EAGLE GOLD PROJECT

Cyanide Management Plan

Version 2019-01

March 2019

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DOCUMENT CONTROL

Submission History

Version Number	Version Date	Document Description and Revisions Made
2014-01	May 2014	Original submission in support of an application to the Yukon Water Board for a Type A Water Use License for the full Construction, Operation and Closure of the Project. Version 2014-01 was also submitted to the Department of Energy, Mines and Resources in support of an application for a Quartz Mining Licence allowing the full Construction, Operation and Closure of the Project.
2019-01	March 2019	Version 2019-01 has been developed to guide operations at the Eagle Gold Mine and is also intended to satisfy Clauses 132 and 133 of the Water Use Licence (WUL; QZ14-041), and Schedule C, Part 2, Clause 1.3 Quartz Mining License (QML-00011) for the Project.

Version 2019-01 of the Cyanide Management Plan (the Plan) for the Eagle Gold Project has been revised in March 2019 to update Version 2014-01 submitted to the Yukon Water Board in May 2014. The table below is intended to identify modifications to the Plan compared to Version 2014-01, being the last iteration provided to all interested parties, and provide the rationale for such modifications.

Version 2019-01 Revisions

Section	Revision/Rationale
Full Document	▪ Sections throughout the entire document have included revisions to reflect the final title of a number of Standard Operating Procedures (SOPs) and other management plans. These revisions have not been provided below on a section by section basis.
1.1 Cyanide Management Plan Description	▪ References to updated International Cyanide Management Code materials ▪ Revisions to text to acknowledge that the SOPs to support the implementation of the Plan have been developed.
1.2 Plan Review, Approval, and Update Requirements	▪ Minor text revisions to acknowledge that the Plan has been updated to reflect he final detailed design of the Project.
2.1 Contractual Requirements and Responsibility Assignments	▪ Inclusion of updated information on sodium cyanide packaging types. ▪ Inclusion of details on supplier selected for provision of cyanide.
2.2 Management of Temporary Supplies from Alternate Producers	▪ Minor text revisions to provide primary supplier information.
3.1 Contractual Requirements and Responsibility Assignments	▪ Inclusion of specific obligations based on contract requirements with selected supplier. ▪ Inclusion of reference to specific emergency response plan utilized by supplier.
3.2 Management of Deliveries from Alternate Transporters	▪ Minor text revisions to provide primary supplier information.

Section	Revision/Rationale
4.1 Cyanide Unloading and Storage	▪ Text revisions based on issued for construction design of cyanide receiving, storage and use areas. ▪ Inclusion of updated figures based on issued for construction design of cyanide receiving, storage and use areas.
4.2 Cyanide Mixing and Solution Storage	▪ Minor text revisions and inclusion of figure based on issued for construction design of cyanide receiving, storage and use areas.
4.3 Prevention of Cyanide Releases and Workforce Exposures	▪ Minor text revisions to improve readability and to acknowledge the status of Project planning and commitments.
5.1.1 Management Plans and Procedures	▪ Minor text revisions to improve readability and to acknowledge the status of Project planning and commitments. ▪ Updated process flowsheet based on issued for construction designs. ▪ Updated facility layout based on issued for construction designs.
5.3.2 Water Balance - General Input Parameters	▪ Minor text revisions to improve readability and to acknowledge the status of Project planning and commitments. ▪ Updated WBM schematic based on issued for construction design.
5.4.1 Preventative Measures for Open Ponds	▪ Inclusion of text to acknowledge SGC commitment to equip the Events Pond with bird deterrents and manage vegetation growth around the facility so it is not an attractant.
5.4.2 Monitoring of Cyanide Concentrations in Open Ponds	▪ Minor text revisions to improve readability. ▪ Inclusion of commitment to increase mitigation measures if necessary.
5.4.4 Leach Solution Application Controls	▪ Minor text revisions to improve readability.
5.5.1 Direct Discharges to Surface Water	▪ Minor text revisions to improve readability. ▪ Reference to specific Project requirement to have cyanide detoxification capability. ▪ Text revisions to specify that the regulatory approvals for the Project have set discharge criteria.
5.5.2 Indirect Discharges to Surface Water	▪ Minor text revisions to state that groundwater monitoring is intended to support the identification or potential seepage issues and the subsequent adaptive management of seepage.
5.5.3 Protection of Beneficial Uses of Surface Water	▪ Clarification that a detoxification circuit is required for the Project based on regulatory approvals and is not just a consideration.
5.7.2 Sizing Considerations for Secondary Containments	▪ Removal of table with conceptual ADR Plant storage tank volumes.
5.7.3 Management of Solution/Contaminated Water in Secondary Containments	▪ Text revisions based on issued for construction design of cyanide receiving, storage and use areas.

Section	Revision/Rationale
5.7.5 Spill Prevention/Containment Measures for Process Solution Pipelines	▪ Minor text revisions to improve readability
5.8.1 Construction QA/QC Program - ADR	▪ Complete revision to include detail on the completed, ongoing or planned QA/QC programs for cyanide related facilities.
5.9.1 Monitoring Program Documentation	▪ Minor text revision to clarify that a detoxification circuit is required for the Project based on regulatory approvals and is not just a consideration.
6.1.1 Decommissioning Plan and Procedures	▪ Minor text revisions to improve readability.
6.1.2 General Schedule or Sequence for Decommissioning of Cyanide Facilities	▪ Minor text revisions to improve readability.
6.1.3 Periodic Review and Update of Decommissioning Plan and Procedures	▪ Update to schedule for periodic review and updated of RCP to align with regulatory approvals.
6.2 Financial Assurance Mechanism for Decommissioning Cyanide Facilities	▪ Minor text revisions to acknowledge Yukon specific requirements. ▪ Text revisions based on issued for construction design of cyanide receiving, storage and use areas.
7 Worker Safety	▪ Minor text revisions throughout based on issued for construction design of cyanide receiving, storage and use areas and to acknowledge the current status of the Project.
7.1.1 Exposure Risk Assessments	▪ Text revision to acknowledge that assessments of exposure risks will be ongoing throughout operations.
8 Emergency Response	▪ Minor text revisions throughout based on issued for construction design of cyanide receiving, storage and use areas and to acknowledge the current status of the Project.
8.1.4 Response Actions	▪ Minor updates to the Emergency Response flowchart.
8.4.1 Procedures and Contacts for Emergency Reporting	▪ Inclusion of reporting requirements mandated by the regulatory approvals for the Project.
8.5.2	▪ Clarification of cyanide destruction reagents. ▪ Minor text revisions to improve readability.

Section	Revision/Rationale
Prohibited Treatment Chemicals for Cyanide Release to Surface Water	
9.3.2 Decontamination and First Aid Training	▪ Clarification that the administration of certain cyanide antidotes requires specific qualifications.
10.1 Stakeholder Outreach and Opportunities for Communication	▪ Minor text revisions to improve readability.
Appendices	▪ Inclusion of referenced SOPs. ▪ Inclusion of certain management plans that involve cyanide facilities.

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LIST OF ACRONYMS

ADR	Adsorption, Desorption, and Recovery
API	American Petroleum Institute
CMP	Cyanide Management Plan
CQA	Construction Quality Assurance
CWP	Construction Work Plan
EHS	Environment, Health, and Safety
ERT	Emergency Response Team
FNNND	First Nation of Na-Cho Nyäk Dun
FTB	Film Tearing Bond
HCN	Hydrogen Cyanide
HDPE	High-density polyethylene
HLF	Heap Leach Facility
IBC	Intermediate Bulk Containers
ICMC	International Cyanide Management Code
ICMI	International Cyanide Management Institute
IFC	International Finance Corporation
ITP	Inspection Test Plan
LLDPE	Linear low-density polyethylene
MEDEVAC	MEDical EVACuation
MSDS	Material Safety Data Sheet
NFS	Non-Frost Susceptible
OFA	Occupational First Aid
PM	Preventive Maintenance
PPE	Personal Protective Equipment
RCMP	Royal Canadian Mounted Police
RFI	Request for Information
SCBA	Self-Contained Breathing Apparatus
SGC	StrataGold Corporation
SOP	Standard Operating Procedure
QA/QC	Quality Assurance/Quality Control
VDR	Vendor Data Requirement
WAD	Weak Acid Dissociable
WHMIS	Workplace Hazardous Materials Information System
WPS	Welding Procedure Specification
YWCHSB	Yukon Workers' Compensation Health and Safety Board

1 INTRODUCTION

1.1 CYANIDE MANAGEMENT PLAN DESCRIPTION

This *Cyanide Management Plan* (CMP) describes the practices and procedures that StrataGold Corporation (SGC) will apply to the procurement, delivery, storage handling, and use of sodium cyanide (cyanide) reagent for mineral extraction purposes at the Eagle Gold Project (the Project), Yukon Territory, Canada. It is designed to address the requirements of the *International Cyanide Management Code* (ICMI, 2016) and is structured to correspond closely to the interpretative guidance provided by *International Cyanide Management Institute - Gold Mining Operations Verification Protocol* (ICMI, 2018). The ICMC has been widely and successfully applied in international gold mining projects, and is recognized by the World Bank/International Finance Corporation (IFC) and World Gold Council as a best practice in management of all mining operations with cyanide-based mineral extraction processes.

The CMP presents a complete management structure for prevention or mitigation of environmental and social impacts associated with the use of cyanide. It is supported by a suite of complementary management plans and Standard Operating Procedures (SOPs) that have been developed prior to the transport of cyanide to the mine site and will be implemented during commissioning and operation of the Project.

1.2 PLAN REVIEW, APPROVAL, AND UPDATE REQUIREMENTS

The CMP is one of the Project's primary environmental, health, and safety (EHS) management plans. The CMP has been updated to reflect the final detailed design of the Project, and will be kept current with any cyanide facility or process changes that may occur over the life of the mine. All versions to the CMP and the supporting management plans and SOPs cited herein will be reviewed and approved by SGC management, and formally controlled in accordance with SGC-CMP-SOP-001, "*Preparation, Review, Approval, Update, and Controlled Distribution of Eagle Gold Project Management Plans and Standard Operating Procedures*".

2 CYANIDE PROCUREMENT

2.1 CONTRACTUAL REQUIREMENTS AND RESPONSIBILITY ASSIGNMENTS

SGC will purchase cyanide in solid briquette form, to be delivered in 1 tonne nylon "supersacks", overpacked in polyethylene-lined plywood pallet crates (known as Intermediate Bulk Containers or IBCs) or alternate packaging as/if deemed appropriate provided it meets the standards set out in the ICMC and transported to the Project site in standard steel intermodal containers. SGC has established a long-term supply contract with Cyanco Canada Inc. (Cyanco), an experienced, ICMC-certified, North American supplier. Cyanide supplied to the Project will be manufactured at Cyanco's ICMC certified plant at Alvin Texas.

SGC has established contractual conditions under which Cyanco assumes responsibility for management of the entire supply chain pursuant to the requirements of the ICMC (see Section 3). Copies of all contracts or ordering agreements, amendments, and purchase orders will be retained in accordance with SGC-CMP-SOP-003, "*Records Management*".

2.2 MANAGEMENT OF TEMPORARY SUPPLIES FROM ALTERNATE PRODUCERS

SGC has established a long-term supply chain contract with Cyanco, an ICMC-certified producer. However, in the event that Cyanco's supply is interrupted, SGC may be required to temporarily purchase cyanide (in the same delivery form noted in Section 2.1) from alternate sources and supply chains. In such cases, SGC will make a good-faith effort to preferentially purchase cyanide from sources offering an ICMC-certified supply chain. Purchases of cyanide from partially certified supply chains or non-certified sources will be permitted only if all other viable ICMC-certified cyanide supply chains and sources are exhausted. In all cases, the ICMC-certified supply chain will be reinstated as soon as circumstances permit. Correspondence documenting the effort to locate alternate supply chains and/or to reinstate fully certified supply chains will be retained in the Project records in accordance with SGC-CMP-SOP-003, "*Records Management*".

3 CYANIDE TRANSPORTATION

3.1 CONTRACTUAL REQUIREMENTS AND RESPONSIBILITY ASSIGNMENTS

As noted in Section 2.1, SGC has established contractual conditions with Cyanco under which Cyanco assumes responsibility for management of the entire supply and delivery chain, pursuant to the requirements of the ICMC. The contractual terms and conditions with Cyanco are in accordance with Incoterms specifications for Delivered At Place (DAP). DAP specifies that Cyanco will bear all risks involved in bringing cyanide to the Project site and are thus responsible for all aspects of transportation.

Transportation to the Project by Cyanco will be supported by Cyanco's Global Transportation Emergency Response Plan (GTERP), which includes as annex the Emergency Response Assistance Plan for Canada.

The GTERP, a confidential document that is licensed for use and reproduction only by Cyanco, and other Cyanco policies and procedures addresses:

- Packaging and product labeling as required by the United Nations for international shipments;
- Storage prior to shipment;
- Evaluation and selection of optimal delivery routes, including all necessary community relations contacts and interactions with responsible emergency response authorities;
- Transport from the production facility in Alvin Texas to the Project site, using optimal delivery routes, global positioning system (GPS) tracking, and lead pilot vehicles on shipments between Mayo and the mine site;
- Interim unloading, storage, loading, and security in transit;
- Safety and maintenance of the means of transportation;
- Safety and operational/task training for all transportation personnel, throughout transport;
- Emergency response throughout transport; and
- Contractor training.

SGC will be responsible for unloading intermodal containers of cyanide upon receipt, and will take formal ownership of the product at that point.

3.2 MANAGEMENT OF DELIVERIES FROM ALTERNATE TRANSPORTERS

See Section 2.2; SGC has established a long-term supply chain contract with Cyanco, an ICMC-certified producer, who is responsible for all aspects of transportation of cyanide to the Project site. In the event that the primary ICMC-certified supply chain is temporarily interrupted, SGC will make a good-faith effort to preferentially purchase cyanide from sources offering a fully ICMC-certified supply chain as near as possible to the Project site. Purchases of cyanide from sources with partially certified or non-certified supply chains will be considered only if all other viable sources of ICMC-certified cyanide and cyanide transport are exhausted. In all cases, ICMC certification status notwithstanding, transporters will be certified for transportation of hazardous materials under applicable governmental regulations. The ICMC-certified supply chain must also be reinstated as soon as circumstances permit. Correspondence documenting the effort to locate alternate transporters and/or resume the use of fully certified transporters will be retained in the Project records in accordance with SGC-CMP-SOP-003, "*Records Management*".

4 CYANIDE RECEIPT, HANDLING, AND STORAGE

4.1 CYANIDE UNLOADING AND STORAGE

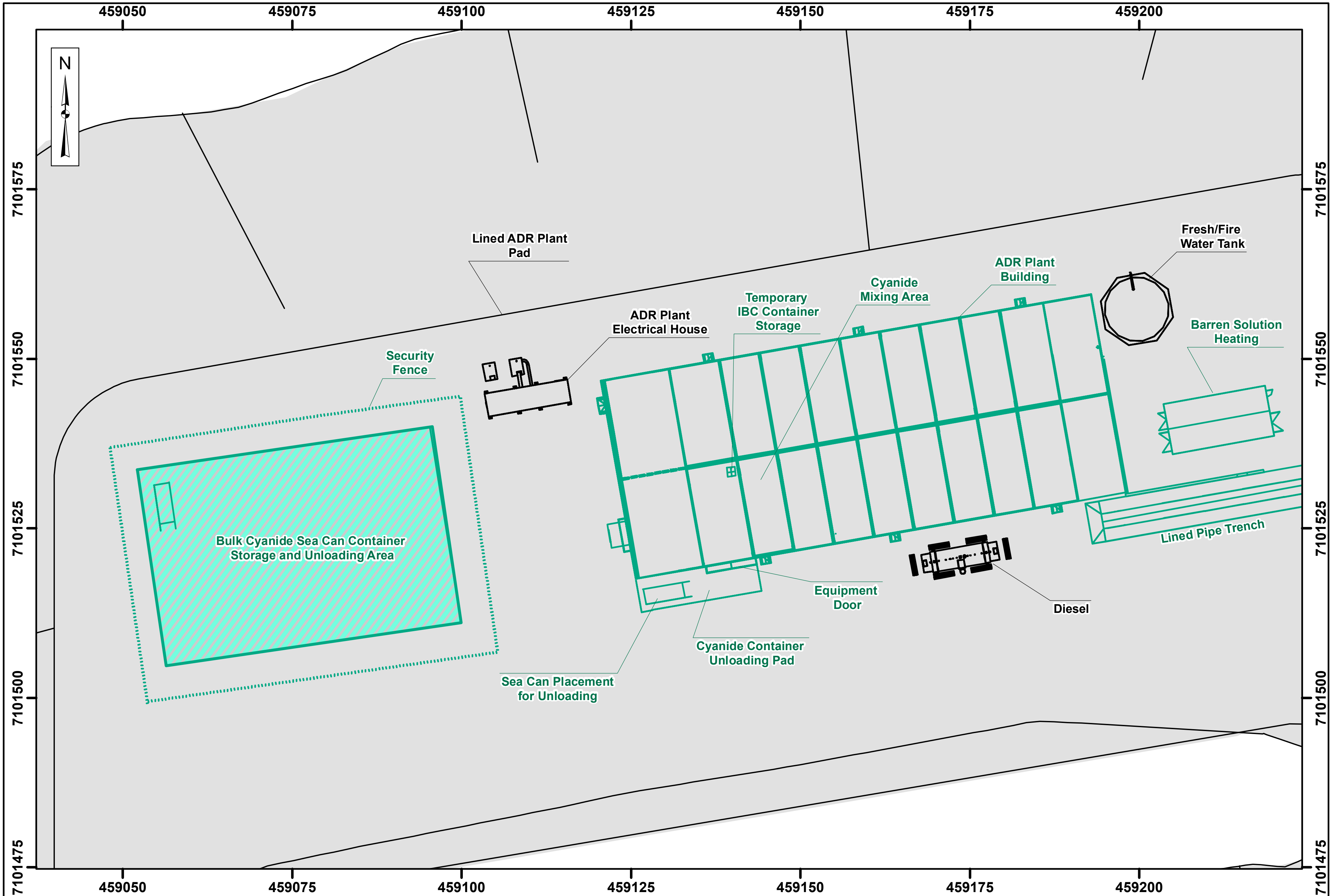
Cyanide will be received at a designated unloading and storage area adjacent to the Adsorption, Desorption, and Recovery (ADR) plant building. The designated unloading and storage area and the ADR plant are well away from the location of the Project camp (Figure 4.1-1) .

The delivery area will be cordoned with warning signs and visual barriers to prevent unauthorised passage of personnel and equipment while the cyanide intermodal containers are being offloaded.

The ADR plant includes an external pad for the storage of a single intermodal container that represents the unloading point of IBCs destined for use in the ADR plant. The external storage pad is a bermed concrete pad permitting dry retrieval of any potential spillage of cyanide briquettes (Figure 4.1-2).

The ADR Plant includes a dedicated internal storage area for IBCs. As required, IBCs will be removed from the intermodal storage container on the external pad and stored at the dedicated internal storage area in preparation for use. The internal IBC storage area will be provided with appropriate warning signage at all entry doors, along with an audible and visual hydrogen cyanide (HCN) alarm and monitoring systems that can be observed from the ADR plant operations control station (Figure 4.1-2). Fire extinguishing equipment for cyanide storage areas will comply with SGC- CMP-SOP-009, "*Fire Prevention/Protection Program*" requirements.

Overall procedural controls for cyanide unloading and storage operations will be defined in SGC-CMP-SOP-004, "*Receipt and Storage of Reagent Cyanide*".



Legend:

Dry Cyanide Storage

ADR Plant Pad

Cyanide Facility

Facility

Fenced Area

StrataGold Corporation

0 5 10 20

Metres

Projection: NAD 83 UTM Zone 8N

Drawn By: JK

Date: 2019/03/04

Figure: 4.1-1

EAGLE GOLD PROJECT
YUKON TERRITORY

Cyanide Intermodal Container Receiving and Storage Area

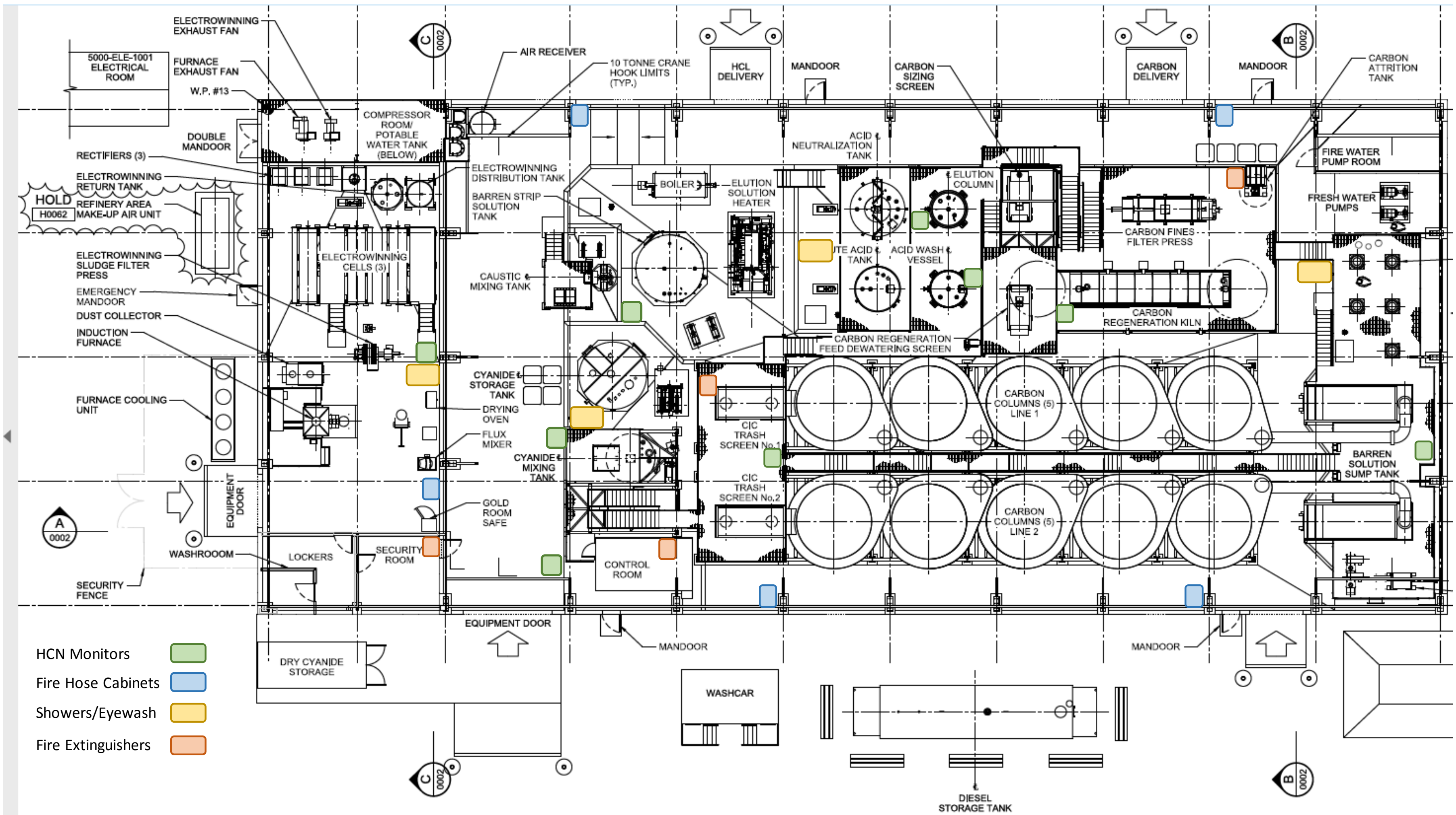


Figure 4.1-2: Location of ADR/Cyanide Storage, Mixing Areas and Safety Equipment

4.2 CYANIDE MIXING AND SOLUTION STORAGE

SGC will conduct bag cutting, cyanide mixing, and high-strength solution storage operations in strict accordance with SGC-CMP-SOP-005, "*Cyanide Mixing Process*". The cyanide mixing and storage tanks will be located in the ADR building. The cyanide mix plant area will be well ventilated to minimize the potential for build-up of HCN vapours.

The ADR building contains appropriate crane facilities for lifting and positioning reagent supersacks over the mixing tank. The mixing tank will be fitted with a hopper and integral bag cutter and bag rinse arrangement. The mixing deck will be fitted with an audible and visual hydrogen cyanide (HCN) alarm, a stationary HCN monitor set to alarm at 4.7 ppm, and a video monitoring system, all of which can be accessed/observed from the ADR plant operations control station. Mixing operations will be conducted by a two-man team with personal HCN monitors and appropriate personal protective equipment (PPE) in accordance with SGC-CMP-SOP-008, "*Personal Protective Equipment for Cyanide Facility Operations*". The mixing and storage tank will be maintained at a pH of 12 or greater as a precaution against the generation of HCN. Both the mixing and storage tanks will be fitted with hard-plumbed overflows (with solution collection and return pumps) and remotely-monitored tank level indicators.

Concrete impoundments for the mixing and storage tanks will be sealed, physically isolated from acids or other incompatible materials, and sized to contain at least 110% of the largest contained tank, plus flowback, giving due consideration to the potential reduction of containment volume from pumps or other equipment installed within the containment. The configuration of the concrete impoundments in the ADR plant is shown in Figure 4.2-1.

Mixing and storage tanks will also be subject to baseline and periodic ultrasonic testing under the Project's Preventive Maintenance (PM) program (see Section 5.1.3) for monitoring of corrosion effects on wall thickness, in accordance with American Petroleum Institute (API) Standard 653, *Tank Inspection, Repair, Alteration and Reconstruction* (API, 2008) or an equivalent standard. Testing records, construction quality assurance/quality control (QA/QC) and secondary containment volumes calculation records will be maintained in accordance with SGC-CMP-SOP-003, "*Records Management*".

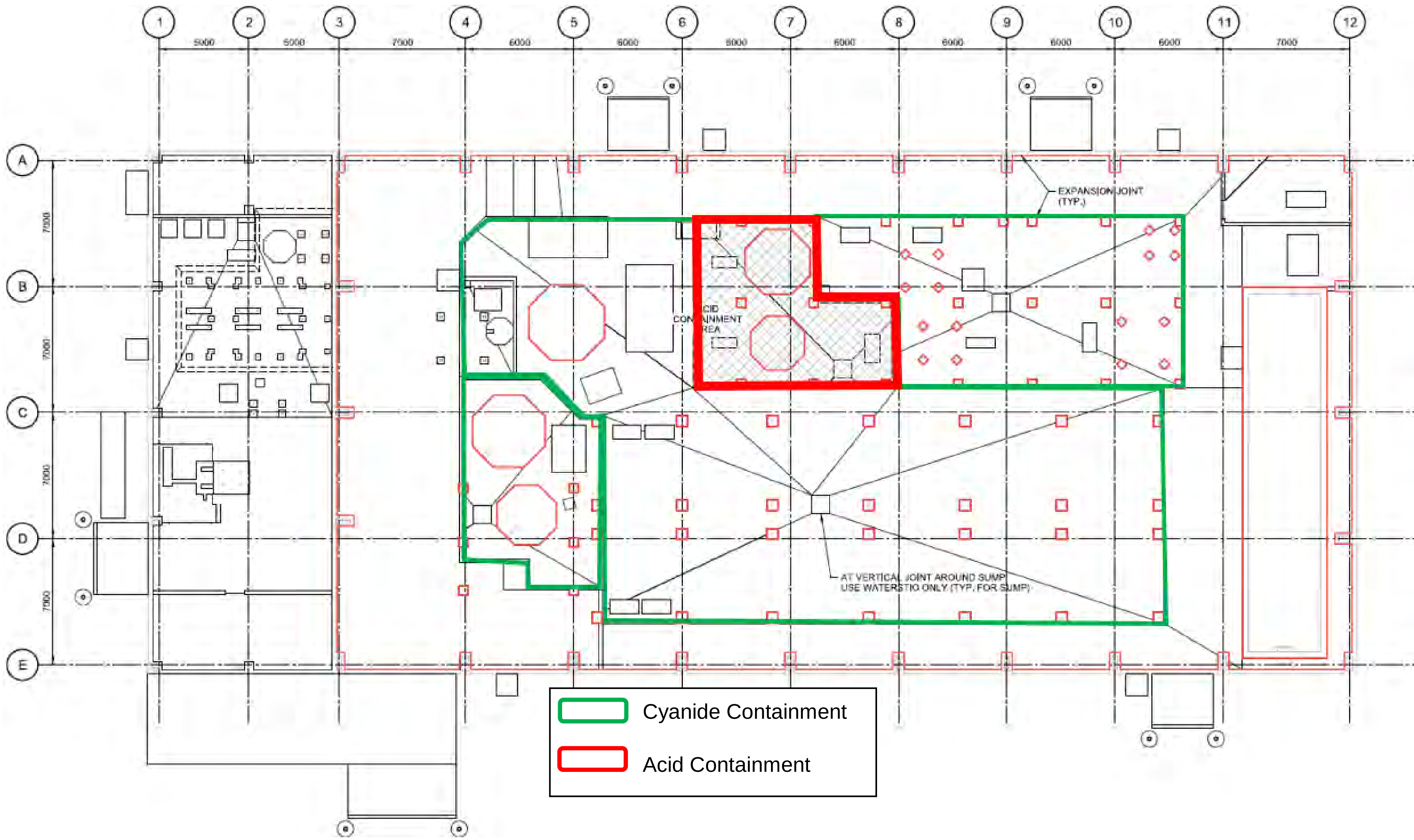


Figure 4.2-1: Cyanide Storage and Mixing Area Containment

4.3 PREVENTION OF CYANIDE RELEASES AND WORKFORCE EXPOSURES

SGC will implement several SOPs to prevent cyanide releases and/or workforce exposures during the unloading, storage, and mixing of cyanide. SGC-CMP-SOP-004, "*Receipt and Storage of Reagent Cyanide*" addresses care in the use of unloading equipment in cyanide unloading and staging operations, and limits the stacking of the IBC (approximately one metre cube) plywood cyanide crates in the dedicated cyanide storage area in the ADR building to 3 high.

As noted in SGC-CMP-SOP-005, "*Cyanide Mixing Process*", the mixing deck area will be ventilated and instrumented to detect any potential generation of HCN gas. After completion of bag cutting and emptying, the empty supersack will be triple-rinsed using a water spray arrangement integrated with the bag cutter, with all rinseate reporting directly to the mix tank. Empty rinsed bags and all associated overpacking materials (i.e., plywood crates, polyethylene liners, and strapping materials) will be collected and transported to a securely fenced incinerator and disposed of in accordance with SGC-CMP-SOP-006, "*Controlled Disposal of Cyanide Packaging Materials*". Recycling or re-use of any cyanide packaging materials for any other purpose is strictly prohibited.

5 OPERATIONAL PROCESS CONTROLS

5.1 OPERATING PLANS AND PROCEDURES

5.1.1 Management Plans and Procedures

SGC has establish and will continue to maintain and update as necessary a suite of management plans and supporting SOPs for the safe and responsible operation of all cyanide management facilities at the Project. These cyanide management facilities are defined as:

- the (solid) cyanide reagent unloading and storage area in the ADR building;
- the cyanide mixing and storage tank area, also located in the ADR building;
- the incinerator used for disposal of rinsed supersacks, plywood overpacks, and other cyanide packaging wastes;
- the rest of the ADR building, less the gold room, including the elution column, carbon adsorption tank trains, strip/wash area, carbon screens, and associated piping system components;
- the barren solution tank on the south side of the ADR building;
- pregnant and barren solution pipelines to and from the heap leach facility (HLF);
- the HLF;
- the Event Pond; and
- all other project areas, pipelines, or infrastructure containing Weak Acid Dissociable (WAD) cyanide solution potentially $\geq$ 0.5 mg/l.

The process relationships between and among major cyanide facilities are represented schematically in the flowsheet included as Figure 5.1-1; facility locations are shown in the general site layout drawing provided as Figure 5.1-2. The primary management/operational plans and/or SOPs associated with cyanide facility operations are listed in Table 5.1-1.

Table 5.1-1: Primary Cyanide Facility Management Plans/SOPs

Facilities	Management Plan/SOP Title and/or Designator
Cyanide unloading bay and dry storage area (ADR building)	• SGC- CMP-SOP-004, "*Receipt and Storage of Reagent Cyanide*" • SGC-CMP-SOP-007, "*Cyanide Facility Inspections*" • SGC-CMP-SOP-008, "*Personal Protective Equipment for Cyanide Facility Operations*" • SGC-CMP-SOP-009, "*Fire Prevention/Protection Program*" • *ADR Plant Maintenance Plan* • *Spill Response Plan* • *HLF Emergency Response Plan*

Facilities	Management Plan/SOP Title and/or Designator
Cyanide mixing and storage tanks and secondary containment	• SGC-CMP-SOP-005, "*Cyanide Mixing Process*" • SGC-CMP-SOP-007, "*Cyanide Facility Inspections*" • SGC-CMP-SOP-008, "*Personal Protective Equipment for Cyanide Facility Operations*" • SGC-CMP-SOP-009, "*Fire Prevention/Protection Program*" • *ADR Plant Maintenance Plan* • *Spill Response Plan* • *HLF Emergency Response Plan*
Incinerator for cyanide packaging materials	• SGC-CMP-SOP-006, "*Controlled Disposal of Cyanide Packaging Materials*" • SGC-CMP-SOP-007, "*Cyanide Facility Inspections*" • SGC-CMP-SOP-008, "*Personal Protective Equipment for Cyanide Facility Operations*" • SGC- CMP-SOP-009, "*Fire Prevention/Protection Program*" • *ADR Plant Maintenance Plan*
Other ADR plant areas and secondary containments, less the gold room but including the barren solution tank	• SGC-CMP-SOP-007, "*Cyanide Facility Inspections*" • SGC-CMP-SOP-008, "*Personal Protective Equipment for Cyanide Facility Operations*" • SGC-CMP-SOP-009, "*Fire Prevention/Protection Program*" • SGC- CMP-SOP-010, "*Backup Generator Operations and Maintenance*" • *ADR Plant Operations Plan* • *ADR Plant Maintenance Plan* • *Spill Response Plan* • *HLF Emergency Response Plan*
Pregnant and barren solution pipelines, containment trenches, and pumping stations/containments	• SGC-CMP-SOP-007, "*Cyanide Facility Inspections*" • SGC- CMP-SOP-010, "*Backup Generator Operations and Maintenance*" • *Heap Leach and Process Facilities Management Plan* • *HLF Operations, Maintenance and Surveillance Manual* • *ADR Plant Maintenance Plan* • *Spill Response Plan* • *HLF Emergency Response Plan*

Facilities	Management Plan/SOP Title and/or Designator
HLF earthworks, risers, distribution lines, emitters, internal pond(s), and leak detection system	• SGC-CMP-SOP-007, "*Cyanide Facility Inspections*" • SGC- CMP-SOP-010, "*Backup Generator Operations and Maintenance*" • SGC-CMP-SOP-011, "*Wildlife Mortality Reporting/ Investigation*" • *Heap Leach and Process Facilities Management Plan* • *ADR Plant Maintenance Plan* • *Spill Response Plan* • *HLF Emergency Response Plan* • *HLF Operations, Maintenance and Surveillance Manual* • *HLF Contingency Water Management Plan* • *Operations Water Management Plan*
External solution and Events Pond and leak detection systems	• SGC-CMP-SOP-007, "*Cyanide Facility Inspections*" • SGC-CMP-SOP-011, "*Wildlife Mortality Reporting/ Investigation*" • *Heap Leach and Process Facilities Management Plan* • *ADR Plant Maintenance Plan* • *Spill Response Plan* • *HLF Emergency Response Plan* • *HLF Operations, Maintenance and Surveillance Manual* • *HLF Contingency Water Management Plan* • *Operations Water Balance Plan*
Surface water interceptor ditches	• SGC-CMP-SOP-007, "*Cyanide Facility Inspections*" • *HLF Operations, Maintenance and Surveillance Manual* • *HLF Contingency Water Management Plan*

In addition, all cyanide facilities are subject to routine maintenance as described in Section 5.1.3 and the *Preventive Maintenance Program Plan*.

All of the management plans and SOPs noted in Table 5.1-1 and discussed elsewhere in this CMP are considered to be controlled documents, and will be subject to the requirements of SOP SGC-CMP-SOP-001, "*Preparation, Review, Approval, Update, and Controlled Distribution of Eagle Gold Project Management Plans and Standard Operating Procedures*". Training in cyanide receipt, storage, transport, use and health and safety precautions and SOP requirements will be provided to all affected workers in accordance with Section 9 of this CMP and the requirements of SGC-CMP-SOP-002, "*Training Program*". Training records will be retained on file in compliance SGC-CMP-SOP-002 and SGC-CMP-SOP-003, "*Records Management*".

5.1.2 Documentation of Design Assumptions and Parameters in Operating Plans and Procedures

The *Heap Leach and Process Facilities Plan, the Heap Leach Facility Contingency Water Management Plan, and the Water Management Plan* (which includes discussion of both the HLF Water Balance Model and the Site-wide Water Balance Model*)* document the key assumptions and design parameters for the HLF and its supporting infrastructure, giving due consideration to applicable regulatory requirements and maximum precipitation events. At a minimum, these parameters will include:

- the required minimum freeboard for the Events Pond (although the normal operating practice at the pond will be to keep it empty), defines the maximum pond level that will be permitted before it must be reduced in accordance with the *Heap Leach Facility Contingency Water Management Plan*;
- definition of the characteristics of the assumed storm events considered in the design and operation of the Events Pond;
- the target concentrations of residual WAD cyanide in any potential controlled release from the Events Pond to the cyanide detoxification/water treatment plant and/or from the water treatment plant to Haggart Creek (see Section 5.5.1 and Section 5.5.2).

5.1.3 Preventive Maintenance System and Interface with Facility Inspection Plans/Procedures

SGC will establish and maintain a comprehensive maintenance program as described in the *ADR Plant Maintenance Plan*. The maintenance system will be capable of:

- identifying routine maintenance inspection actions to be conducted by maintenance staff, for all cyanide facilities and equipment items (e.g., tank level indicators, pumps, inline cyanide analyzers, HCN and pH monitors and alarm systems, emergency eyewash/shower installations, controlled temperature cabinets for cyanide antidote kits);
- generating work orders for all required actions; and
- tracking work order completion.

The maintenance program has been designed to ensure that cyanide facility-related actions receive the highest priority over all other maintenance actions, and will also be capable of initiating work orders based on observations resulting from daily operator inspections and routine environmental, health, and safety (EHS) inspections, as noted in SGC-CMP-SOP-007, "*Cyanide Facility Inspections*" and SGC-CMP-SOP-010, "*Backup Generator Operations and Maintenance*".

The maintenance program will maintain a revision history of all routine maintenance inspection actions, as well as records of all completed work orders for at least four years, as noted in SGC-CMP-SOP-003, "*Records Management*".

5.1.4 Management of Facility Changes

All proposed changes or modifications to any aspect of Project cyanide management facilities or processes will be reviewed for their potential impact on the environment, occupational or public health and safety considerations, and the requirements of this CMP, in accordance with SGC-CMP-SOP-012, "*Cyanide Facility Change Management Process*". Any identified impacts will be mitigated by appropriate modifications, additions, or improvements of the management practices defined by this CMP. Changes to the CMP and its supporting documents will be controlled in accordance with SGC-CMP-SOP-001, "*Preparation, Review, Approval, Update, and Controlled Distribution of Management Plans and Standard Operating Procedures*". Documented process changes or additions will be introduced to affected members of the workforce in accordance with SGC-CMP-SOP-002, "*Training Program*". See also Section 7.1.3.

5.1.5 Contingency Plans/Procedures

The *Heap Leach and Process Facilities Plan, the Heap Leach Facility Operations, Maintenance and Surveillance Manual* and the *Heap Leach Facility Contingency Water Management Plan*include guidance on measures to be taken to stabilize the operation of the ADR and HLF (and the management of solution volumes entrained in the heap) in the event an upset in the water balance is observed, or if mining/leaching operations must be temporarily suspended for economic or operational reasons. Contingency actions required to address specific predictable non-conformances in HLF or ADR facility operations shall be as specified in the *Heap Leach Facility Contingency Water Management Plan* and the *ADR Plant Operations Plan*, respectively. Contingency actions required to address unanticipated types of non-conformances that may be observed in facility monitoring or inspection activities shall be developed and implemented on a case by case basis in accordance with CMP-SOP-024, "*Incident Investigation and Reporting*"; SGC-CMP-SOP-016, "*Assessment and Mitigation of Workplace Cyanide Exposure Risks*"; and/or SGC-CMP-SOP-012, "*Cyanide Facility Change Management Process*", as appropriate for the circumstances.

5.1.6 Facility Inspection Schedule

As noted in SGC-CMP-SOP-007, "*Cyanide Facility Inspections*", all cyanide facilities are subject to routine inspections, the results of which are reviewed by EHS staff on at least a weekly basis.

5.1.7 Facility Inspection Requirements

SGC-CMP-SOP-007, "*Cyanide Facility Inspections*" defines routine inspection requirements for the Project; the general focus areas for these inspections are summarized in Table 5.1-2.

Table 5.1-2: Routine Cyanide Facility Inspection Focus Areas

Facilities	Inspection Focus Area
Cyanide unloading and storage area	• maintenance of general housekeeping practices, presence of water or debris • proper segregated storage of incompatible materials • integrity and proper positioning and stacking of stored intermodal containers and IBCs • presence of properly rated fire extinguishers • functionality of fixed HCN alarms and video monitors • legibility of hazard warning signage • availability of Material Safety Data Sheets (MSDSs) for cyanide briquettes • cordoning of container unloading area during unloading operations, and restriction of access by unauthorized personnel • use of appropriate operator PPE during unloading operations • functionality of eyewashes/emergency showers and water supply line pressure • condition of emergency response equipment and first aid storage cabinets

Facilities	Inspection Focus Area
Cyanide bag cutter arrangement, mixing and storage tanks, and secondary containments	• structural integrity, signs of corrosion, buildup of cyanide salts, or leakage (tanks, valves, pumps, and other piping system components) • structural integrity, cracks, spalling, or deterioration of concrete impoundments • functionality of fixed HCN alarms and video monitors • functionality of tank level indicators • condition of chain hoist and bag lifting bridle • functionality of eyewashes/emergency showers and water supply line pressure • temperature, cleanliness, and condition of cyanide antidote kits and first aid storage cabinets • condition of emergency response equipment and PPE • use of appropriate operator PPE during mixing operations • legibility of hazard warning and direction flow signage • integrity of lockout/tag-out mechanisms on major solution or containment drain valves • maintenance of physical separation from chemically incompatible materials • maintenance of general housekeeping practices, presence of spilled solution or debris
Incineration of cyanide packaging materials	• legibility of hazard warning signage • adequacy and integrity of security fencing, gate, and lock • completeness of combustion of packaging residues • control of windblown debris outside of fenced area • evidence of animal intrusion

Facilities	Inspection Focus Area
ADR plant and secondary containments	• structural integrity, signs of corrosion, buildup of cyanide salts, or leakage involving process solution storage tanks, valves, pumps, and other piping system components • structural integrity, cracks, spalling, or deterioration of concrete impoundments • management of fluids in impoundments • functionality of fixed HCN alarms and video monitors • functionality of tank level indicators • functionality of eyewashes/emergency showers and water supply line pressure • temperature and condition of cyanide antidote kits • condition of emergency response equipment and PPE • legibility of hazard warning and direction flow signage • integrity of lockout/tag-out mechanisms on major solution or containment drain valves • maintenance of physical separation from chemically incompatible materials • maintenance of good general housekeeping practices, including routine cleanup of spilled or leaked solution or debris
Pregnant and barren solution pipelines and pumping stations/ containments	• structural integrity, signs of corrosion, buildup of cyanide salts, or leakage (pipelines, valves, pumps, and other components) • structural integrity, cracks, spalling, or deterioration of concrete impoundments • functionality of eyewashes/emergency showers • temperature and condition of cyanide antidote kits • condition of emergency response equipment and PPE • legibility of hazard warning and direction flow signage • integrity of lockout/tag-out mechanisms on major solution or containment drain valves
HLF earthworks, risers, distribution lines, emitters, internal pond(s), and leak detection system	• signs of erosion, slumps, or cracks in earthworks or the ore pile • signs of pipeline/flange leakage, and associated ponding • signs of ponding on HLF surface; if present, adequacy of screening or other appropriate avian exclusion devices • signs of animal trails or intrusion • management of fluids in impoundments • functionality of leak detection system and maintenance of associated detection logs • legibility of hazard warning and direction flow signage
External Events Pond and leak detection systems	• adequacy of available freeboard (comparison to surveyed markers)

Facilities	Inspection Focus Area
	• tears or holes in liner material or signs of erosion or slumps in underlying earthworks • signs of pipeline/flange leakage, and associated ponding • adequacy of wildlife fencing and avian exclusion devices • signs of animal trails or intrusion • functionality of leak detection system and maintenance of associated detection logs • legibility of hazard warning and direction flow signage
Surface water interceptor ditches	• tears or holes in liner material (if lined) or signs of erosion, slumps, or cracks in earthworks • signs of animal trails or intrusion • signs of blockage or other surface runoff impediments

5.1.8 Management of Inspection Records

Records from all cyanide facility inspections conducted by operators and EHS personnel will identify the inspector, indicate the date of inspection, and will note the work order number(s) associated with any required corrective or preventive action, as noted in SOP-007, "*Cyanide Facility Inspections*". All inspection records will be retained for at least 4 years, in accordance with SGC-CMP-SOP-003, "*Records Management*".

5.1.9 Preventative Maintenance Programs

SGC will establish and maintain a maintenance program for all major equipment items and systems as described in *ADR Plant Maintenance Plan* and the *Heap Leach Facility Operations, Maintenance and Surveillance Manual*. The maintenance program will be capable of:

- identifying routine preventative maintenance inspection actions, to be conducted by maintenance staff, for all cyanide facilities and equipment items;
- generating work orders for all required actions; and
- tracking work order completion.

The maintenance program will be designed to ensure that cyanide facility-related actions receive the highest priority over all other categories of maintenance actions, and will also be capable of initiating work orders based on observations resulting from daily operator inspections as well as routine EHS inspections, as noted in SGC-CMP-SOP-007, "*Cyanide Facility Inspections*" and SGC-CMP-SOP-010, "*Backup Generator Operations and Maintenance*".

5.1.10 Critical Power

SGC will maintain onsite diesel generation capacity sufficient to maintain the HLF solution pumping system, Events Pond operations, and key aspects of ADR and emergency services operations in the event of temporary loss of grid power, in accordance with the contingency requirements of the *Heap Leach and Process Facilities Plan* and the *Contingency Water Management Plan*. Generator sets and starting battery systems will be subject to routine preventative maintenance in accordance with the SGC-CMP-SOP-010, "*Backup Generator Operations and Maintenance*".

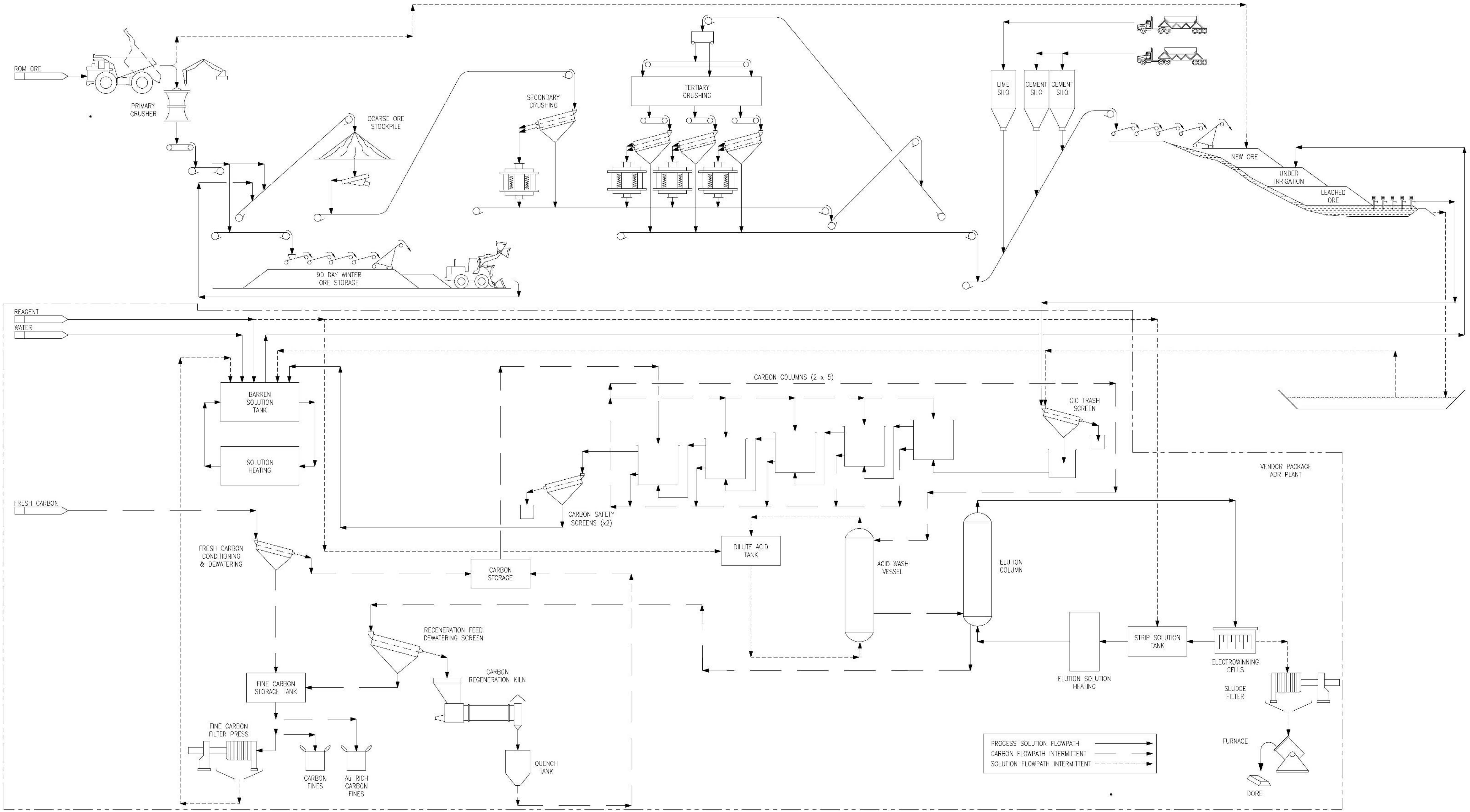
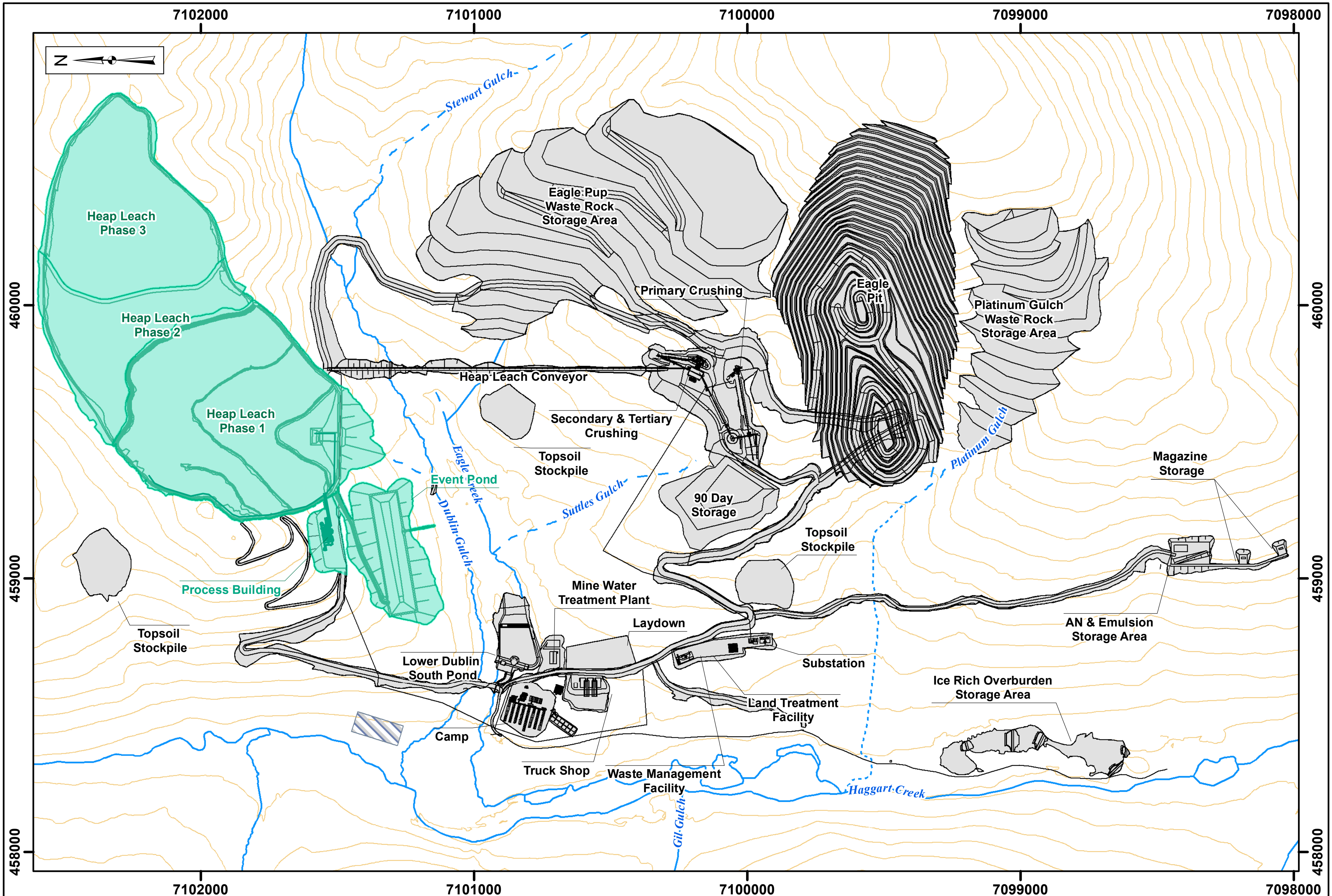


Figure 5.1-1: Mineral Extraction Process Flowsheet



Legend:

Cyanide Facilities | Other Facilities | Perennial | Intermittent

Cyanide Facility | Reserved Area | Ephemeral | Contour (25m)

StrataGold Corporation

0 125 250 500
Metres

Projection: NAD 83 UTM Zone 8N

Drawn By: JK

Date: 2019/03/04

Figure: 5.1-2

EAGLE GOLD PROJECT
YUKON TERRITORY

Cyanide Facilities Location

5.2 OPTIMIZATION OF CYANIDE USAGE

The corresponding section of the ICMC [Standard of Practice 4.2; see (ICMI, 2018)] applies specifically to cyanidation associated with milling operations and hence is not applicable to the Project, which is a heap leach operation and does not generate tailings.

5.3 WATER BALANCE MANAGEMENT

5.3.1 Probabilistic Water Balance Description

The Project will establish and maintain a comprehensive operational water balance model which is depicted graphically in Figure 5.3-1.

5.3.2 Water Balance – General Input Parameters

The operational water balance model will include an operational heap leach water balance model. The *Eagle Project Heap Leach and Process Facilities Plan, the Operations Water Management Plan,* the *Heap Leach Facility Operations, Maintenance and Surveillance Manual*, and the *Heap Leach Facility Contingency Water Management Plan* will specifically consider the following input data:

- the predicted range of rates at which pregnant solution will be applied to the active leach areas of the HLF;
- design storm volumes and storm return intervals to provide assurance of preventing overtopping of the in-heap pond and the Events Pond, over the operational life of the mine;
- the hydrometeorological data relative to actual site conditions, collected onsite;
- the amount of water entering the Events Pond from direct precipitation;
- effects of freezing and thawing conditions on the accumulation of precipitation within the HLF and Events Pond, as well as the watershed upgradient of the HLF;
- the effects of potential power outages or pump station failures on HLF draindown; and
- the capacity and on-line availability of necessary water treatment systems that may be required prior to any emergency discharges of accumulated emergency pond water to surface water.

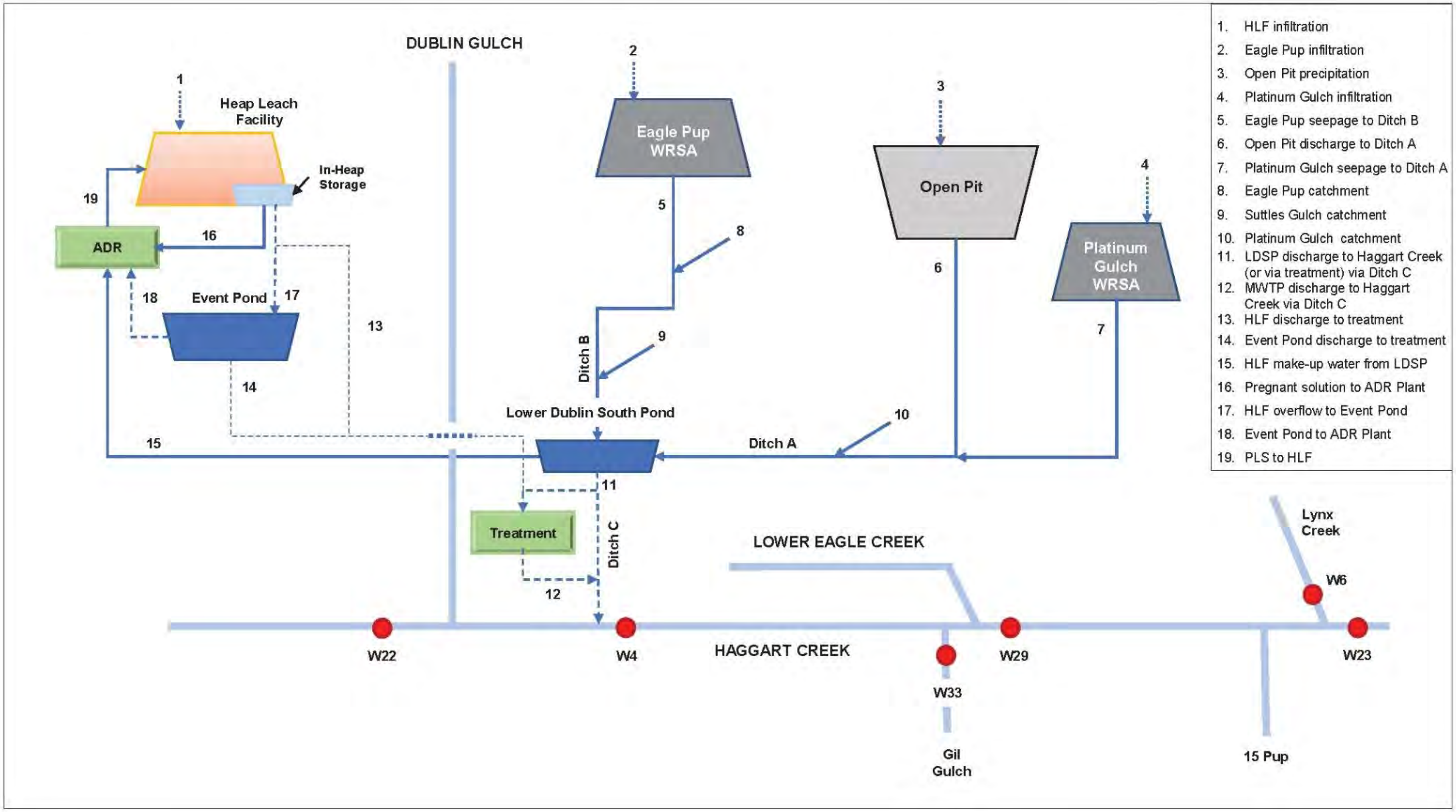


Figure 5.3-1: Site Water Balance Model

5.3.3 Water Balance – Inspection and Monitoring Data Input

As previously noted, SGC-CMP-SOP-007, "*Cyanide Facility Inspections*" will include monitoring of the in-heap pond solution level; the level of the Events Pond and available freeboard; daily monitoring of precipitation levels at meteorological stations; and the periodic inspection of upgradient water interceptor ditches for their effectiveness in preventing uncontrolled run-on to the HLF. These data will be considered in the annual heap leach water balance model described in the *Heap Leach and Process Facilities Plan* and the *HLF Contingency Water Management Plan.*

5.3.4 Freeboard Considerations – Events Pond

Freeboard requirements for the event pond will be as defined in the *Heap Leach Facility Contingency Water Management Plan* the level of the Events Pond and available freeboard will be monitored on a daily basis as noted in SGC-CMP-SOP-007, "*Cyanide Facility Inspections*".

5.3.5 Meteorological Facilities/Precipitation Measurement

Precipitation, wind speed, wind direction, and other data will continue to be collected onsite as described in the *Environmental Monitoring, Surveillance and Adaptive Management Plan*. Monthly summaries of required data will be accessed as necessary to support refinements or updates to the operational site wide and HLF water balance models, and will be retained as project records over the life of the mine in accordance with SGC-CMP-SOP-003, "*Records Management*".

5.4 WILDLIFE PROTECTION

5.4.1 Preventive Measures for Open Ponds

Perimeter fencing will be installed around the Events Pond to discourage the intrusion of terrestrial wildlife. The Events Pond will be maintained empty except to contain and temporarily store exceptional rainfall events or overflows from the in-heap pond. After these events, the retained water will be cycled into the process circuit as soon as possible and be used as make-up water until the pond is emptied.

The Events Pond area will be equipped with deterrents for waterfowl or other birds. Additionally, the Events Pond will not be reclaimed during operations to minimize, and control as necessary, the growth of vegetative cover to prevent wildlife use of vegetation.

5.4.2 Monitoring of Cyanide Concentrations in Open Ponds

If for operational or other reasons the event pond cannot be evacuated quickly as noted in Section 5.4.1, stored water will be monitored on a daily basis. If monitoring data indicate that Events Pond water contains WAD cyanide in concentrations $\geq$50 ppm, the installed avian deterrent systems will be monitored for effectiveness and mitigation measures increased as may be necessary.

5.4.3 Wildlife Mortality Monitoring

Inspections performed in accordance with SGC-CMP-SOP-007, “*Cyanide Facility Inspections*” will require the immediate documentation and reporting of any observed wildlife fatalities in accordance with SGC-CMP-SOP-011, “*Wildlife Mortality Reporting/ Investigation*”.

5.4.4 Leach Solution Application Controls

The *Heap Leach Facility Operations, Maintenance and Surveillance Manual* requires monitoring of active leach areas to determine if any significant ponding is occurring. If significant ponding is observed on the surface of the pad, appropriate action will be taken to either dissipate the ponded solution (e.g., cessation of leaching in areas of ponding, reconsideration of drip emitter placement, etc.), or to cover it with portable avian exclusion screens or installation of other avian deterrent devices.

5.5 MANAGEMENT OF DIRECT/INDIRECT PROCESS SOLUTION DISCHARGES

5.5.1 Direct Discharges to Surface Water

In normal operation, the Project will be managed as a closed facility, and no cyanide impacted water will be directly released to surface water. The HLF (including the Events Pond) is fully lined, with pregnant solution reporting to an internal collection pond, the In-Heap Pond (see Figure 5.5-1), prior to being pumped to the ADR for metal extraction. The Events Pond is designed to accept direct precipitation on the pond and any overflow from the In-Heap Pond (via the spillway), and hence may include low concentrations of cyanide from surface contact; all water reporting to the event pond will be pumped back to the ADR with residence time in the pond as low as possible, as noted in Section 5.4.1.

When mining operations cease and the ADR plant is taken offline, any water collected in the event pond will be either pumped back to the top of the heap to assist in the heap rinsing process or will be treated in the mine water treatment plant to the discharge criteria established for the Project prior to release.

It should be emphasized that mine water treatment at the Project is required primarily to ensure that metals concentrations from all areas impacted by mining are reduced to permitted levels. The residual cyanide in the HLF will be subject to substantial natural degradation and dilution; however, the overall water treatment process will include an appropriate detoxification circuit to further reduce residual cyanide in treated effluent to values that comply with regulations and the regulatory approvals for the Project as necessary.

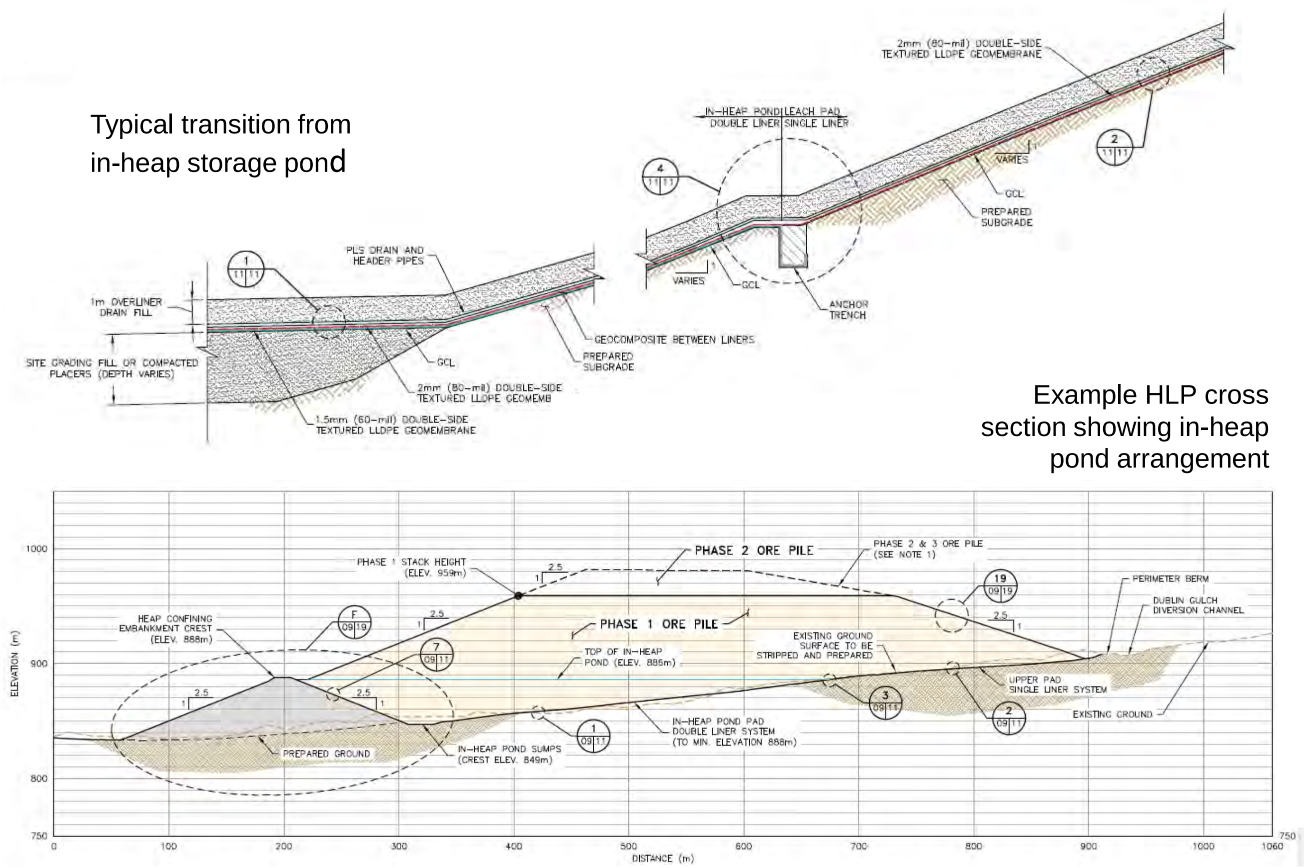


Figure 5.5-1: Example HLF Cross-Sections, Showing Typical Transition and In-Heap Pond Arrangement

5.5.2 Indirect Discharges to Surface Water

The Project is designed to prevent indirect discharges of process solution or cyanide-impacted water or runoff. As noted in the *Heap Leach and Process Facilities Plan,* the HLF and event pond are both fully lined facilities with interstitial leak detection arrangements. Runs of solution pipelines in trenches that do not drain to the HLF impoundment will also be lined, with any leakage, stormwater, or snowmelt accumulation in the liner system reporting to either the HLF In-Heap Pond or to the events pond. The *Environmental Monitoring, Surveillance and Adaptive Management Plan* also describes downgradient monitoring wells located specifically to detect any potential seepage from the HLF, ADR, events pond, or barren and pregnant solution pipelines and associated pumping stations such that any potential indirect discharges to surface water via groundwater are identified and addressed.

5.5.3 Protection of Beneficial Uses of Surface Water

As discussed in Section 5.5.1, the heap leach process will be operated as a closed system until the Project enters the closure phase. At that time, some potential exists for residual cyanide in event pond and HLF draindown water to require additional treatment prior to release to the environment. The overall water treatment process will therefore consider the potential presence of residual cyanide in untreated effluents and will include an appropriate detoxification circuit to further reduce residual cyanide in treated effluent to values that are protective of aquatic habitat, which is the “beneficial use” established for the receiving water body. SGC will manage the treatment of any residual cyanide concentration in wastewater to ensure that treatment plant effluent is less than the discharge values established by the regulatory approvals granted for the Project.

5.5.4 Monitoring Discharges to Surface Water

The *Environmental Monitoring, Surveillance and Adaptive Management Plan* includes direction on the effluent sampling point (i.e., at the discharge points), if residual cyanide detoxification is indeed required as part of the water treatment regime in closure. The *Environmental Monitoring, Surveillance and Adaptive Management Plan* will be supported by SGC-CMP-SOP-025, “*Environmental Monitoring Procedures*”, which defines field sampling protocols, field QA/QC procedures, sample collection and labeling requirements, as well as sample preservation, maintaining sample chain-of-custody to the analytical laboratory, and field reporting.

5.6 MANAGEMENT OF CYANIDE FACILITY GROUNDWATER IMPACTS

5.6.1 Management of Seepage from Cyanide Facilities

The Project is designed to prevent indirect discharges of process solution or cyanide-impacted wastewater or runoff. As noted previously, the HLF and events pond are both fully lined facilities with interstitial leak detection arrangements. Runs of solution pipelines in trenches that do not drain to the HLF impoundment will also be lined, with any leakage, stormwater, or snowmelt accumulation in the liner system reporting to either the HLF impoundment or to the events pond.

5.6.2 Groundwater Monitoring

The *Environmental Monitoring, Surveillance and Adaptive Management Plan* also describes downgradient monitoring wells located specifically to detect potential seepage from the HLF, ADR, events pond, or barren and pregnant solution pipelines and associated pumping stations. The *Environmental Monitoring, Surveillance and Adaptive Management Plan* will be supported by SGC-CMP-SOP-025, “Environmental Monitoring Procedures”, which will define field sampling protocols, field QA/QC procedures, sample collection and labeling requirements, sample preservation requirements, maintaining sample chain-of-custody to the analytical laboratory, and field reporting requirements.

5.7 SPILL PREVENTION AND CONTAINMENT MEASURES FOR PROCESS SOLUTION TANKS AND PIPELINES

5.7.1 Secondary Containment Description – Mixing and Storage Tanks and ADR Process Solution Tanks

Concrete impoundments are constructed within the ADR for the mixing and storage tanks, the elution column, adsorption train tanks, and the barren solution tank. All cyanide solution impoundments will be sealed and physically isolated from acids or other incompatible materials, and sized to contain at least 110% of the largest contained tank, plus flowback, giving due consideration to the potential reduction of containment volume from pumps or other equipment installed within the containment.

5.7.2 Sizing Considerations for Secondary Containments

Calculated containment values for the final design configuration of affected tanks will be retained on file with the ADR CQA inspection package in accordance with SGC-CMP-SOP-003, “*Records Management*”.

5.7.3 Management of Solution/Contaminated Water in Secondary Containments

If an upset occurs in any of the ADR processes, all of the secondary containment areas in or adjacent to the ADR plant building are designed to drain to concrete sumps either with dedicated pumps or managed with portable suction pumps, that permit immediate return to appropriate locations in the process. No residual spill material will be generated in normal operations that will require management and disposal as waste. In the unlikely event that the secondary containments in the ADR are somehow overwhelmed, the grading of the ADR pad allows for spillage to drain to the HLF facility via the lined pipe trench which is integrated with the ADR plant LLDPE liner system.

5.7.4 Contingency Planning for Remediation of Contaminated Soil

If secondary containments for solution pipelines, the HLF, the event pond, or the cyanidation operations in or adjacent to the ADR were to fail and the soil surface was thereby contaminated, the *Heap Leach and Process Facilities Emergency Response Plan* and the *Spill Response Plan* would be implemented to guide the remediation process. The *Heap Leach and Process Facilities Emergency Response Plan* and the *Spill Response Plan* will be supported by procedure SGC-CMP-SOP-020, “*Cyanide Emergency Response Procedures*”, which describes the response procedures and roles and responsibilities for each of several potential cyanide release scenarios. For each scenario, specific measures will be included to ensure that appropriate mitigation measures, remediation actions, and monitoring programs are implemented to prevent or minimize potential impacts to the environment. These include:

- type and location of emergency soil moving/excavation equipment and stockpiled materials as required, to respond to large liquid spills or earthworks failures;
- methods for recovery of solid and liquid cyanide spills;
- management and/or disposal of cyanide-contaminated soil to the heap leach pad, and spills of cyanide briquettes or process solution back into appropriate process locations;
- location, preparation and use of cyanide neutralization chemicals; and
- soil and water sampling/analytical methods, as necessary to delineate, monitor, and confirm completion of any required remediation of cyanide-impacted land or water.

5.7.5 Spill Prevention/Containment Measures for Process Solution Pipelines

Process solution pipelines within the ADR area are all installed within concrete secondary containment. All barren solution risers and distribution lines will be placed within the lined footprint of the HLF, thus any potential leakage is captured within the pad, ultimately reporting to the In-Heap Pond. The pregnant and barren solution pipelines to the HLF riser arrangements and associated pumping stations that do not drain directly to the HLF impoundment will be placed in lined trenches, with any leakage, stormwater, or snowmelt accumulation in the liner system reporting to either the HLF impoundment. Apart from the routine inspections of ADR and HLF pipelines required by SGC-CMP-SOP-007, "*Cyanide Facility Inspections*", the *Environmental Monitoring Surveillance and Adaptive Management Plan* also includes the monitoring of downgradient groundwater wells located specifically to detect any potential seepage from the HLF, ADR, events pond, or barren and pregnant solution pipelines and associated pumping stations.

5.7.6 Tank and Pipeline Material Compatibility

All tank, pipeline, and piping system components contacting cyanide have been constructed of materials suitable for cyanide services. The adsorption tank trains, elution column, cyanide mixing and storage tanks and all associated pumps, valves, and piping system components have been constructed of steel or other nonreactive materials, as appropriate for the intended service. All steel piping system components will employ welded joints. HLF riser pipes, distribution lines, and emitters may be constructed of HDPE or other suitable material.

5.8 CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROGRAM

5.8.1 Construction QA/QC Program – ADR

The Engineers selected for the Project, have designed all cyanide facilities under professionally recognized and technically appropriate QA/QC program requirements. As previously noted, cyanide facilities are specifically defined as:

- the cyanide reagent unloading and storage area in the ADR building;
- the cyanide mixing and storage tank area in the ADR building;
- the rest of the ADR building, less the gold room, including the elution column, carbon adsorption tank trains, strip/wash area, carbon screens, and associated piping system components;
- the barren solution sump tank located within the ADR building;
- pregnant and barren solution pipelines, risers, and pumping station;
- the HLF;
- the Events Pond; and
- all other project areas, pipelines, or infrastructure containing solution potentially $\geq$ 0.5 mg/l WAD cyanide.

The Engineer(s) are required to oversee and sign-off on the Construction Quality Assurance program (CQA or QA/QC) to ensure all facilities are constructed according to the design. A summary of the QA/QC programs(s) in effect during construction of these facilities is provided below and will be included in the As-built design package.

As part of the QA/QC program described below, the design and/or on-site engineer will specifically evaluate the suitability of:

- materials for cyanide service;
- ground preparation for the placement of synthetic liners for the HLF and Events Pond;
- the construction of major tank foundations;
- the adequacy of synthetic liner materials relative to governing specifications, as well as materials placement and seam welding;
- the adequacy of cyanide mixing, storage, and process tank weldments; and
- the functionality of the fully commissioned and interconnected ADR plant, pregnant and barren solution pipeline, and event pond systems.

All QA/QC records created during the construction of the cyanide facilities, or as a result of any facility change, will be retained in accordance with SGC-CMP_SOP-003 “Records Management”.

5.8.1.1 Materials for Cyanide Service

Materials selected for the construction of Project components used for cyanide service, or that have the potential to come into contact with cyanide, were assessed by the Engineer during the design phase to ensure that they are compatible with cyanide. This assessment process is considered the first step in the QA/QC program for materials for cyanide service.

The construction specifications for materials selected by the Engineer for cyanide service are incorporated into technical specifications. Technical specifications are then provided to a list of interested suppliers with a request for quotation. The ability for a supplier to provide the materials and their internal QA/QC program to ensure that the product meets the specifications is then assessed by the Engineer upon receipt of a quotation. Once a suitable supplier has been selected, a contract is executed that specifies the frequency of QA/QC verification required by the supplier, the verification process of QA/QC information by SGC, any field verification that will be undertaken by either, or both of, the supplier and SGC, and the process for replacement of any material that is deemed to be inadequate by either party.

5.8.1.2 Ground Preparation for Liner Placement

The issued for construction designs for each of the HLF, Events Pond and ADR pad include specific criteria for ground conditions that consider soil/fill type, particle size, moisture content, placement methods for fill, depth requirement, permeability, final elevations, etc. Inspection Test Plans (ITPs) are developed for each cyanide facility and define the inspection activities and acceptance criteria implemented at each stage of ground preparation, prior to liner placement.

Cyanide facility ITPs related to ground preparation for liner placement utilize the following common process:

1. ITP is provided by contractor to SGC and their client representative (collectively SGC for the purposes of the QA/QC program) for review and approval.
2. Request for Information (RFI) provided by contractor to SGC to specify any areas that the contractor requires further guidance on or an area in which the contractor proposes an alternate construction method that would meet the acceptance criteria.
3. SGC provides a response to the RFI to close out the contractor’s RFI.
4. Final drawings are received by contractor with all parties confirming that their understanding of the work is in agreement.

Once ITPs have been completed, area specific activities and acceptance criteria are then followed through construction of each the cyanide facilities.

ADR Plant

The ITP for the ADR Plant ground preparation utilizes the following process steps:

1. Clearing, grubbing and bulk earthworks undertaken by contractor to the grades and elevations provided in the final drawings.
2. Survey undertaken by the site survey team to confirm that the grades and elevations specified in the final drawings have been achieved by the contractor.
3. Installation of 0.15 m of bedding material by the contractor.
4. Field density (compaction) testing by engineering team.
5. Survey undertaken by the site survey team to confirm that the grades and elevation specified in the final drawings have been achieved by the contractor.

6. 60 mil-single sided textured non-conductive LLDPE geomembrane installed by liner manufacturer (see 5.8.1.3).
7. Backfill of 0.15 m of bedding material above liner.
8. Field density (compaction) testing by engineering team.
9. Survey undertaken by the site survey team to confirm that the grades and elevation specified in the final drawings have been achieved by the contractor.
10. Placement, moisture-conditioning and compaction of 0.85 m of Non-Frost Susceptible (NFS) structural fill in three lifts. Field density (compaction) testing of each lift by engineering team.

    NFS structural fill must satisfy the requirements of Table 5.8-1 below

Table 5.8-1: Gradation Requirements - Percent Passing by Dry Weight

	U.S. Standard Sieve Size	NFS Structural Fill
Gradation Requirements - Percent Passing by Dry Weight	6 - inch	100
	1 - inch	50 - 100
	¾ - inch	-
	½ - inch	35 -100
	⅜- inch	-
	No. 4	20 - 80
	No. 8	-
	No. 16	10 - 50
	No. 50	5 - 25
	No. 200	0 - 8
Fill Material Properties	**Mohr-Coulomb Shear Strength**	
	Bulk Density (kN/m^3)	21
	Friction Angle (D)	40
	Cohesion (kPa)	0
	Concrete-Soil Friction Angle (D)	27
	Stiffness	
	Deformation Modulus, E_S (MPa)	50 - 100
	Modulus of Subgrade Reaction, Kv_1 (kPa/mm)[1]	150 - 300
	Dynamic Properties	
	Shear Modulus, G_{max} (MPa)[2]	100 - 200
	Poisson's ratio, v	0.3

Notes:
1. Modulus of subgrade reaction has been provided for a standard 1 foot plate diameter. Values need to be scaled to footing size.
2. Shear modulus is presented for very low strains of 10-6 to 10-5, and have been estimated from available shear wave velocities (Vs). Modulus should be reduced for larger strains. Poisson's ratio inferred from Bowles, 1982.

11. Proof roll using fully loaded dump truck under the supervision of the engineering team to reveal any soft or yielding material to supplement field density (compaction) testing. Observations to be made where visual contract can be maintained with the operator, and 2 to 3 m distance and at an approximate 45° angle from the tires.

Heap Leach Facility and Events Pond

The QA/QC program for the HLF and Events Pond is provided in Appendix J - Project Technical Specifications of the Eagle Gold Project Heap Leach Facility Detailed Design by BGC Engineering dated November 16, 2017. The

Engineer of record for the facilities and their quality assurance team are responsible for testing construction materials to assess whether materials and methods comply with the technical specification of design.

Certain laboratory tests and field tests are conducted to ensure the construction works meet the requirements specified by the Engineer of record. The test methods and frequency for the various components of the HLF and Events Pond for ground preparation are provided below in table 5.8-2.

Table 5.8-2: HLF and Events Pond Testing Methods and Frequencies

Component	Laboratory/Field Test	Test Frequency
Site Grading Fill	Moisture Content	Minimum 1 per 5,000 m^3
	Atterberg Limits	Minimum 1 per soil type or 1 per 5,000 m^3, whichever is more frequent
	Gradation	Minimum 1 per soil type or 1 per 5,000 m^3, whichever is more frequent
	Moisture/Density Relationship	Minimum 1 per soil type or 1 per 5,000 m^3, whichever is more frequent
	In-Place Density and Moisture	Minimum 1 per 1,500 m^3 placed
Select Fill	Moisture Content	Minimum 1 per 3,000 m^3
	Atterberg Limits	Minimum 1 per soil type or 1 per 3,000 m^3, whichever is more frequent
	Gradation	Minimum 1 per soil type or 1 per 3,000 m^3, whichever is more frequent
	Moisture/Density Relationship	Minimum 1 per soil type or 1 per 3,000 m^3, whichever is more frequent
	In-Place Density and Moisture	Minimum 1 per lift per 1,500 m^3
	Laboratory Permeability	Minimum 1 per lift per 75,000 m^3
Overliner drain fill, Select drain fill and trench drain fill	Gradation	Minimum 1 per 5,000 m^3
Anchor trench backfill	Moisture Content	Minimum 1 per 5,000 m^3
	Atterberg Limits	Minimum 1 per soil type or 1 per 5,000 m^3, whichever is more frequent
	Gradation	Minimum 1 per soil type or 1 per 5,000 m^3, whichever is more frequent
	Moisture/Density Relationship	Minimum 1 per soil type or 1 per 5,000 m^3, whichever is more frequent
	In-Place Density and Moisture	Minimum 1 per 150 linear meters of trench length

If the above tests indicate that construction work does not meet the specified requirements, remedial action, re-compaction (if required), and retesting is performed to the satisfaction of the Engineer.

5.8.1.3 Liner Specifications

Manufacturing

Liner systems provided for the Project undergo QA/QC programs during the manufacturing process to ensure that the Engineer's specifications are satisfied before product is shipped to the site. The specific properties and the testing method conducted prior to shipment to site are provided below in Tables 5.8-3 to 5.8-5.

Table 5.8-3: ADR Pad, HLF and Events Pond Geomembrane Properties, Testing Methods and Frequencies

Tested Property	Test Method	Frequency	Minimum Average Value			
			1.50 mm HDPE Textured	2.0 mm HDPE Textured	1.50 mm LLDPE Textured	2.0 mm LLDPE Textured
Thickness, (minimum average), mm	ASTM D 5994	every roll	1.50	2.00	1.50	2.00
Lowest individual reading			1.28	1.70	1.28	1.70
Density, g/cm^3 (min.)	ASTM D 1505	90,000 kg	0.940	0.940	0.939	0.939
Tensile Properties (each direction)	ASTM D 6693, Type IV	9,000 kg				
Strength at Break, N/mm	Dumbbell, 50 mm/min		23.1	30.8	29.4	39.2
Strength at Yield, N/mm			23.1	30.8		
Elongation at Break, %	G.L.=50mm		350	350		
Elongation at Yield, %	G.L.= 33 mm		13	13	400	400
Tear Resistance, N	ASTM D 1004	20,000 kg	200	267	160	222
Puncture Resistance, N	ASTM D 4833	20,000 kg	534	667	310	400
Carbon Black Content, % (Range)	ASTM D 1603*/4218	9,000 kg	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	20,000 kg	Note	Note	Note	Note
Asperity Height, mm	ASTM D 7466	second roll	0.51	0.46	0.51	0.46
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	90,000 kg	>140	>140	>140	>140

The above properties are also evaluated by the manufacturer at a minimum frequency of one test every 0.5 hectares. The results of the QA/QC program during the manufacturing process are submitted to SGC prior to any shipment of materials. Additionally, prior to delivery, one sample of liner per 6 acres or one sample per batch (whichever is less) is sent to a third-party laboratory selected by SGC for conformance testing to ensure the sample meets the specified liner requirements.

Table 5.8-4: HLF and Events Pond Non-Woven Geotextile Minimum Average Roll Values

Nonwoven Geotextile Property	ASTM Test Method	Value[1]	
		270 gr/sq m (8 oz/sq yd)	405 gr/sq m (12 oz/sq yd)
Grab Tensile Strength, N (lb)	D-4632	930 (210)	1,420 (320)
Grab Elongation, %	D-4632	50	50
Puncture Strength, N (lb)	D-4833	600 (135)	930 (210)
Mullen Burst, kPa (psi)	D-3786	2,895 (420)	4,270 (620)
Trapezoidal Tear Strength, N (lb)	D-4533	420 (95)	555 (125)
Apparent Opening Size, US Sieve No. (mm)	D-4751	80 (0.180)	100 (0.150)
Permeability, cm/sec	D-4491	0.38	0.29
Water Flow Rate, lpm/m^2 (gpm/ft^2)	D-4491	4,480 (110)	2,440 (60)
UV Resistance (retained after 500 hours), %	D-4355	70	70

Note:

1. All values are MARV (minimum average roll value) except apparent opening size which is the maximum average value per roll; and the UV resistance which is the minimum value.

Table 5.8-5: HLF and Events Pond Non-Woven Geotextile Minimum Average Roll Values

GCL Property	ASTM Test Method	Required Value
Bentonite Swell Index	D-5890	24 mL/2 g min.
Bentonite Fluid Loss	D-5891	18 mL max.
Bentonite Mass/Area[1]	D-5993	3.6 kg/m^2 (0.75 lb/ft^2) min.
GCL Grab Strength[2]	D-4632 D-6768	660 N (150 lbs) MARV 88 N/cm (50 lbs/in) MARV
GCL Peel Strength[2]	D-4632 D-6496	65 N (15 lbs) min. 6.1 N/cm (3.5 lbs/in) min.
GCL Hydraulic Conductivity	D-5887	5 x 10^{-9} m/sec max.
GCL Hydrated Internal Shear Strength[3]	D-5321 D-6243	24 kPa (500 psf) typ.

Notes:

1. At 0 percent moisture content.
2. Testing is performed in the machine direction using 100-mm grips. Results are reported as MARV unless otherwise indicated.
3. Peak values measured at 10 kPa (200 psf) normal stress for a specimen hydrated for 48 hours.

Installation

The manufacturer is also responsible for placement of the liner at the Project site. Prior to a work area being handed over to the manufacturer for liner installation, their installation team must certify in writing that the surface on which the liner is to be installed is acceptable. The installation team confirms in writing that the surface to receive the liner is smooth and free of all rocks, stones, sticks, roots, sharp objects or debris of any kind and that it is a firm unyielding foundation for the liner with not sudden, sharp or abrupt changes in grade.

Geomembrane installation requiring seaming, where possible, is welded using the double-wedge fusion welding method. Prior to seaming, each welding technician and apparatus used in the field must pass a test weld. Scrap pieces of geomembrane material at least 1 m long and 0.3 m wide are seamed together under the same conditions as those in the area to be lined. A minimum of four 25 mm wide coupons are cut from the test weld and quantitatively tested for shear and peel with a field tensiometer in accordance with ASTM D-6392. A test weld passes when the break is ductile and a film tearing bond (FTB); and the minimum values in Tables 5.8-6 to 5.8-7 are met:

Table 5.8-6: HDPE Seam Strength Properties

Material (mil)	Shear Strength (PPI)	Fusion Peel (PPI)	Extrusion Peel (PPI)
60	120	91	78
80	160	121	104

Table 5.8-7: LLDPE Seam Strength Properties

Material (mil)	Shear Strength (PPI)	Fusion Peel (PPI)	Extrusion Peel (PPI)
60	90	75	66
80	120	100	88

A test weld is considered passing when all coupons pass the above requirements. If repeated test welds fail, the welding technician or apparatus may not be used until the reason for the failing values is identified. Once the test welds have passed and are approved by the Engineer, seaming of the geomembrane may begin.

Once liner placement and seaming has begun, testing of the geomembrane seams shall consist of both destructive and non-destructive testing. The process for both destructive and non-destructive testing are provided in Appendix J - Project Technical Specifications of the Eagle Gold Project Heap Leach Facility Detailed Design by BGC Engineering dated November 16, 2017.

QA testing is then performed by the Engineer of record. The manufacturer and their installation team are responsible for notifying the Engineer when areas are completed and ready for QA testing. The Engineer will recommend final acceptance when all seams have passed destructive testing, the manufacturer and their installation team has supplied all documentation and all field and laboratory testing is complete and satisfactory. As part of the final acceptance, the manufacturer and their installation team provide as-built drawings showing the location of the geomembrane panels, seams, repairs, patches and destructive samples.

5.8.1.4 Major Tank Foundations

Concrete installations, including major tank foundations in the ADR plant, follow Construction Work Plans (CWP) developed by SGC. The CWPs include specific hold points at each major construction stage to ensure that the specifications provided by the Engineer have been met. Concrete installations cannot proceed beyond a hold point until SGC (including their Construction Manager, the Safety Manager, and the Environmental Manager) and the Contractor have confirmed that the specifications have been met.

The CWP activity sequence (representing hold points) relevant to major tank foundations include:

- Base Preparation
  - Confirmation of base elevation prior to form work commencement.
  - Testing and surveying in accordance with facility specific ITPs.
  - Review and correction of any identified deficiency.
  - Mass concrete pours monitored by thermal infrared guns (confirmed to be operational by QA/QC Coordinator) to monitor temperature.
  - Pour thickness reviewed with engineering.
- Forming Concrete
  - In-place forming (or gang-style prefabricated) nearby and flown into place by crane if required.
  - In-place installation of rebar or, where appropriate, pre-tied assembly.
  - Prior to closure of forms and placement of concrete, contractor QA/QC Coordinator, Supervisor and Surveyor check formwork, reinforcing and anchor bolts to confirm that acceptable tolerances are achieved before allowing the concrete to be placed. Sign off on hold point required by Engineer or SGC approved alternate as specified in approved ITP.
  - Conduct pre-pour meeting to review sequence, timing, pour rate, and pump placement with the Contractor, concrete supplier, pump truck company, area Superintendent, Pour Coordinator,

Health and Safety Coordinator, QA/QC Coordinator, concrete finishing representative, Reinforcing Steel Foreman, and the SGC Construction Superintendent.

- Concrete Placement
  - Pour Coordinator maintains radio communication with the batch plant operators, directs cement trucks and mobile equipment to ensure pour continuity, verifies volume requirements and monitors/coordinates quality testing.
- Concrete Curing and Formwork Removal
  - Formwork to be left in place until the minimum curing period has lapsed or adequate strength of concrete has been achieved. Once this period has been achieved, forms will be stripped and curing agent generally applied on all flat work so as to continue the curing process.
  - Protection applied as necessary depending on weather conditions.
  - Concrete will be inspected by the QA/QC Coordinator for deficiencies. Any post-pour deficiencies are recorded and repaired as necessary.
  - Shoring/falsework to be left in place as long as feasible to ensure adequate cure and to provide additional safety for any work occurring above work zone.
- Deficiency and Punch List Items Addressed
  - All deficiencies tracked during the process will be fixed or scheduled to be fixed prior to turnover to SGC.
  - A final walk through will be completed.
- Document Management
  - The following documentation at a minimum will be created and retained for major tank foundation work:
    - Non-Conformance Reports
    - Inspection Test Plans
    - Pre- and Post- Pour QA Checklists
    - Material Receiving Reports
    - Material Test Reports
    - Equipment Calibrations Logs and Reports
    - Formwork/Falsework QC Checklists
    - SGC Approved Shop Drawings
    - Reinforcing Steel Pre-Pour QC Checklists
    - Welding Inspections Forms
    - SGC Approved Concrete Mix Designs

- Concrete Field Test Reports
- Concrete Pour Tracking Logs
- 3rd Party Field Test Reports
- Laboratory Concrete Break Report Tests
- Survey Cross Reference Report
- Concrete QC Curing Inspection Forms
- Master Punch List
- Redlines and As-Built Drawings

5.8.1.5 Welding

For each manufacturing step for equipment within the ADR Plant, approved ITPs including control standards are developed. The ITPs include specific hold points to ensure that the design standards for the ADR Plant are reached. The ITPs include non-destructive test methods and quality checks for each welding method.

Welding Procedure Specifications (WPS) which define the method, preparation, and sequences to be adopted to achieve a satisfactory welded joint for all weld types are to be provided by the supplier which are then approved by SGC when required by a Vendor Data Requirement (VDR). The WPS will include all welding essential and non-essential variables for each process used, including appropriate test results, which must comply with the standard or code pertaining to the welding required. When requested in a VDR, a weld map will be prepared by the supplier for any fabricated item and a summary of the WPS identifying the weld points.

Once fabrication and installation are completed for components requiring welding, leak tests or pressure tests are completed on the component to ensure that the specifications have been met. The supplier of ADR Plant equipment will perform all such tests including providing the necessary inspection, measuring and test equipment and ensure ADR Plant equipment has been adequately welded.

5.8.1.6 ADR Plant Functionality

To support transitioning from construction to the commissioning phase of the ADR Plant and other cyanide related facilities, a formal handover process commences. The handover includes the provision of construction area turnover packages that include all QA/QC, verification and testing documents developed to date. The handover from construction to commissioning follows a certification process as listed below:

- Construction release (C1 Certification)
- System testing of equipment (C2 Certification)
- Wet commissioning (C3 Certification Process Systems Only)
- Site wide integration test run with ore/leach solution (C4 - all Systems)
- Ramp up to sustainable operation (C5)

The certification process is shown below in Figure 5.8-1.

Construction to Pre-Com Testing (Turnover)

Pre-Com to Operations (Handover)

<table>
<tr><th>Function</th><th></th><th>Construction Release</th><th colspan="2">Pre-Commissioning</th><th>Commissioning</th><th>Ramp-Up</th></tr>
<tr><td>Stage</td><td rowspan="9">Commissioning Planning and Setup</td><td>C1: Construction Release</td><td>C2: System Testing of Equipment</td><td>C3: Wet Commissioning</td><td>C4: Systems Integration Test Run/Ore Commissioning</td><td>C5: Ramp-Up to Sustainable Operations</td></tr>
<tr><td>Activity</td><td>Equipment Inspection (Construction Checksheets)</td><td>Equipment inspection and testing</td><td>System testing</td><td>Process start up and testing</td><td>Ramp-up</td></tr>
<tr><td>Conditions</td><td>Non-energized equipment</td><td>Equipment and PCS Energized</td><td>Inert materials (water, air)</td><td>Process materials (Ore, reagents)</td><td>Process materials (Ore, reagents)</td></tr>
<tr><td rowspan="3">Example Tasks</td><td>Wiring point to point, cable insulation tests</td><td>Loop Tests</td><td>Interlock check</td><td>Run systems with process materials</td><td>Increase throughput to design rate</td></tr>
<tr><td rowspan="2">Pressure Pipe Tests</td><td>Valve Tests</td><td>Energize water and air headers</td><td rowspan="2">Run complete plant to stability</td><td rowspan="2">Complete Performance Testing</td></tr>
<tr><td>Motor Function Tests and Run-ins</td><td>Pumping system tests with water</td></tr>
<tr><td>Responsible Person</td><td>Construction Manager</td><td colspan="2">Commissioning Manager</td><td colspan="2">Project Manager / Commissioning Manager</td></tr>
<tr><td>Responsible Team</td><td>Construction Team</td><td colspan="2">Commissioning Team</td><td colspan="2">Operations Team / Commissioning Team</td></tr>
<tr><td>Completion Milestone</td><td>Mechanical Completion</td><td>System ready for Wet Commissioning</td><td>Systems are Ready for Ore/Tie-in</td><td>Systems ready for performance testing</td><td>Sustainable Operations Achieved</td></tr>
</table>

Figure 5.8-1: Certification Process

Specific requirements for each stage in the certification process must be met for the Project site in general to ensure that equipment and process functionality have been achieved as shown below:

C1 Acceptance Criteria (Turnover)

- C1 checklists, by tagged equipment, facility or sub facility for non-process systems, are checked off and all tests within the scope of C1 completed, including all contractor QA/QC records
- All required signatories agree that the system is ready for C2/3 commissioning
- Equipment or structure has been built and installed to drawings and specifications
- Accurate and certified “as-built” documentation has been completed
- Turnover documentation has been received
- All category 1 deficiencies have been rectified. Non-critical deficiencies have been recorded on the punch list
- SGC personnel have witnessed critical tests as required
- C1 certification will include verification of design

- C1 certification of electrical devices includes activities such as grounding tests, insulation tests and continuity tests.

C2 Acceptance Criteria

- C2 checklists, by tagged equipment, facility or sub facility for non-process systems, are checked off and all tests within the scope of C2 completed
- All required signatories agree that the system is ready for C3 commissioning
- Equipment has been energized and functionally tested
- Accurate and certified re-line documentation has been completed
- All new category 1 deficiencies have been rectified. Non-critical deficiencies have been recorded on a punch list
- SGC personnel have witnessed critical tests as required
- C2 certification includes testing as a stand-alone system and the interface to instrumentation (loop checks, by the pre-commissioning team)
- Loop diagrams confirmed (C2 by Pre-Commissioning team)
- All safety interlocks have been verified through testing and the bit register and jumper log does not have any bypassed safety interlocks in place.

C3 Acceptance Criteria

- C3 Work Instruction completed and signed off for each system (where applicable)
- Systems have been tested with applicable fluids and satisfy their functional and performance requirements as defined in the C3 Work Instruction
- All category 1 deficiencies corrected
- Systems operated for 1 hour (minimum) with inert material (air/water) or no-load throughput and stable control as applicable
- The system is ready to accept ore feed or production solution.

C4 Acceptance Criteria

Part 1: Technical Acceptance

Acceptance criteria are defined in specific work instructions but may include:

- C4 Work Instruction completed and signed off for each system or group of systems
- All category 1 deficiencies corrected
- Demonstrated efficiency through lab testing, grading analyses, etc.
- Process systems have been tested and satisfy their functional and performance requirements.

Part 2: C4: Transfer of Care Custody and Control to SGC

- All systems required run the facility as an integrated Plant has been commissioned to C4
- Continuous operation for 72 hours with ore at nameplate capacity
- Technical acceptance signed-off
- Project operations are ready to accept Care, Custody and Control of the described system.

5.8.2 Construction QA/QC Records Management

Design and construction reports will be retained for all cyanide facilities (or groups of facilities), as well as any CQA inspection packages and commissioning/acceptance test records will be retained as permanent facility records in accordance with SGC-CMP-SOP-003, "*Records Management*".

5.8.3 Construction QA/QC Approvals

All QA/QC or CQA packages will specifically document approval of the as-delivered facility against the latest iteration of the issued for construction design drawings and specifications; this approval will be reviewed and approved by the contractor's project manager or other senior project engineer, who will be licensed as a professional engineer in Yukon Territory. Approval will be documented by the engineer of record; and filed with the associated QA/QC or CQA package and retained as part of the permanent facility records in accordance with SGC-CMP-SOP-003, "*Records Management".*

5.9 WILDLIFE AND SURFACE/GROUNDWATER QUALITY MONITORING PROGRAMS

5.9.1 Monitoring Program Documentation

Overall requirements for the monitoring of surface and groundwater quality is described in the *Environmental Monitoring, Surveillance and Adaptive Management Plan,* supported by SGC-CMP-SOP-025 "*Environmental Monitoring Procedures*". The *Environmental Monitoring Surveillance and Adaptive Management Plan* notes the location, frequency, and type of each surface and subsurface sample to be acquired, along with discussion of sampling conditions, applicable analytical parameters (e.g., cyanide species to be analyzed) and specific container/container preservation, chain of custody, data quality verification, and reporting requirements.

Any observations of wildlife intrusion will be documented in accordance with the *Wildlife Protection Plan*; observations of animal mortality will be documented and separately investigated in accordance with SGC-CMP-SOP-011, "*Wildlife Mortality Reporting/ Investigation*".

As noted in Section 5.5, the *Environmental Monitoring, Surveillance and Adaptive Management Plan* includes sampling of treated effluent for residual cyanide, at the discharge point as well as at downstream monitoring locations.

5.9.2 Development of Sampling and Analytical Protocols

All of the sampling, sample management, and analytical protocols cited in the *Environmental Monitoring, Surveillance and Adaptive Management Plan* has been developed by qualified technical professionals.

6 DECOMMISSIONING OF CYANIDE FACILITIES

6.1 DECOMMISSIONING PLANNING

6.1.1 Decommissioning Plan and Procedures

The *Reclamation and Closure Plan* reflects the details of the final mine design, and complies with the *Yukon Mine Site Reclamation and Closure Policy*. The *Reclamation and Closure Plan* discusses procedures for decommissioning and closure of cyanide facilities. It is expected that these procedures will be fully developed as SOPs to support the last update of the Plan undertaken prior to the initiation of final closure operations, in accordance with SGC-CMP-SOP-001, "*Preparation, Review, Approval, Update, and Controlled Distribution of Eagle Gold Project Management Plans and Standard Operating Procedures*".

6.1.2 General Schedule or Sequence for Decommissioning of Cyanide Facilities

The *Reclamation and Closure Plan* contains a conceptual schedule or sequence of planned activities, which will be advanced during project operations to support ongoing reclamation work and to inform a final detailed schedule for the last update of the Plan undertaken just prior to the initiation of final decommissioning and reclamation activities. For individual cyanide facilities, closure schedule line items will be initiated at the point in time the facility is no longer required to be in use.

6.1.3 Periodic Review and Update of Decommissioning Plan and Procedures

The *Reclamation and Closure Plan* will be reviewed and updated in response to major changes in any cyanide management facilities or processes, and

- at least every two years, in accordance with the regulatory approvals currently held for the Project until the cessation of mining activities;
- every two years thereafter until the completion of major restoration actions (e.g., demolition and detoxification of the cyanide mixing and storage tanks and desorption trains; demolition of the ADR building; detoxification and draindown of the HLF); and
- at least every five years thereafter unless other post-closure monitoring obligations are negotiated with the appropriate regulatory agencies.

All updates will be subject to controlled distribution in accordance with SGC-CMP-SOP-001, "*Preparation, Review, Approval, Update, and Controlled Distribution of Eagle Gold Project Management Plans and Standard Operating Procedures*".

6.2 FINANCIAL ASSURANCE MECHANISM FOR DECOMMISSIONING CYANIDE FACILITIES

6.2.1 Cost Estimate for Third-Party Decommissioning of Cyanide Facilities

The *Reclamation and Closure Plan* includes an overall mine site closure cost estimate that estimates third-party costs to close cyanide management facilities. These facilities include:

- the cyanide reagent unloading and storage area adjacent to the ADR plant;
- the cyanide mixing and storage tanks area;
- the rest of the ADR building, less the gold room, including the elution column, carbon adsorption tank trains, and associated piling system components;
- the barren solution sump tank within the ADR building;
- pregnant and barren solution pipelines to and from the HLF;
- the HLF;
- the Events Pond; and
- other project areas, pipelines, or infrastructure that, were known to contain solution with WAD cyanide concentrations $\geq$ 0.5 mg/l.

6.2.2 Cost Estimate Updates

At a minimum, cyanide facilities closure cost estimates will be updated in concert with the regular planned updates of the *Reclamation and Closure Plan* as discussed in Section 6.1.3 above.

6.2.3 Jurisdictional Requirements for Financial Assurances/Guarantees for Funding Third-Party Decommissioning of Cyanide Facilities

SGC will comply with the requirements of *Yukon Mine Site Reclamation and Closure Policy* Financial Guidelines (Yukon, 2014) , which establishes the Yukon Government's authority in determining the specific form and amount of the financial security that SGC must provide to address the Project's overall reclamation and closure liability. The amount of this negotiated financial security is to be based on third-party cost estimates, as is also required by the ICMC. The security will be documented in a negotiated financial instrument, and is subject to modification in keeping with the major project or process changes that may occur over the life of the mine. The funds necessary for closure of cyanide facilities will by definition always be less than the total level of funding necessary to close and reclaim all areas impacted by the Project.

7 WORKER SAFETY

Under the provisions of the SGC *Occupational Health and Safety Policy*, SGC is committed to the protection of the health and safety of its employees, on-site contractors, and site visitors. SGC-CMP-SOP-016, "*Assessment and Mitigation of Workplace Cyanide Exposure Risks*" and other SOPs will be implemented to guide:

- the assessment and management of cyanide exposure risks in the workplace;
- management of workplace hazards associated with the use of cyanide; and
- maintenance of equipment and the workplace in a safe condition.

Training programs (see Section 9 and SGC-CMP-SOP-002, "*Eagle Gold Project Training Program*") will also be implemented to ensure that employees work in compliance with regulations, approved policies, and procedures; have adequate training to safely complete their assigned work tasks; and establish and properly operate effective emergency preparedness systems.

7.1 IDENTIFICATION AND MANAGEMENT OF CYANIDE EXPOSURE SCENARIOS

SGC will develop and maintain operating procedures for managing its facilities to limit worker exposure to HCN gas and sodium cyanide salts of the worker.

7.1.1 Exposure Risk Assessments

In compliance with SGC-CMP-SOP-016 "*Assessment and Mitigation of Workplace Cyanide Exposure Risk*" a risk assessment will be conducted prior to start-up of operations to identify those areas where there is a significant risk of cyanide exposure from HCN gas generation. The pre-operational assessment will support the assessment conducted during the detailed design phase of the Project and be informed by the experience of operational staff prior to the introduction of cyanide to the facility. Both the design phase and pre-operational assessment will initially focus on the cyanide receipt and storage areas, the mixing area, cyanide storage and transfer points, carbon strip/wash area and carbon screens. Fixed HCN detectors will be installed in those areas determined to present a significant risk to workers. A risk assessment, supported by periodic ambient HCN gas surveys of cyanide facilities, will thereafter be conducted, at least annually and following any changes to cyanide equipment, processes, or operations to ensure that the number and location of fixed HCN detectors provide adequate and effective monitoring coverage. Records of risk assessments will be maintained in compliance with SGC-CMP-SOP-016 "*Assessment and Mitigation of Workplace Cyanide Exposure Risk"*; SGC-CMP-SOP-022 "*Processing Plant and Reagent Handling - Cyanide Monitoring"*, and SGC-CMP-SOP-003, "*Records Management*".

HCN detectors will be designed to sound a highly audible evacuation alarm and initiate a flashing beacon if the airborne cyanide concentration reaches the most stringent of the worker exposure limits set to trigger, that is 4.7 ppm (5 mg/m^3) cyanide. The detector will also send an electronic alarm signal to the ADR plant control room.

7.1.2 Personal Protective Equipment (PPE) and Pre-work Inspection Requirements

A comprehensive program for the proper use of equipment is provided in SGC-CMP-SOP-008 "Personal Protective Equipment for Cyanide Facility Operations" and will be an integral part of site induction and task training provided to workers in accordance with Section 9 of this CMP and the requirements of SGC-CMP-SOP-002 "Eagle

Gold Project Training Program." SGC-CMP-SOP-008 will identify the minimum PPE required on the site as well as any additional PPE required for each work area, job function and task, after all practical process changes and/or engineering controls have been implemented to eliminate, reduce or control possible exposure. All SOPs involving storage, handling and use of cyanide will also list the minimum PPE requirements to perform that operation, as well as other equipment requirements (e.g., communication radio, portable HCN monitor) to safety perform a task.

All SGC employees and site contractors are accountable for their own safety and for the safety of their fellow workers. In keeping with the company's commitment to maintaining a safe working environment, it is the duty of every worker to conduct pre-work inspections prior to carrying out a specific task. In addition, formal documented pre-work inspections will be undertaken during shift changes, as an integral part of job safety analysis procedures, tasks requiring work permits, and for critical cyanide work tasks. The latter include the specific tasks addressed in SGC- CMP-SOP-004, "Receiving and Storage of Reagent Cyanide" and SGC-CMP-SOP-005, "Cyanide Mixing Process."

7.1.3 General Signage Requirements

Signage will comply with requirements of SGC-CMP-SOP-019 "*Cyanide Workplace Signage Requirements*". Warning signs will be placed on perimeter fencing at the entrances to the ADR plant; at the entrances to the water treatment plant; on the perimeter fence at the incinerator; and any other areas where cyanide is stored or used, in order to alert workers to the presence of cyanide and that smoking, open flames, eating, and drinking are all prohibited. General signage posted at the entrances to the HLF, event pond, and ADR (and the water treatment plant) will also display minimum PPE requirements. Special signage will also be placed to identify emergency exits and the location of emergency equipment stations including emergency shower/eyewash stations, fire extinguishers, cyanide antidote kits, and first aid stations.

7.1.4 Location of Emergency Showers/Eyewash Stations and Fire Extinguishers

Low pressure safety shower/eyewash stations and non-acidic dry powder fire extinguishers will be installed at strategic locations throughout the operation where cyanide is present, including cyanide uploading and storage areas, the process plant and pump/valve houses. Safety showers will be fitted with quick activation valves and will be protected to prevent freezing where necessary.

A site plan will be posted in the control room, building access points and the main work areas that show the locations of safety equipment. The equipment will be inspected and maintained on a routine basis as required in SGC-CMP-SOP-008 "*Cyanide Facility Inspection*" and during pre-inspections as required in SGC-CMP-SOP-004, "*Receiving and Storage of Reagent Cyanide*" and SGC-CMP-SOP-005, "*Cyanide Mixing Process*".

7.1.5 Process Tank and Pipeline Signage Requirements

All tanks and vessels containing cyanide will include signage identifying the contents and the capacity of each tank. Piping containing WAD cyanide at concentrations $\geq$10 ppm will be color coded and labeled at prominent locations (e.g., flanged junctions and valves) to identify the contents and flow direction. Colour coding for piping will follow the guidelines of ANSI/ASME 13.1-2007, "*Scheme for the Identification of Piping Systems*" (ANSI/ASME 2007). Cyanide signage requirements are addressed in SGC-CMP-SOP-019 '*Cyanide Workplace Signage Standards*".

7.1.6 Material Safety Data Sheet (MSDS) and Cyanide Safety Information

As required by Workplace Hazardous Materials Information System Regulations (WHMIS), O.I.C. 1988/107, SGC will implement a worker right-to-know program to identify controlled products in the workplace and train workers in the hazards and safety precautions required when using or working around controlled products and in the use and access to MSDS. As part of this program all controlled products will be appropriately identified (with placards and/or supply/workplace labels and MSDS made available in the workplace to inform workers of properties and hazards associated with controlled products, safety requirements, and first aid and emergency response information.

Hard copies of MSDS for cyanide will be available in the ADR plant control room, cyanide mix tank area, and other prominent areas where cyanide is a potential hazard. In addition, information on cyanide exposure symptoms, and first aid and emergency response information will be posted in these areas.

7.1.7 Management of Occupational Health and Safety Issues in Facility Changes

All proposed changes or modifications to the Project cyanide management facilities or processes will be reviewed for their potential impact on the environment, occupational or public health and safety considerations, and the requirements of this CMP, in accordance with SGC-CMP-SOP-012, "*Cyanide Facility Change Management Process*". Changes to the CMP and its supporting documents will be controlled in accordance with SGC-CMP-SOP-001, "*Preparation, Review, Approval, Update, and Controlled Distribution of Eagle Gold Project Management Plans and Standard Operating Procedures*". Approved and properly documented process changes or additions will be introduced to affected members of the workforce in accordance with SGC-CMP-SOP-002, "*Eagle Gold Project Training Program*". See also Section 5.1.4.

7.1.8 Solicitation of Workforce Input on Occupational Health and Safety Issues

In keeping with the SGC *Occupational Health and Safety Policy,* all employees are considered to be accountable for their own safety and for the safety of their fellow workers. In keeping with maintaining a safe working environment, workers will be encouraged to provide input on occupational health and safety issues. SGC will consider this input in developing, evaluating and reviewing operating procedures and during formal safety meetings and informal pre-work safety sessions (see SGC-CMP-SOP-018 "*Cyanide Workplace Safety Meetings*").

7.2 OPERATIONAL MONITORING OF CYANIDE FACILITY WORKER HEALTH AND SAFETY

7.2.1 Management of pH

The *Heap Leach and Process Facilities Management Plan* and the *ADR Plant Operations Plan* will detail the operating constraints and parameters within which the ADR plant and the heap leach pad will be managed. The *Heap Leach and Process Facilities Management Plan* and *HLF Contingency Water Management Plan* will also address procedures to be followed if conditions extend outside of the set operation parameters, there is a general plant upset, or if there is an emergency or planned shutdown. To minimize the risk of cyanide exposure to workers, the potential for HCN gas generation will be reduced by ensuring that pH is maintained within the range of 10.0 and 10.5 in the various cyanide bearing process solutions that will be present throughout the operation. This will be achieved by the addition of lime in deposition of fresh ore to the heap leach pad, as required, and by pH adjustment in the ADR circuit through a lime addition system. In addition, as required in SGC-CMP-SOP-005 "*Cyanide Mixing Process*", prior to a cyanide mix, the contents of the mix tank will be checked and pH adjusted through addition of caustic soda to ensure that the pH of the solution is greater than 12 before adding cyanide briquettes for the mix. The pH will be monitored through a combination of routine sampling and laboratory analysis of solutions during normal operations, and electronic pH meters that are readable on location and report to the control room. The results of pH analysis will be entered onto daily operation logs in accordance with *ADR Plant Operations Plan*, completed copies of which will be maintained as required by SGC-CMP-SOP-003 "*Records Management*".

7.2.2 Ambient/Personal Monitoring Devices

As discussed in Section 7.1.1, fixed HCN monitors will be installed in all areas determined to present a risk of cyanide exposure to workers. In addition, workers will be required to carry portable HCN monitors, set to alarm at 4.7 ppm, when performing tasks where there is a risk of cyanide exposure. These tasks include but are not limited to confined space entry into tanks, vessels and sumps where cyanide may be present, conducting maintenance procedures requiring decontamination of cyanide equipment, and cyanide unloading and mixing.

HCN monitors will be operated, calibrated and maintained in conformance with SGC-CMP-SOP-022 "*HCN Monitors*". HCN monitors will be maintained, tested and calibrated using, at a minimum, the procedures and schedules recommended by the manufacturer. Calibration records will include the date of calibration and actual calibration information and be maintained in accordance with SGC-CMP-SOP-003 "*Records Management*".

7.2.3 Investigation and Evaluation of Exposure Incidents

Safety and environmental incidents, including those involving cyanide, will be investigated using SGC-CMP-SOP-024, "*Incident Investigation and Reporting*". This procedure provides instruction and guidance to ensure that investigations are completed thoroughly. The procedure addresses incidents associated with injuries/illnesses; fires and explosions; property damage; hazardous substance discharges and other incidences. The procedure will include requirements for reporting incidents, formation and responsibility assignments for investigation committees, root cause analysis, implementation of recommendations to prevent reoccurrence, and external reporting requirements.

SGC will keep records of all incident investigation reports in conformance with SGC-CMP-SOP-003 "*Records Management*" and maintain an electronic incident reporting system (see SGC-CMP-SOP-024) to track and communicate information on incidents and completion of associated corrective or preventive action.

7.3 EMERGENCY PREPAREDNESS AND RESPONSE PLANS AND PROCEDURES

As describes in the following sections, SGC will provide and maintain the capability, emergency procedures, and employee training necessary for effectively responding to emergencies involving worker exposure to cyanide.

7.3.1 Emergency Response/First Aid Equipment

SGC will maintain emergency equipment and supplies at strategic locations to allow rapid response to emergencies involving cyanide exposure. In addition to the shower/eyewash stations discussed in Section 7.1.4, cyanide first aid kits will be maintained that will include medical oxygen equipment with resuscitator, activated carbon, and cyanide antidote [amyl nitrite and/or hydroxocobalamin (e.g., “CynoKit”)]. At a minimum, cyanide first aid kits will be located in the control room and medical clinic. Additional medical oxygen will be available in the site ambulance that will be stationed at the first aid room.

7.3.2 Emergency Response/First Aid Equipment Inspections and Maintenance

Emergency first aid kits will be inspected and maintained on a regular basis as required in SGC-CMP-SOP-007 “*Cyanide Facility Inspections*”, in order to ensure the kits are complete, equipment is operational, and antidote is stored within the temperature range stipulated by the manufacturer, and replaced with a new supply within the recommended expiration date.

7.3.3 Emergency Response Procedures for Cyanide Exposures

First aid procedures for response to cyanide exposure are provided in SGC-CMP-SOP-023, “*Cyanide Exposure Symptoms and First Aid*”. All employees that work with cyanide and able to respond to a cyanide exposures emergency will be trained in cyanide exposure recognition, first response and basic first aid procedures including the application of medical oxygen, and antidote, as available and as suitably qualified. As hydroxocobalamin requires intravenous injection, this antidote should only be administered by qualified medical personnel.

7.3.4 Onsite First Aid/Medical Assistance Capabilities

Due to the distance of the mine site relative to offsite emergency response support, medical services, and public hospitals, a first aid room has been established at the Project site, with the equipment and staff to handle first response of all readily foreseeable types of medical emergencies. The first aid room is staffed 24 hours a day, 7 days a week and able to provide advanced emergency first aid, including first aid to respond to cyanide poisoned patients. In addition, the Project retains an emergency response team (ERT), which, in addition to their regular daily jobs, will be trained and certified as emergency responders. The ERT will be trained in fire, highwall, and hazardous materials emergency response and include members trained to Occupational First Aid (OFA) Level 3 medical first aid.

7.3.5 Agreements with Offsite Medical Facilities

SGC will work with local emergency and medial staff to develop medical evacuation (MEDEVAC) emergency arrangements to transport a stabilized cyanide poison patient to Whitehorse General Hospital, and with the hospital to provide further treatment and observation of cyanide exposed patients as may be required.

7.3.6 Mock Emergency Drills

SGC will conduct emergency drills for response to cyanide exposures and/or releases at least annually. The drills will be designed to test each of the potential cyanide emergencies scenarios appropriate for the site as considered in the *Heap Leach Facility Emergency Response Plan*. Written documentation of the scope and evaluated results of each drill will be maintained as per the procedure and SGC-CMP-SOP-003, “*Records Management*”. The *Heap Leach Facility Emergency Response Plan*, *Spill Response Plan*, and applicable emergency response training programs will be subsequently be reviewed, as necessary based on evaluation of the drill results.

8 EMERGENCY RESPONSE

8.1 EMERGENCY RESPONSE PLANNING

8.1.1 Considerations for Potential Cyanide Releases in Emergency Response Plan

SGC will incorporate measures in the design, construction and operation of its facilities to prevent cyanide releases to the natural environment as well as workplace exposures. The unloading, storage, mixing and use of cyanide in the gold extraction process will be conducted within contained areas of the ADR plant, as noted in Figure 4.1-1. The plant design will require individual containment areas to be sized to accept 110% of the volume of the largest tank within the impoundment, plus flowback. Provisions will be included in the containment to capture spills in sumps or other arrangements that permit them to be pumped directly back to the appropriate point in the cyanidation process. No residual spill material will be generated in normal operations that will require management and disposal as waste. Any potential spills of dry sodium cyanide briquettes in the unloading or storage area will be captured and deposited in the mixing tank. Spills of process solution will be captured in sumps or with portable suction pumps, and returned to appropriate locations in the process. Containment areas associated with cleaned-up spills will be washed into sumps within the containment, and the collected fluids pumped back to the process.

8.1.2 Potential Cyanide Emergency Scenarios

SGC-CMP-SOP-020, "*Cyanide Emergency Response Procedures*" provides guidance on responding to injuries and serious incidents as defined in Section 30(1) of the current *Yukon Occupational Health and Safety Act* (Yukon, 2002b). These include any release of process solution outside of containment, any release of hazardous product in which there is a potential for that product to enter a waterway, and any release that results in dysfunction from lack of oxygen or poisoning.

A risk assessment will be undertaken by personnel tasked with any work function that may involve exposure to cyanide prior to the start of operations and after any significant facility or process change to determine possible emergency scenarios that may occur. Potential cyanide emergency situations considered include (but are not limited to):

- catastrophic release of HCN from the mixing, storage, and process facilities in the ADR building;
- transportation accidents;
- releases during unloading, storage, or mixing;
- releases during fires and explosions;
- significant pipe, valve, or tank leaks or ruptures;
- overtopping of the event pond and any downstream impoundments;
- power outages and pump failures;
- uncontrolled seepage from the internal solution pond in the HLF or the pregnant or barren solution pipelines;
- failure of cyanide treatment, destruction, or recovery systems, if installed; and

- geotechnical failure of the HLF.

For each potential emergency scenario involving cyanide, procedure SGC-CMP-SOP-020 describes special emergency response procedures and the roles and responsibilities of emergency responders and coordinators.

8.1.3 Responses to Transportation-Related Emergencies

As discussed in Section 2.1., SGC has entered a contract to purchase cyanide from Cyanco, an ICMC-certified cyanide producer. SGC has established contractual conditions under which Cyanco will also assume responsibility for management of the entire delivery chain, pursuant to the requirements of the ICMC. Contractual terms and conditions specifically denote supply chain contractor responsibilities for all aspects of transportation, including, emergency response along the whole of the transportation route to the Project site. The emergency response capability and preparedness of the transporter is clearly set out in the *ICMI Cyanide Transportation Verification Protocol* (ICMI, December 2016).

Nevertheless, for incidents in proximity to the mine SGC will, on request from the transporter, assist with responding to a transportation related incident.

8.1.4 Response Actions

SGC-CMP-SOP-020, "*Cyanide Emergency Response Procedures*" describes the specific actions and sets out the responsibilities and duties of responders and management to respond to a "Serious Incident". Figure 8.1-1 illustrates the emergency response and incident reporting and follow-up processes.

The discoverer of a "Serious Incident" will call a CODE 1 on the radio, stating name, location and nature of the assistance required. This will generate a response from the Health and Safety Manager who will coordinate the initial response, mobilize the emergency response team and summon any specialized resources required. For each potential emergency scenario, SGC-CMP-SOP-020, "*Cyanide Emergency Response Procedures*" details the response actions and mitigation measures to be undertaken and the roles and responsibilities for initiating and conducting these actions.

Procedures VGC-ERP-SOP-0002 "*Medical Emergencies on Site*", and VGC-ERP-SOP-0003 "*Management/ ERT Responsibilities – Fire in Camp*" describe additional requirements and responsibilities for medical emergencies and site evacuation.

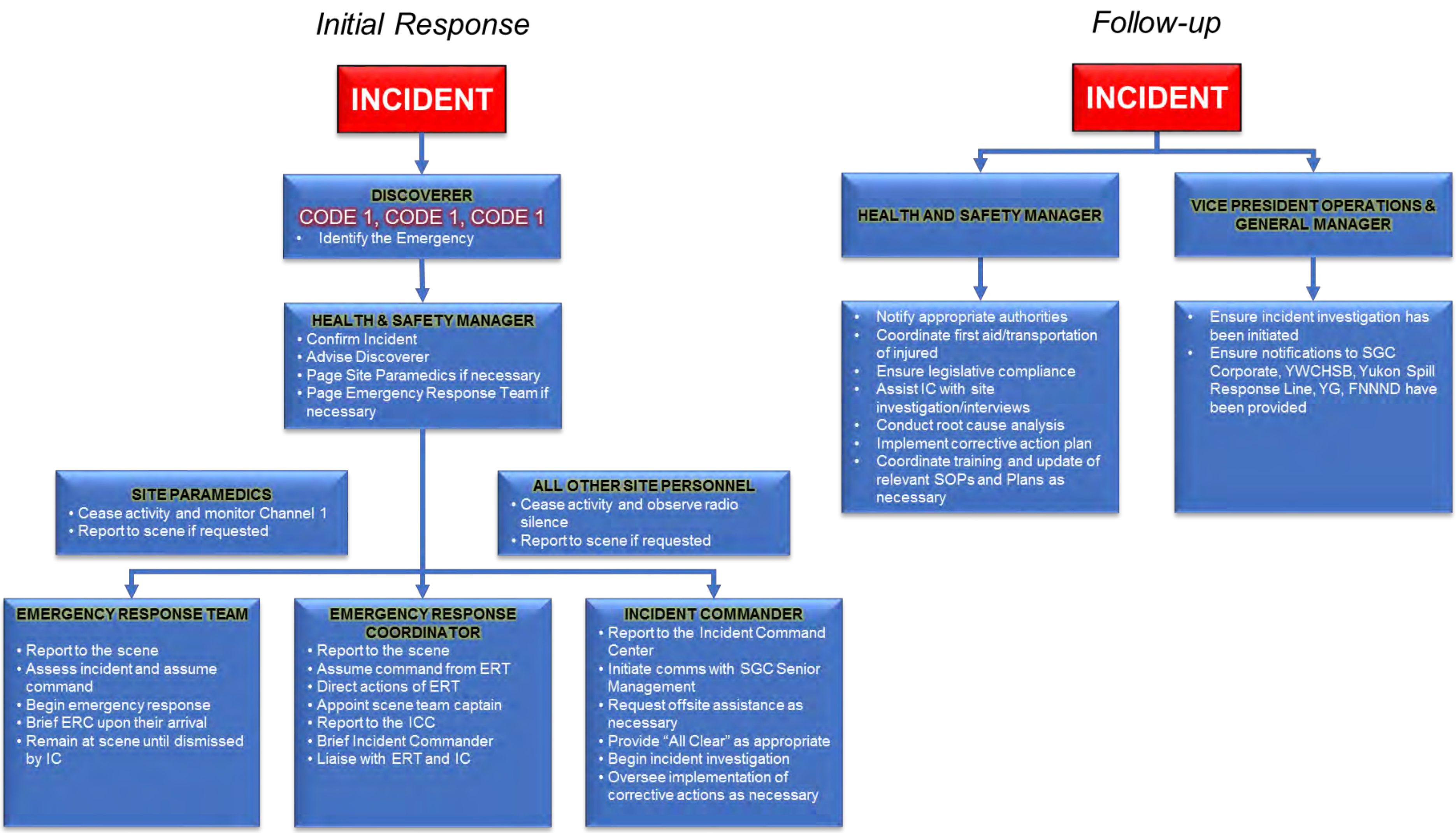


Figure 8.1-1: Emergency Response/Reporting Tree Diagrams

8.2 STAKEHOLDER ENGAGEMENT IN EMERGENCY RESPONSE PLANNING PROCESS

8.2.1 Planning for Stakeholder/Workforce Engagement

SGC-CMP-SOP-020, “*Cyanide Emergency Response Procedures*” has been developed with the involvement of and consultation with the project workforce and external experts in order to ensure that the plan addresses site-specific scenarios. Because of the remoteness of the site, SGC will retain its own emergency response capability to respond to all potential emergency scenarios, including medical, fire and HAZMAT response. In addition to OFA Level 3 First Aid personnel, SGC also has a first aid room operated 24 hours a day, 7 days a week. Formal arrangements to provide external airborne medical evacuation (MEDEVAC) services through the Mayo Nursing Station and with the hospital at Whitehorse, or other, for cyanide exposure patients requiring additional treatment and observation will also be executed by SGC Senior Management.

8.2.2 Consultation with Potentially Affected Individuals and Communities

As noted in Section 10SGC has, and will continue to consult with the First Nation of Na-Cho Nyäk Dun (FNNND) and the citizens of the Village of Mayo to provide background information on the use of cyanide in the mining process, and to identify the risks of any cyanide release scenarios that may potentially affect them. SGC will also periodically advise potentially affected individuals and communities on the procedure of communication with them if an accidental cyanide release were to occur, and any specific measures that may need to be taken to protect water supply, human health, or wildlife habitat.

8.2.3 Consultation with Local Response Agencies and Medical Facilities

SGC will engage their own security, fire, ambulance and medical capability at the mine site and therefore will not need to rely on the Royal Canadian Mounted Police (RCMP) or local medical assistance for first response to emergency situations. However, as discussed in Section 8.2.1, engagement will be made with Mayo Nursing Station and Whitehorse Hospital for the provision of MEDEVAC and hospital care services if needed.

8.2.4 Stakeholder Engagement in Emergency Response Plan Updates

On an annual basis, SGC will review any arrangements made for MEDEVAC services regarding potential treatment of patients for cyanide exposure; any required modifications will be reflected in an update to the appropriate plans and SOPs for the Project. Current controlled copies such plans and SOPs will be distributed to the appropriate medical responders and the Yukon Workers’ Compensation Health and Safety Board (YWCHSB), in accordance with SGC-CMP-SOP-001, “*Preparation, Review, Approval, Update, and Controlled Distribution of Eagle Gold Project Management Plans and Standard Operating Procedures*”.

8.3 COMMITMENT OF RESOURCES AND PERSONNEL FOR EMERGENCY RESPONSE

8.3.1 Cyanide-Related Elements of the Emergency Response Plan

Among its other provisions, the *Emergency Response Plan* will:

- designate primary and alternate emergency response coordinators who will have explicit authority to commit the resources necessary to implement the Plan;
- identify the current members of the ERT;
- define the minimal training requirements for emergency responders;
- include mustering procedures and 24-hour contact information for emergency coordinators and ERT members;
- specify the duties and responsibilities of the emergency coordinators and ERT members;
- include procedural direction for periodic inspection of emergency response equipment to ensure its functionality and availability; and,
- describe specific roles, if any, of the Mayo Nursing Station MEDEVAC service, YWCHSB, Whitehorse General Hospital, and any other outside responders, medical facilities, or community organisations in the emergency response process.

8.3.2 Stakeholder/Workforce Engagement in Mock Drills

As discussed in Section 7.3.6, SGC will conduct mock emergency drills for response to cyanide exposures and/or releases on at least an annual basis.

8.4 INTERNAL/EXTERNAL EMERGENCY NOTIFICATION AND REPORTING PROCEDURES

8.4.1 Procedures and Contacts for Emergency Reporting

Procedure SGC-CMP-SOP-024, "*Incident Investigation and Reporting*" sets out the internal requirements for documenting, reporting and investigating all incidents, which by definition include significant releases or exposures to cyanide; Federal and/or Territorial regulations require immediate notification in the event of any serious incident or reportable spill. SGC-CMP-SOP-024 provides specific direction on the reporting process. As previously noted, the *Emergency Response Plan* provides direction for the reporting and follow-up required for serious incidents (see Figure 8.1-1), as well as a table of reportable spill quantities. Current contact numbers for the Yukon Spill Report Line (for reporting spills) and for the Yukon Territory OH&S Mines Inspector (for the reporting of serious incidents, injuries or accidents) are also listed.

In compliance with QML-0011, Part VI, Audits and Reporting, Clause 13.7: In the event of a cyanide release or exposure incident in Yukon related to the Project, SGC will immediately notify the Director and Inspector, and undertake the following:

- notify management, regulatory agencies, outside response providers and medical facilities of the cyanide emergency;
- notify potentially affected communities of the cyanide related incident and any necessary response measures;
- communicate publicly any hospitalization or fatality related to cyanide exposure;
- communicate publicly the nature of release on or off the mine site requiring response, remediation, or reporting under applicable regulations; and
- communicate publicly the nature of release that exceeds applicable cyanide limits or that causes applicable limits to be exceeded.

8.4.2 Emergency Notifications – Potentially Affected Communities and Media Communications

SGC will conduct periodic communications in Mayo and other regional locations, in order to provide general information on the progress of the Project, to answer questions, and to disseminate general written information on mining activities and practices for the safe management of cyanide. As part of this initiative, SGC will keep the FNNND, the YWCHSB, and other community leaders informed of any serious incidents or reportable spills that may occur and will promptly notify them of any offsite incident that may potentially affect the public. In order to better ensure consistency and accuracy in the information provided, all media interactions will be controlled through a designated SGC spokesperson.

8.5 REMEDIATION MEASURES/MONITORING ELEMENTS FOR CYANIDE HAZARDS

8.5.1 Identification of Potential Cyanide Release Scenarios in Emergency Response Plan

As discussed in Section 8.1.2**.**, SGC-CMP-SOP-020, "*Cyanide Emergency Response Procedures*" describes the response procedures and roles and responsibilities for each of the possible cyanide release scenarios that may reasonably occur at the site. Specific measures are included to ensure that appropriate mitigation measures, remediation actions, and monitoring programs are implemented to prevent or minimize potential impacts to the environment. These procedures include:

- type and location of emergency soil moving/excavation equipment and stockpiled materials as required, to respond to large liquid spills or earthwork failures;
- methods for recovery of solid and liquid cyanide spills;
- management and /or disposal of cyanide-contaminated soil to the heap leach pad, and spills of cyanide briquettes or process solution back into the process (see Section 8.1.1);
- location, preparation and use of cyanide neutralization chemicals; and
- soil and water sampling/analytical methods, as necessary to delineate, monitor, and confirm completion of any required remediation of cyanide-impacted land or water.

If any cyanide release has a potential for impacting drinking water supplies, SGC-CMP-SOP-020 will provide direction on providing an alternate drinking water supply to affected residences or communities.

8.5.2 Prohibited Treatment Chemicals for Cyanide Releases to Surface Water

A supply of hydrogen peroxide will be maintained as part of the emergency response kit for use in neutralizing and decontaminating areas impacted by cyanide spills. SGC-CMP-SOP-020, "*Cyanide Emergency Response Procedures*" will describe the method for preparing neutralization chemicals for safe use and application to ensure that treatment chemicals and by-products of the neutralization process do not unduly impact surface waters.

8.5.3 Monitoring for Extent of Potential Cyanide Releases

SGC-CMP-SOP-020, "*Cyanide Emergency Response Procedures*" will describe the proposed monitoring activities that will be undertaken to identify the extent and effects of a cyanide release. The procedures will specify the type, location, number, and analytical methods to be used, depending on the nature and location of the spill. Field sampling protocols and QA/QC procedures, including sample collection and labeling, sample preservation, chain-of-custody, and field reporting, will be specified in SGC-CMP-SOP-025, "*Environmental Monitoring Procedures".*

8.6 EVALUATION AND UPDATE OF EMERGENCY RESPONSE PROCEDURES AND CAPABILITIES

8.6.1 Routine Emergency Response Plan Review and Update Requirements

The SGC Health and Safety Manager will be responsible for keeping the *Emergency Response Plan* up to date. The *Plan* will be reviewed at least annually and updated as applicable to incorporate any significant changes in any facility infrastructure or operational processes involving the management or use of cyanide. The *Emergency Response Plan* will also be reviewed and modified to incorporate any improvements or "lessons learned" resulting from the evaluation of the results of each emergency response or mock drill (see Section 7.3.6). The Health and Safety Manager will also be responsible for maintaining up to date emergency contact information and ensuring that this information is incorporated in updates to the *Emergency Response Plan*; as previously noted, all *Plan* updates will be subject to controlled distribution in accordance with SGC-CMP-SOP-001, "*Preparation, Review, Approval, Update, and Controlled Distribution of Eagle Gold Project Management Plans and Standard Operating Procedures*".

8.6.2 Mock Emergency Drills

As discussed in Section 7.3.6, SGC will conduct emergency mock drills to test the adequacy of response procedures for cyanide exposures and/or releases, on at least an annual basis.

9 TRAINING OF WORKERS AND EMERGENCY RESPONSE PERSONNEL

9.1 CYANIDE HAZARD RECOGNITION TRAINING

9.1.1 Cyanide Hazards Recognition Training Program

SGC's cyanide hazard recognition training requirements will be set out within the context of SGC-CMP-SOP-002, "*Training Program*". All visitors to the Project will be required to complete site induction training prior to being permitted to enter the operating area of the site. This induction training will include a briefing on potential hazards at the site, required PPE, general health and safety precautions, and emergency response procedures.

All full-time employees and contractors working in areas where there is a potential for encountering cyanide will also be required to complete Cyanide Hazard Recognition training. This program will include a general introduction to this *Cyanide Management Plan* and the *Emergency Response Plan.* Training topics will also include: recognizing cyanide reagent and solution, and where such materials will be encountered within the operation; discussion of the health effects of cyanide; precautions to prevent cyanide exposure; symptoms of cyanide exposure; and specific procedures to follow in the event of exposure.

9.1.2 Refresher Training Requirements

All full-time employees and contractors who may work in areas where there is a potential for encountering cyanide will also be required to complete Cyanide Hazard Recognition refresher training at least once a year.

9.1.3 Retention of Training Records

Induction training and Cyanide Hazard Recognition/Cyanide Hazard Recognition refresher training records and course presentation materials will be maintained on file in compliance with SGC-CMP-SOP-003, "*Records Management*". Training records will include the names of the employee and the trainer, the date of training, the topics covered, and employee proficiency test results, were required. Initial and refresher training will be tracked on a training matrix to ensure training of all employees is complete and current.

9.2 OPERATIONAL TRAINING REQUIREMENTS

9.2.1 Operational Training Program for Cyanide Facility Workers

As part of their standard job-specific training, employees directly involved with cyanide management or mineral processing operators will receive specific training on the management plans and supporting SOPs that govern their work. At a minimum, these management plans will include:

- *Heap Leach and Process Facilities Plan;*
- *Spill Response Plan;*
- *HLF Contingency Water Management Plan;*
- *Emergency Response Plan;*

- *Environmental Monitoring Surveillance and Adaptive Management Plan;* and
- *Preventive Maintenance Program Plan*

Such training will involve instruction on required operational tasks, the prevention of unplanned releases of cyanide, minimization of cyanide-related risks to their own health and safety and the health and safety of their co-workers and the general public; and the protection of the environment. All training will be documented as note in SGC-CMP-SOP-002, "*Training Program*", with records retained as described in SGC-CMP-SOP-003, "*Records Management*".

9.2.2 Trainer Qualification Requirements

Employee task training will be undertaken by dedicated training specialists with experience in the cyanide process, or by supervisors or managers with prior experience in training and the knowledge and experience in the systems and procedures that are the primary subject of the training tasks to be accomplished. Resumes showing the qualifications and experience of trainers will be maintained as per SGC-CMP-SOP-002, "*Training Program*" and SGC-CMP-SOP-003, *"Records Management*".

9.2.3 Authorization of Trainees/Release for Cyanide Facilities Work

An employee will not be permitted to work with cyanide in an unsupervised manner until he or she has successfully completed the induction training and Cyanide Hazard Recognition/Cyanide Hazard Recognition refresher training described in Section 9.1, as well as the operational training specified for their work assignment.

9.2.4 Evaluation of Training Program Effectiveness and Refresher Training

The effectiveness of cyanide training and the competence of employees performing their jobs in a safe and environmentally protective manner will be evaluated through informal observations and formal task observations undertaken by supervisors and managers. Where deficiencies are noted an employee will be required to complete task refresher training before being permitted to work unsupervised on that task.

9.2.5 Operational Training Records Requirements

Operational or task training records will be maintained as per SGC-CMP-SOP-003, "*Records Management*". Training records will include the names of the employee and the trainer, the date of training, the topics covered, and the employee proficiency test results, where required. As noted in SGC-CMP-SOP-003, operational training will be tracked on a training matrix to ensure training of employees working in specific areas of the plant and cyanide process have completed all required training and are approved to work unsupervised in those areas.

9.3 CYANIDE RELEASE RESPONSE TRAINING

9.3.1 Cyanide Release Response Training – Cyanide Facilities Workers / Maintenance Personnel

As discussed in Section 9.1.1, all employees that may encounter cyanide in the work place will be required to complete Cyanide Hazard Recognition training and annual refresher training. This component of the overall training program will include actions to be taken by the first responder in the event of an emergency (i.e., report the emergency by calling CODE 1 on the radio, stating name, location and nature of the assistance required and provision of first aid and decontamination procedures).

9.3.2 Decontamination and First Aid Training

The Cyanide Hazard Awareness training will also include recognition of cyanide exposure symptoms and the application of basic first aid including the administration of medical oxygen and appropriate decontamination practices. The training program will include instruction on the location of emergency showers/eyewashes and emergency first aid stations, and practical exercises on the administration of medical oxygen and amyl nitrite antidote, as available and as suitably qualified in the case of the administration of cyanide antidotes.

9.3.3 Emergency Response Coordinator/Emergency Response Team Training

Emergency responders and coordinators will be trained in all elements of the *Emergency Response Plan* and their specific responsibilities and duties during an emergency response. In addition to Cyanide Hazardous Awareness training, members of the Project ERT will also complete and maintain training in responses to accidents, fire, and hazardous materials. All emergency team members will be trained in use of self-contained breathing apparatus (SCBA) and selected members will also be trained to OFA Level 3. In addition to participating in mock emergency drills, the Emergency Response Team will also meet routinely for classroom and practical emergency response training. All training records will be maintained as per SGC-CMP-SOP-003, "*Records Management*".

9.3.4 Offsite Emergency Responder Cyanide Release Response Training

Medical staff will be familiarized with the *Emergency Response Plan* and their responsibilities and duties in the event of a medical emergency. SGC will provide their own emergency response capability and therefore there is no requirement to train offsite emergency responders. Nevertheless, SGC will engage with Mayo Nursing Station and Whitehorse Hospital for the provision of MEDEVAC and hospital care in the event of a cyanide exposure emergency.

9.3.5 Refresher Training Requirements

As discussed in Section 9.1.1, all employees that may encounter cyanide in the work place will be required to complete Cyanide Hazard Awareness training and annual Refresher Training. This includes emergency responders and medical staff.

9.3.6 Mock Cyanide Emergency Drills and Effectiveness Evaluations

As discussed in Section 7.3.6, SGC will conduct emergency mock drills for response to cyanide exposures and/or releases. Where the evaluation of a mock drill identifies deficiencies in the methods and effectiveness of the response the adequacy of emergency response training will be reviewed, and additional or revised training may be recommended to hone the knowledge and skills of the responders.

10 PUBLIC DIALOGUE AND DISCLOSURE

10.1 STAKEHOLDER OUTREACH AND OPPORTUNITIES FOR COMMUNICATION

SGC conducts on-going communication in Mayo and other regional locations (as required), in order to provide general information on the progress of the Project, and to disseminate general written or visual information on cyanide, its use in the mining process, and the general practices established to protect the environment and the health and safety of the workforce and the public with respect to any potential spills or releases. This communication permits discussion of any concerns or questions related to the use of cyanide or other aspects of mine operations. Stakeholders either through informal meetings, Project specific workshops and open houses, or the regulatory engagement processes include the FNNND, the YWCHSB, community leaders, and other stakeholders.

10.2 DISSEMINATION OF CYANIDE INFORMATION TO EXTERNAL AND INTERNAL STAKEHOLDERS

10.2.1 Written Descriptions of Cyanide Use and Associated Management Practices

Where appropriate, SGC will prepare and maintain written and visual materials suitable for external distribution that describe the use of cyanide on the Project; these may be in the form of a written brochures, booklets, or papers, or may include video or audio presentations, or posters or other graphical/non-verbal methods.

10.2.2 Dissemination of Information on Cyanide Exposures or Releases

SGC is committed to disseminating information on any cyanide exposures or releases that could impact human health or the environment, in compliance with all applicable Yukon and Federal Government requirements. SGC-CMP-SOP-020, "*Cyanide Emergency Response Procedures*" will provide guidance on responding to injuries and serious incidents as defined in Section 30(1) of the current *Yukon Occupational Health and Safety Act* (Yukon, 2002b). These will include any release of process solution outside of containment, any release of hazardous product in which there is a potential for that product to enter a waterway, and any release that results in dysfunction from lack of oxygen or poisoning. In addition, as noted in the *Emergency Response Plan*, a designated member of SGC's senior management team will serve as a single point of contact with the media for specific information on any such exposure or release, associated corrective measures, and preventive measures taken the reduce or prevent the recurrence of similar incidents in future.

11 REFERENCES

ANSI/ASME, 2007; ANSI/ASME 13.1-2007, “Scheme for the Identification of Piping Systems”; American National Standards Institute/American Society of Mechanical Engineers, New York, New York, 2007.

API, 2008; API Standard 653 *Tank Inspection, Repair, Alteration, and Reconstruction,* Third Edition, Includes Addendum 1 (2003), Addendum 2 (2005), Addendum 3 (2008); American Petroleum Institute, Washington , D.C., USA, 2008.

ICMI, 2009; *International Cyanide Management Institute - Cyanide Transportation Verification Protocol;* accessed at http://www.cyanidecode.org/pdf/14_ICMITransportProtocol.pdf; International Cyanide Management Institute, Washington, D.C., USA, October 2009.

ICMI, 2016; *International Cyanide Management Code;* accessed at https://www.cyanidecode.org/sites/default/files/pdf/18_CyanideCode12-2016.pdf; International Cyanide Management Institute, Washington, D.C., USA, December 2016.

ICMI, 2018; *International Cyanide Management Institute - Mining Operations Verification Protocol*; accessed at https://www.cyanidecode.org/sites/default/files/pdf/9_GoldMiningProtocol_2-2018.pdf ; International Cyanide Management Institute, Washington, D.C., USA, February 2018.

IFC, 2007; *Environmental, Health and Safety Guidelines for Mining;* World Bank/International Finance Corporation, Washington, D.C., USA, December 10, 2007.

Yukon, 2002a; Yukon Occupational Health and Safety Act. 2002 “Workplace Hazardous Materials Information System (WHMIS) Regulations, O.I.C. 1988/107, as amended by: O.I.C. 193/88”; Government of Yukon, Whitehorse, Yukon Territory, 2002.

Yukon, 2002b; Yukon Occupational Health Act, Section 30(1), “Report and investigation”; accessed at http://www.gov.yk.ca/legislation/acts/ochesa.pdf; Government of Yukon, Yukon Workers' Compensation Health and Safety Board, Whitehorse, Yukon Territory, 2002.

Yukon, 2006a; Yukon Occupational Health Regulations; accessed at http://www.wcb.yk.ca/Media/documents/Occupational_Health_Regs.pdf; Government of Yukon, Yukon Workers' Compensation Health and Safety Board, Whitehorse, Yukon Territory, 2006.

Yukon, 2006b, “Yukon Mine Site Reclamation and Closure Policy”; accessed at http://www.emr.gov.yk.ca/mining/pdf/mine_reclamation_policy_web_nov06.pdf; Government of Yukon, Energy, Mines & Resources, Whitehorse, Yukon Territory, 2006.

APPENDIX A

Standard Operating Procedures

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

Standard Operating Procedures (SOPs) are written instructions that describe routine or repetitive methods or processes to be followed by an organization. The development and use of SOPs are an integral part of a successful quality system that provide individuals with the information to perform their jobs safely, properly, with consistency, and in compliance with regulatory requirements.

When used as part of personnel training, are readily accessible to and consistently implemented by individuals performing the activity, they assist the organization in maintaining quality assurance and quality control.

1.2 PURPOSE

The purpose of this document is to establish a uniform process for the preparation, review and approval of SOPs and management plans for the Eagle Gold Mine. Once established, SOPs are considered to be controlled documents, and this procedure outlines the process for controlling distribution, regular review and updating of procedures and plans.

1.3 SCOPE

This procedure applies to all employees, supervisors, and managers of the Eagle Gold Mine who may be involved in the preparation, review, approval, implementation, update or distribution of SOPs.

1.4 RESPONSIBILITY

1.4.1 Mine General Manager or their designate:

- Review to ensure SOP includes sufficient detail.
- Approval and sign-off of SOPs.

1.4.2 Department Managers or their designates:

- Review to ensure SOP includes sufficient detail.
- Approval and sign-off of SOPs.

- Provide to Vice President Operations & General Manager or designate for final approval.

1.4.3 Supervisors or their designates:

- Draft and review SOPs immediately once a need for a particular SOP or revision is identified, following this procedure.
- Circulate draft SOPs to relevant staff members for review and comment.
- Finalize SOPs, and provide to department managers for sign-off.
- Distribution, training and implementation of fully approved SOPs.

1.4.4 All Employees

- Follow established and applicable SOPs, and seek clarification if procedure is unclear.
- Identify the need for development or revision of a SOP and convey that need to their immediate supervisor.

1.5 DEFINITIONS

Standard Operating Procedure (SOP): Written instructions that describe routine or repetitive methods or processes to be followed by an organization

Originator: The individual primarily responsible for the development of a SOP

2 OPERATING PROCEDURE

2.1 IDENTIFYING A NEED FOR DEVELOPMENT OF A SOP

All employees are responsible for identifying the need for development of a SOP, or for revision of an established SOP, and conveying that need to their immediate supervisor. A new SOP or revision to an established SOP may be, for example:

- the result of a safety incident;
- the implementation of a new or high hazard task;
- the use of new or specialized equipment; or
- as part of the regular review schedule.

Supervisors or their designate will then evaluate whether a new SOP or revision to an established SOP is the best solution to address the issue. If so, Supervisors or their designate will seek approval from their Department Manager to begin preparing or revising a SOP.

2.2 SOP PREPARATION

SOPs are prepared by supervisory staff qualified to perform the procedure. SOPs should be written in a concise, step-by-step, easy-to-read format. Information should be clear and explicit to remove doubt as to what is required. Flow charts and checklists can be used to illustrate the process being described.

All new SOPs should include:

- **Page Header Contents:** StrataGold Corporation logo, title of the SOP, Department, Document Number, Section, Effective Date, Revision, Replaces, and Approval (to be signed once final)
- **Introduction** (optional): brief description of context and/or explanation of why the SOP has been established.
- **Purpose:** specific operations, tasks or identified safety hazards covered by the SOP.
- **Scope:** Personnel impacted and required to adhere to the new procedure.
- **Responsibility:** Personnel responsibilities for tasks outlined within the SOP.
- **Definitions:** Included if there are definitions of specific technical terms, concepts or acronyms used within the SOP.
- **Operating Procedure:** A description of each task in detail, including:
  - The order in which activities are done
  - Timing sequences and times allowed
  - Materials or tools used and how they are used
  - Safety or health considerations – place these warnings PROMINENTLY in the SOP.

- **References and Related Documents:** References to other associated SOPs, or material relied upon to develop procedure.
- **Document Control and Frequency of Review:** Plans and SOPs should be reviewed regularly and in response to a change at the mine site that might affect the procedure. Frequency of regular reviews will depend on the plan or SOP, and should be indicated in this table.
- **Distribution Control:** included if external distribution of plan or SOP is required.

2.3 SOP REVIEW AND APPROVAL

- Review the draft with impacted staff including managers and supervisors impacted by the SOP.
- Have staff check the written procedures against actual practices before implementation and make revisions if necessary.
- Once the team agrees that procedures and expectations are appropriate and achievable, provide the SOP to the Department Manager or their designate for sign-off.
- Supervisor are then responsible for internal distribution, training and implementation of SOPs.

2.4 EXTERNAL DISTRIBUTION

In some cases, SOPs or plans will need to be shared with external parties. For example, Emergency Response plans and procedures may need to be shared with local authorities. In cases like this, a section tracking external distribution of a plan or SOP is required.

If a plan or SOP distributed externally is revised, the Department Manager will be responsible for providing external parties with up-to-date versions.

EXTERNAL DISTRIBUTION TABLE		
Distributed To:	**By:**	**Date:**

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

Department:	Human Resources	**Document No.:**	***SGC-CMP-SOP-002***
Section:		**Effective Date:**	January 1, 2019
Revision:		**Replaces:**	
Approved:	David Rouleau, Vice President Operations & General Manager		

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 Purpose

The purpose of this procedure is to establish the process of ensuring the competence, training, and hazard awareness of personnel performing tasks at the Eagle Gold Mine (EGM).

1.2 Scope

This procedure applies to all employees, visitors, and contractors at the EGM performing tasks involving cyanide in any form.

1.3 Responsibility

1.3.1. Mine General Manager or their designate:

- Implements training plans;
- Verifies training procedures are implemented;
- Ensures resources are allocated for required training; and
- Responsible for the evaluation, training and improvement of technical and quality related skills.

1.3.2. Department Managers or their designates:

- Approve individual training plans and records; and
- Implement training plans.

1.3.3. Health, Safety and Security Manager or their designate:

- Monitor the implementation of this procedure; and
- Ensure this procedure is maintained.

1.3.4. Supervisors:

- Ensures proper supervision of trainees until training is completed;
- Monitors employee competence to identify any need for retraining or continuous education;
- Identifies training needs resulting from new or revised procedures;
- Make recommendation on individual training plans;
- Implement training plans; and
- Keep training records for their staff.

1.3.5. All Employees:

- Make recommendations on individual training plans; and
- Ensure their professional training is up to date

1.4 Definitions

Emergency Response Team (ERT): EGM personnel specifically identified and trained in response procedures for emergency situations.

2 OPERATING PROCEDURE

2.1 Training Requirements

2.1.1. Hazard Information

Department managers or their designates will ensure that each worker at the EGM who works with a hazardous product or may be exposed to a hazardous product in the course of their work has received the appropriate education and training. The education and training will include hazard product information received from a supplier, as well as training on the use, storage, and handling of that hazardous product.

2.1.2. Hazard Signage, Labels, and Safety Data Sheets

Department managers or their designates will ensure that each worker at the mine who works with a hazardous product or may be exposed to a hazardous product in the course of their work has received education and training on how to read and assess supplier labels, hazard signage, and safety data sheets. The employee must be able to identify the purpose and significance of suppler labels, workplace labels, and safety data sheets. Safety data sheets for all hazardous substances at the mine will be made readily available to all employees. During workplace orientations, workers will be shown the location of all fixed hazard signage within their working, recreating and living spaces as necessary and as determined by Department managers.

2.1.3. Workplace Procedures

Department managers or their designates will ensure that each worker at the mine has received training in procedures for the safe use, storage, handling, and disposal of hazardous product in their workplace. The procedures will include steps to take when dealing with, but not limited to, hazardous material in a pipe, a piping system, a process vessel, a reaction vessel, or a tank truck.

2.1.4. Hazard Assessment

Department managers or their designates will ensure that each worker is trained and able to assess when hazardous and/or abnormal operating conditions are present in their workplace. The assessment of hazardous and/or abnormal operating conditions will specifically include training in the recognition of exposure symptoms.

In the case of exposure, spills and emergency response, personnel will be trained on the procedures described the Spill Response Plan, the Emergency Response Plan, the HLF Emergency Response Plan and SGC-CMP-SOP-020 “Cyanide Emergency Response Procedures”.

2.1.5. Refresher Training and Knowledge Evaluation

Department managers or their designates will review the education and training provided to workers and the knowledge and procedures provided regarding the safe use, handling, and storing of hazardous products. Reviews will be at least annually with additional reviews if there is a change in work conditions, new hazard information, or in consultation with the Joint Occupational Health & Safety Committee and health and safety representatives.

2.2 Training Process

2.2.1. Induction Training

All visitors to the EGM will be required to complete site induction training prior to being permitted to enter the operating area of the site. This induction training will include a briefing on potential hazards at the site, required PPE, general health and safety precautions, and emergency response procedures.

2.2.2. Cyanide Hazard Recognition Training

All full-time employees and contractors working in areas where there is a potential for encountering cyanide will also be required to complete Cyanide Hazard Recognition training. This component of the overall training program will include actions to be taken by the first responder in the event of an emergency (i.e., report the emergency by calling CODE 1 on the radio, stating name, location and nature of the assistance required and provision of first aid and decontamination procedures). Cyanide Hazard Recognition training will also include recognition of cyanide exposure symptoms and the application of basic first aid including the administration of medical oxygen and appropriate decontamination practices. The training program will include instruction on the location of emergency showers/eyewashes and emergency first aid stations, and practical exercises on the administration of medical oxygen and contacting appropriately trained personnel for the administration of an antidote.

This program will include a general introduction to this Cyanide Management Plan, the Spill Response Plan and the Emergency Response plans including all relevant SOPs. Training topics will also include: recognizing dry cyanide and process leach solution, and where such materials will be encountered within the operation; discussion of the health effects of cyanide; precautions to prevent cyanide exposure; symptoms of cyanide exposure; and specific procedures to follow in the event of exposure.

2.2.3. Management Plans and Supporting SOPs

As part of their standard job-specific training, employees directly involved with cyanide receipt, storage, use, first aid treatment, and/or containment and spill response will receive specific training on the management plans and supporting SOPs that govern their work. At a minimum, these management plans, either wholly or in part as appropriate, will include:

- Cyanide Management Plan;

- Spill Response Plan;
- HLF Contingency Water Management Plan;
- Emergency Response Plan;
- HLF Emergency Response Plan
- ADR Preventive Maintenance Program Plan; and,
- ADR Plant Operations Manual.

Such training will involve instruction on required operational tasks, the prevention of unplanned releases of cyanide, minimization of cyanide-related risks to their own health and safety and the health and safety of their co-workers and the general public; and the protection of the environment.

2.2.4. Trainers

Employee task training will be undertaken by dedicated training specialists with experience in the cyanide process, or by supervisors or managers with prior experience in training and the knowledge and experience in the systems and procedures that are the primary subject of the training tasks to be accomplished. Resumes showing the qualifications and experience of trainers will be maintained as per SGC-CMP-SOP-003, “Records Management”.

2.2.5. Comprehension

Testing or observation will be conducted by supervisors to ensure that employees conduct their activities in compliance with cyanide operating procedures and these tests and observations will be used to evaluation the effectiveness of all training programs. Emergency drills simulating worker exposures or releases of process solution will be conducted periodically to ensure that personnel have adequate knowledge and skills in emergency situations.

2.2.6. Evidence and Tracking

Records documenting employee training will be retained throughout an individual’s employment and will include the names of the employee and trainer, the date of training, the topics covered, and if the employee properly demonstrated an understanding of the training materials. Training records will be taken and retained in accordance with SGC-CMP-SOP-003, “Records Management”.

2.3 Emergency Response Training

2.3.1. Emergency Response Team

Emergency responders and coordinators will be trained in all elements of the Emergency Response Plan and their specific responsibilities and duties during an emergency response. In addition to Cyanide Hazardous Awareness training, members of the WGM Emergency Response Team (ERT) will also complete and maintain training in responses to accidents, fire, and hazardous material release and exposure. All ERT members will be trained in the use of self-contained breathing apparatus (SCBA) and selected members will also be trained, or required to have been certified prior to employment, to Occupational First Aid Level 3. In addition to participating in mock emergency drills, the ERT will also meet routinely for classroom and practical emergency response training. All training records will be maintained as per SGC-CMP-SOP-003, "Records Management."

2.3.2. Offsite Emergency Responder Cyanide Information Sharing

The Health and Safety Manager or designate will engage with offsite Emergency Responders and health care professionals including the Yukon Hospital Corporation, Whitehorse General Hospital, Mayo Health Centre, and the Mayo Nursing station to provide information regarding SGC's responses to cyanide related emergencies.

Medical staff will be familiarized with the Emergency Response Plan and their responsibilities and duties in the event of a medical emergency, as deemed necessary by those offsite agencies. SGC will provide their own emergency response capability; however, the Health and Safety Manager or designate will ensure that offsite health care facilities have been advised that the provision of MEDEVAC and hospital care in the event of a cyanide exposure emergency may be necessary.

2.3.3. Refresher Training Requirements

As discussed in Section 2.1.5, all employees that may encounter cyanide in the work place will be required to complete Cyanide Hazard Awareness training and annual Refresher Training. This includes EGM emergency responders and medical staff. The Health and Safety Manager or designate will extend an invitation to attend annual refresher training to offsite emergency responders as necessary.

2.3.4. Mock Cyanide Emergency Drills and Effectiveness Evaluations

As discussed in Section 2.3.1, the ERT will conduct emergency mock drills for response to cyanide exposures and/or releases. Where the evaluation of a mock drill identifies deficiencies in the methods and effectiveness of the response the adequacy of emergency response training will be reviewed, and additional or revised training may be recommended to hone the knowledge and skills of the responders.

3 REFERENCES AND RELATED DOCUMENTS

3.1 Reference & Related Document List

Document	Primary File Location	Frequency of Review
Cyanide Management Plan	H&S Office	Annual
Spill Response Plan	H&S Office	Annual
HLF Contingency Water Management Plan	H&S Office	Annual
Emergency Response Plan	H&S Office	Annual
HLF Emergency Response Plan	H&S Office	Annual
Preventive Maintenance Program Plan	Maintenance Office	Annual
ADR Plant Operations Manual.	ADR Plant	Annual

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

Project records provide evidence of actions, decisions, supporting daily functions and Eagle Gold Mine (EGM) operations. Records may be used to support EGM policy formation and managerial decision-making. They support consistency, continuity, efficiency and productivity and help execute operations at the EGM safely, and effectively. EGM records held or created form part of the company's information resource, and may comprise records in formats including hard copy, electronic, and photographic records. Records may include information relevant to the following areas:

- Health and Safety information and incident investigation reports
- Environmental data
- Management Plans and SOPs
- Results of ongoing monitoring and inspections
- Personnel/Human Resources information including training records
- Purchasing/supply inventory and contracts, agreements, amendments, and purchase orders
- Correspondence, meeting notes and change management records that include decisions or approvals
- Design and construction reports, Construction Quality Assurance (CQA) inspection packages and commissioning/acceptance test records.

1.2 PURPOSE

This document sets out a framework for EGM personnel creating and using records to follow in order to ensure that records are managed and controlled effectively, and meet legal, operational and information needs.

1.3 SCOPE

This procedure applies to all staff with responsibility for the creation, use and management of Project records.

1.4 RESPONSIBILITY

1.4.1 Mine General Manager or their designate:

- Ensuring the allocation of resources and promoting these procedures throughout.
- Establishing overall records management policies, procedures and standards for implementing processes.

1.4.2 Department Managers or their designates:

- Ensuring that their department keep records as an integral part of their work and in accordance with established policies, procedures and standards.
- Provide the resources necessary for the management of records

1.4.3 IT Manager or their designate:

- Working with department managers to ensure electronic records are appropriately backed-up, retrievable, and secure.
- Management of electronic EGM archives.

1.4.4 Supervisors or their designates:

- Ensuring that their staff create and keep records as an integral part of their work and in accordance with established policies, procedures and standards.
- Provide the resources necessary for the management of records.

1.4.5 All Employees

- Create, receive and keep records as part of their daily work and do so in accordance with established policies, procedures and standards.

1.5 DEFINITIONS

Archive: A storage function to hold records that must be retained for a significant period of time.

Record: Information created, received and maintained by personnel in pursuance of legal obligations or in the transaction of business. Records include papers, maps, photographs, machine-readable materials or other documentary materials regardless of medium

Record Capture: The process of determining that a record should be made and kept.

Record Retention Schedule: A document providing mandatory instructions for what to do with records (and non-record materials) no longer needed for current business.

Record Register: A document providing formal recognition of the existence of a record or record series.

Unstructured Record: Any record not held in an electronic database.

2 OPERATING PROCEDURE

2.1 RECORDS MAINTENANCE AND STORAGE

Records must be easily retrievable at any time, and there must be an auditable trail of record transactions such that they may be tracked and retrieved for business need or other purposes, such as requests from regulatory agencies or auditors.

Irrespective of their format, records must remain accessible up to the point of disposal. Electronic records must be retained on media that permit reliable access and data migration and/or system modifications.

2.2 GUIDELINES FOR NAMING AND FILLING DOCUMENTS

Records should be stored in a structure of folders with meaningful titles, which is easily interpreted, and makes it straightforward for users to save records in the correct locations. File names should:

- Include consistent use of date, number and name formats (e.g., “YYYYMMDD File Name”)
- Include a File Name that provides a short, accurate description of the contents
- Avoid adding words which increase the length of the file name but do not add to its meaning e.g., ‘and’ or ‘the’
- Not use abbreviations which may not be familiar to all users
- Not be personal to the creator as this may render them unclear to other users
- Identify the version and or status.

2.3 RECORD RETENTION AND BACKUP

Records should be retained for long enough to meet retention requirements. For example, Project monitoring and inspection records must be retained for at least 7 years. Records may however be archived by the IT Manager after 3 years. Department managers or their designates should work with the IT department to ensure regular backup of records.

Department managers or their designates are responsible for ensuring records relevant to their department are retained in accordance with company policy and legal obligations. Department managers are responsible for determining the Record Retention Schedule.

Monthly summaries of required data will be accessed as necessary to support refinements or updates to the operational site wide and HLF water balance models, and will be retained as project records over the life of the mine.

Records must be retained for as long as they are required, and in accordance with their Record Retention Schedule, subject to operational, legal, administrative and historical evaluation.

2.4 CONFIDENTIAL RECORDS

Records that hold personal identifiable information of any individual must be managed as sensitive documents. Records may also be classified as sensitive or non-sensitive in terms of their impact on the running of the business if lost or disclosed. It is important to implement a system of protective marking documents to indicate to the users of documents as to their level of confidentiality and how they should be treated.

2.5 RECORD DISPOSAL

All records must be disposed of in a secure manner to render the information illegible and non-retrievable.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 PURPOSE

To establish a procedure for the Eagle Gold Mine (EGM) to control the receipt and unloading of sodium cyanide at the cyanide storage area, and transfer of sodium cyanide to the processing plant to prevent cyanide releases and/or workforce exposures.

1.2 SCOPE

This procedure applies to all employees and contractors involved in the receipt and unloading of sodium cyanide to the storage area.

1.3 RESPONSIBILITY

1.3.1 Mine General Manager or their designate:

- Overall management of the EGM site and workforce; and
- Approval and sign-off of this SOP.

1.3.2 Department Managers or their designates:

- Ensuring this procedure is communicated to their employees;
- Ensuring their employees have received the appropriate training; and
- Ensuring this procedure is implemented.

1.3.3 Supervisors or their designates:

- Implementing these procedures; and
- Ensuring these procedures are followed.

1.3.4 Health, Safety and Security Manager or their designate:

- Monitoring the implementation of this procedure; and

- Ensuring this procedure is maintained.

1.3.5 All Employees:

- Understanding and practicing this procedure as required; and
- Asking their supervisor for clarification if they are unsure of any aspect of this procedure.

2 OPERATING PREOCDURE

2.1 SAFETY

All personnel taking part in the receiving of sea cans containing dry sodium cyanide briquettes in one-tonne Intermediate Bulk Containers (IBCs) and the transfer of IBCs into the storage area are required to use the following PPE in addition to any other PPE required for the ordinary execution of their work:

- Overalls
- Full face shield
- Elbow length chemical-resistant gloves (impervious)
- Splash apron
- Rubber boots
- Portable hydrogen cyanide monitor

All persons involved in this procedure should not be alone. An additional person should be always present during this procedure. During this procedure the affected areas should be vacated of all non-authorized and non-trained personnel.

2.2 SAFE STORAGE

- Appropriate PPE, as listed in Section 2.1, must be worn when in the bulk cyanide storage area, the ADR Plant cyanide receiving bay, and the ADR plant cyanide storage area.

2.2.1 Bulk Cyanide Storage Area

- The bulk cyanide storage area is a lined pad external to the ADR Plant. The bulk cyanide storage area is graded so that any surface runoff flows directly into the heap leach pad.
- No excavation of any kind in this area is permitting without the approval of the Process Manager and the Site Manager to ensure that the liner system underneath the bulk cyanide storage area is not damaged.
- The bulk cyanide storage area is only to be used for the storage of sea cans containing the IBCs. Under no circumstance may IBCs be stored in the bulk cyanide storage area if they are not secured within a sea can.
- Storage areas are to be secured by limiting access to only authorized personnel at all times.
- The sea cans are to be placed such that the lockable ends of two containers are facing each other.
- The sea cans must not be stacked on top of another sea can.
- Keep containers closed and contents dry.
- Do not store with acids or acid salts, containers with water or weak alkalis, or oxidizing agents.

- Do not handle or store food, beverages, or tobacco in cyanide areas.
- Do not store near combustibles or flammables.

2.2.2 ADR Plant Cyanide Receiving Bay and Cyanide Storage Area

- Any area within the ADR Plant used for the receipt and storage of cyanide is designed to be dry, well-ventilated, secured and equipped with constant visual and electronic monitoring. The areas are also designed with secondary containment (i.e., berms and bund walls) in the unlikely event of spillage. If any of cyanide receipt or storage area is found to be in a condition that does not match the design criteria the area is not to be used and the situation MUST be immediately reported to supervisors or their designates.
- IBCs should be stored in a manner that is upright, prevents damage from falling, and allows for easy access and inspections.
- Storage areas are to be secured by limiting access to only authorized personnel at all times.
- No drainage from the ADR Plant cyanide receiving bay nor the cyanide storage area must be allowed to flow into the site's surface water collection system. The receiving bay and storage area are graded such that any fluids that may have spilled are captured within dedicated sumps with the ADR building.
- Keep containers closed and contents dry.
- Do not store with acids or acid salts, containers with water or weak alkalis, or oxidizing agents.
- Do not handle or store food, beverages, or tobacco in cyanide areas.
- Do not store near combustibles or flammables.

2.3 TRANSFER FROM DELIVERY VEHICLE TO STORAGE AREA

a. Perform a preoperational safety inspection. Refer to document SGC-CMP_SOP-018, Cyanide Workplace Safety Meetings, and SGC-CMP_SOP-007 Cyanide Facility Inspections, for more information.

b. Ensure that there is enough storage capacity in the bulk cyanide storage area to hold the contents of the delivered shipment.

c. Have the vendor truck driver position the truck at the unloading station so that the truck can be accessed easily by forklift.

d. Ensure that the truck brakes are engaged, and the wheels are chocked before unloading the contents of the truck with a forklift. Make sure any obstacles are cleared away from the area.

e. Inspect the sea cans for any damage or broken seals. Any damaged containers should be refused and reported to the Shift Supervisor and the Procurement department.

f. The sea cans should be loaded onto the forklift for transfer to the bulk cyanide storage area.

g. The sea cans are to be placed such that the lockable ends of two containers are facing each other.

h. When the truck has been emptied or the bulk cyanide storage area is full, remove the wheel chocks and make sure obstacles are clear.

i. Record the load weight and volume.

2.4 TRANSFER TO ADR PLANT SEA CAN STORAGE AREA

a. Perform a preoperational safety inspection. Refer to document SGC-CMP_SOP-018, Cyanide Workplace Safety Meetings, and SGC-CMP_SOP-007 Cyanide Facility Inspections, for more information.

b. Ensure that there is enough storage capacity in the ADR Plant sea can storage area for the planned transfer.

c. Forklift operators will transfer the sea can from the bulk cyanide storage area to the sea can storage area within the ADR plant.

2.5 TRANSFER TO ADR PLANT SHORT TERM IBC STORAGE AREA

a. Perform a preoperational safety inspection. Refer to document SGC-CMP_SOP-018, Cyanide Workplace Safety Meetings, and SGC-CMP_SOP-007 Cyanide Facility Inspections, for more information.

b. Ensure that there is enough storage capacity in the ADR cyanide storage area for the planned transfer.

c. Forklift operators will remove one IBC per trip from the sea can in the ADR Plant sea can storage area for transport to short term storage within the ADR plant.

d. The IBCs will be stacked no more than three high in the ADR short term storage area.

2.6 TRANSFER TO ADR PLANT MIXING AREA

a. Perform a preoperational safety inspection. Refer to document SGC-CMP_SOP-018, Cyanide Workplace Safety Meetings, and SGC-CMP_SOP-007 Cyanide Facility Inspections, for more information.

b. Ensure that there is enough storage capacity in the ADR mixing area for the planned transfer.

c. Forklift operators will remove one IBC per trip from the ADR short term storage area for transport to the ADR plant mixing area.

d. The IBC will be placed in the pickup zone for further handling by the remote-controlled crane for further handling as described in SGC-CMP_SOP-005 - Cyanide Mixing Process.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review
SGC-CMP_SOP-018, Cyanide Workplace Safety Meetings	ADR Plant	Monthly
SGC-CMP_SOP-007 Cyanide Facility Inspections	ADR Plant	Monthly

REVISION CONTROL TABLE

Version No.	Date	Pages(s)	Section(s)	Purpose of the Modification

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

Cyanide is delivered to and stored at the Eagle Gold Mine (EGM) in solid briquette form in 1 tonne nylon "supersacks", overpacked in Intermediate Bulk Containers (IBCs). Solid sodium cyanide briquettes are mixed with water in the cyanide mixing tank to produce solution required for the heap leaching and gold recovery process, and subsequently stored in the cyanide storage tank prior to distribution for process needs.

The cyanide mixing tank and storage tanks are shown in Figure 1. These tanks are contained, covered and equipped with an exhaust fan to ensure that any harmful gasses are removed from working areas.

The mixing procedure is partially automated and requires operators. The ADR (adsorption, desorption and recovery) building contains appropriate crane facilities for lifting and positioning reagent supersacks over the mixing tank. The mixing tank is fitted with a hopper and integrated bag cutter and bag rinse arrangement. The cyanide mix plant area is well ventilated to minimize the potential for build-up of HCN (hydrogen cyanide) vapour. The gold recovery process requires approximately 14.4 tonnes (t) of sodium cyanide per day, which is provided to the ADR Plant by mixing two 1 t bags of sodium cyanide with 8 t of water to 9.0 m^3 of 20% strength solution several times a day. The resulting solution has a specific gravity of 1.11.

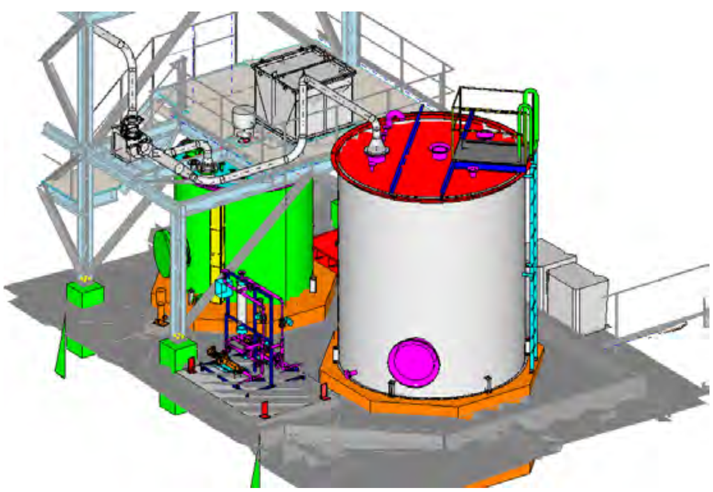


Figure 1: Cyanide Mixing Area

1.2 PURPOSE

To establish a mixing procedure to safely and effectively control the preparation of cyanide solution in the processing plant.

1.3 SCOPE

This procedure applies to all employees and contractors working at the ADR Plant.

1.4 RESPONSIBLITY

1.4.1 Mine General Manager or their designate:

- overall management of the EGM sites and workforce.

1.4.2 Department Managers or their designates:

- ensuring this procedure is communicated to their employees;
- ensuring their employees have received the appropriate training; and
- ensuring this procedure is implemented.

1.4.3 Supervisors or their designates:

- implementing these procedures; and
- ensuring these procedures are followed.

1.4.4 Health, Safety and Security Manager or designate:

- monitoring the implementation of this procedure; and
- ensuring this procedure is maintained.

1.4.5 All Employees:

- understanding and practicing this procedure as required; and
- asking their supervisor for clarification if they are unsure of any aspect of this procedure.

2 OPERATING PROCEDURE

2.1 SAFETY

All persons taking part in the transport of sodium cyanide into the mixing area and following these procedures to prepare cyanide solution are required to use the following personal protective equipment (PPE):

- Approved breathing apparatus
- Chemical resistant face shield
- Chemical resistant suit
- Chemical-resistant gloves (thick, non-penetrable, non-disposable)
- Personal HCN monitor

Required PPE is further described in SGC-CMP-SOP-008 “PPE Required for Cyanide Facility Operations”. Guidelines for operating personal HCN monitors are outlined in SGC-CMP-SOP-022 “HCN Monitors”.

Mixing operations will at all times be conducted by a two-person team.

During the execution of this procedure, the affected areas will be barricaded from all non-authorized and non-trained personnel.

The mixing and storage tank will be maintained at a pH of 12 or greater as a precaution against the generation of HCN.

2.2 RETRIEVING STOCK

This retrieval process is only to be followed for transporting cyanide from the temporary IBC storage area in the ADR Plant to the cyanide mixing area. All other procedures to be followed for the receipt and storage of cyanide are provide in SGC-CMP-SOP-004 “Receipt and Storage of Reagent Cyanide”.

When retrieving dry sodium cyanide from the ADR Plant temporary IBC storage area, only the stock that will be used immediately should be taken. The amount of sodium cyanide retrieved must be recorded in the “Cyanide Stock Use” controlled log book.

Due to the possibility that harmful gasses and dust can escape from packaging when opened, cyanide safety precautions and PPE should be utilized prior to accessing the temporary storage area.

Ensure that the area where the packaging is being handled is clear of all non-authorized and non-necessary personnel, and that there is no potential for contact with liquids.

2.3 PREPARATION OF CYANIDE

The following triggers must be met for the operator to initiate preparation of a new batch of process solution:

- The cyanide mixing tank is empty;

- There is sufficient space in the cyanide storage tank to accept a 9 m^3 batch of solution; and
- At least two sodium cyanide IBCs are in the ADR Plant temporary IBC storage area.

2.3.1 Mixing Process

1. The number of packages of dry sodium cyanide briquettes, as determined by the cyanide solution preparation schedule, should be confirmed in the ADR Plant mixing area.
2. The control system will be engaged by the Process Supervisor to:
    - turn on the cyanide mix tank and storage tank exhaust fan,
    - add water to the cyanide mixing tank until the tank level is 8 m^3,
    - open the reagent bag breaker, and
    - turn on agitator.
3. The operator, wearing the full cyanide handling PPE as described above, will pry the lid off two 1 t cyanide IBCs.
4. From the ground, the remote-control crane will be engaged to remove a cyanide supersack from the IBC using the supersack's straps. The remote-control crane will then position the supersack in the reagent bag splitter located above the cyanide mixing tank. As the supersack is lowered in the reagent bag breaker, the sack is cut open, releasing the sodium cyanide briquettes into the mixing tank via the reagent bag breaker chute that is connected to the cyanide mixing tank.
5. The package will then be triple rinsed within the reagent bag breaker before being removed by the remote-controlled crane.
6. The washed supersacks will be placed in the IBCs for final disposal in accordance with SGC-CMP-SOP-007 "Controlled Disposal of Cyanide Packaging".

NOTE: In the unlikely event of any equipment or process failure that results in a spill of dry sodium cyanide in the mixing area:

- Avoid breathing in dust.
- Work up wind or increase ventilation.
- DO NOT allow material to get wet.
- Immediately sweep up any spilled cyanide and place it in a suitable container.
- Wash and/or treat any contaminated areas with dilute sodium or calcium hypochlorite solution (bleach) to destroy the cyanide. Allow 1 hour for complete decomposition before washing spillage area down with large quantities of water.
- All spills must be immediately reported to the designated Health, Safety and Security Manager.

7. The control system will then be used by the Process Supervisor to:

- Agitate the mix for 60 minutes
- Turn off agitator once mixing is complete
- Pump the mixed solution to the cyanide storage tank

8. DISPOSAL OF CYANIDE PACKAGING

Packaging for dry reagent cyanide may still contain residual cyanide and is to be considered hazardous. Refer to document SGC-CMP_SOP-006 “Controlled Disposal of Cyanide Packaging”, for information on cyanide packaging disposal.

3 REFERENCES AND RELATED DOCUMENTS

Document	**Primary File Location**	**Frequency of Review**
International Cyanide Management Code: Auditor Guidance for Mines	ADR Plant	Annually
SGC-CMP-SOP-004 “Receipt and Storage of Reagent Cyanide”	ADR Plant	Monthly
SGC-CMP-SOP-007 “Controlled Disposal of Cyanide Packaging”	ADR Plant	Monthly
SGC-CMP-SOP-008 “PPE Required for Cyanide Facility Operations”	ADR Plant	Monthly

REVISION CONTROL TABLE

Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

After completion of the cyanide mixing procedure as described in SGC-CMP-SOP-005 "Cyanide Mixing Process", including emptying of the cyanide supersacks and triple-rinsing, with all rinseate reporting directly to the mix tank, disposal of the cyanide packaging is to take place.

Empty rinsed bags and all associated overpacking materials (i.e., IBCs, polyethylene liners, and strapping materials) must then be properly and safely disposed of.

1.2 PURPOSE

To establish a procedure for the proper handling and disposal of cyanide packaging in a safe manner.

1.3 SCOPE

This procedure applies to all employees and contractors at the EGM.

1.4 RESPONSIBILITY

1.4.1 Mine General Manager or designate:

- overall management of the EGM sites and workforce.

1.4.2 Department Managers or their designates:

- ensuring this procedure is communicated to their employees;
- ensuring their employees have received the appropriate training; and
- ensuring this procedure is implemented.

1.4.3 Supervisors:

- implementing these procedures; and
- ensuring these procedures are followed.

1.4.4 Health, Safety and Security Manager or designate:

- monitoring the implementation of this procedure; and
- ensuring this procedure is maintained.

1.4.5 All Employees

- understanding and practicing this procedure as required; and
- asking their supervisor for clarification if they are unsure of any aspect of this procedure.

2 OPERATING PROCEDURE

2.1 SAFETY

All persons taking part in the handling and disposal of used sodium cyanide packaging are required to use the following additional PPE:

- Approved breathing apparatus
- Chemical resistant face shield
- Chemical resistant suit
- Chemical-resistant gloves (thick, non-penetrable, non-disposable)
- Chemical-resistant goggles
- Personal HCN monitor

Required PPE is further described in SGC-CMP-SOP-008 "PPE Required for Cyanide Facility Operations". Guidelines for operating personal HCN monitors are outlined in SGC-CMP-SOP-022 "HCN Monitors".

All persons involved in this procedure should not be alone. An additional person should be always present during this procedure.

During this procedure the affected areas should be vacated of all non-authorized and non-trained personnel.

2.2 DECONTAMINATION

Decontamination of cyanide supersacks will be completed during the transfer of sodium cyanide briquettes into the cyanide mixing tank (5530-TK-016). Each bag of cyanide will be triple-rinsed in the reagent bag breaker located above the cyanide mixing tank to minimize residual solids and dust which may remain in the packaging.

2.3 DISPOSAL OF PACKAGING

- Once the triple rinse cycle has been completed, the remote-controlled crane will return the supersack to the first IBC emptied for the batch mix.
- The Process Supervisor will then remove the second supersack from the second IBC using the remote-controlled crane for the batch as described in SGC-CMP-SOP-005 "Cyanide Mixing Process"
- While the second supersack is being processed, the second IBC will be broken down with a prybar and placed into the first IBC.
- Once the triple rinse cycle has been completed for the second supersack, the remote-controlled crane will return the supersack to the first IBC emptied for the batch mix.
- Record all packaging material collected with detailed information to ensure the packaging is

being accounted for and relocated to the appropriate area.

- The IBC will remain in place until the cyanide batch mix is complete.
- Once the Process Supervisor has indicated the cyanide mix is complete, and the solution has been pumped to the cyanide storage tank, the IBC containing both supersacks and the second broken down IBC will be collected by forklift and transferred to the designated waste storage area.
- Incineration of cyanide packaging will occur once enough packaging for an dedicated incineration cycle is stored in the designated waste storage area.
- Wearing appropriate PPE, the supersacks and broken-down IBC will be placed in the incinerator. The first intact IBC will then be broken down carefully with a prybar and placed inside the incinerator.
- Once all packaging has been securely placed in the incinerator, the burn cycle will be initiated such that the autolocking mechanism on the incinerator is engaged until the full burn cycle has been run.
- ADR Plant personnel will then inform Site Services that a cyanide packaging incineration cycle has been engaged so that in the event of that the incineration cycle is interrupted by equipment failure Site Services are aware of the contents and that personnel with cyanide handling training can attend to the scene.
- Ash from the incineration of the packaging upon completion of a full burn cycle will then be stored in a clean and dry 200 L drum at the waste management area that is clearly labeled as “Cyanide Incineration Ash”. Once the 200 L drum is full, it will be transported by Site Services to the HLF for disposal within the lined footprint of HLF.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review
International Cyanide Management Code: Auditor Guidance for Mines	ADR Plant	Annually
SGC-CMP-SOP-005 “Cyanide Mixing Process”	ADR Plant	Monthly
SGC-CMP-SOP-008 “PPE Required for Cyanide Facility Operations”	ADR Plant	Monthly

REVISION CONTROL TABLE

Version No.	Date	Pages(s)	Section(s)	Purpose of the Modification

StrataGold Corporation	Eagle Gold Operating Procedures		
	Cyanide Facility Inspections		
Department:	Process	**Document No.:**	***SGC-CMP-SOP-007***
Section:		**Effective Date:**	January 1, 2019
Revision:		**Replaces:**	
Approved:	David Rouleau, Vice President Operations & General Manager		

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

The goal of cyanide facility inspections is to prevent incidents, injuries, illness, and damage to property or the environment and ensure the facilities and equipment are functional, undamaged and properly maintained.

This procedure applies to cyanide facilities, which include the following:

- Personal Protective Equipment (PPE), emergency response facilities, and equipment
- Cyanide unloading and dry storage areas
- Cyanide mixing and storage tanks and secondary containment
- Incinerator for cyanide packaging materials
- Other ADR plant areas and secondary containments, less the gold room but including the barren solution tank
- Pregnant and barren solution pipelines, containment trenches, and pumping stations/containments
- HLF earthworks, risers, distribution lines, emitters, and leak detection and recovery system
- Events pond and leak detection and recovery system
- Surface water interceptor ditches

1.2 PURPOSE

To establish a procedure and highlight focus areas for conducting cyanide facilities and equipment inspections to ensure processing facilities remain functional, undamaged and properly maintained.

1.3 SCOPE

This procedure applies to all employees and contractors at the Eagle Gold Mine processing facilities.

1.4 RESPONSIBILITY

1.4.1 Mine General Manager or designate:

- overall management of the EGM sites and workforce.

1.4.2 Department Managers or designates:

- ensuring this procedure is communicated to their employees;
- ensuring their employees have received the appropriate training; and
- ensuring this procedure is implemented.

1.4.3 Supervisors:

- implementing these procedures; and
- ensuring these procedures are followed.

1.4.4 Health, Safety and Security Manager or designate:

- monitoring the implementation of this procedure; and
- ensuring this procedure is maintained.

1.4.5 All Employees:

- understanding and practicing this procedure as required; and
- asking their supervisor for clarification if they are unsure of any aspect of this procedure.

2 OPERATING PROCEDURE

It is the operator's responsibility to monitor the operation of the sodium cyanide storage and distribution system while it is operating to ensure that sodium cyanide solution is stored and distributed in a safe and efficient manner. The following procedures list the routine inspection requirements of the operator while the processing facilities are in operation.

2.1.1 Preoperational Inspections

The operator must perform a preoperational inspection prior to putting the sodium cyanide storage and distribution system into service after a complete shutdown, maintenance activities or before a delivery. This inspection determines whether activities, such as further maintenance tasks, must be performed before the start-up begins. Included in the inspection are:

- Incomplete or omitted repairs.
- Tools, slings, and ladders that have not been cleared away after maintenance.
- Locks left on equipment and **Stop** buttons that have not been reset.
- General safety hazards such as obstructions of walkways or stairways, slippery floors, or tripping hazards.

2.1.2 Routine Inspections

2.1.2.1 Cyanide Unloading and Storage Areas

a) Check the adequacy of maintenance of general housekeeping practices, presence of water or debris.

b) Ensure all cyanide and storage areas for presence of and functionality of PPE and emergency response equipment including:

   i) presence of properly rated fire extinguishers

   ii) functionality of fixed HCN alarms and video monitors

   iii) legibility of hazard warning signage

   iv) availability of Material Safety Data Sheets (MSDSs) for cyanide briquettes

   v) availability of warning signs and visual barriers to prevent unauthorized passage of personnel and equipment during offloading

   vi) use of appropriate operator PPE (or availability of such PPE if active handling is not occurring) during receiving, unloading and storing operations

c) Check the external intermodal container storage areas and determine if a bulk shipment is needed.

   i) Check that if more than one intermodal container is located in the external storage area that the openings of each container are facing one another and stored in close proximity so that the doors cannot be opened.

ii) Check that locking mechanisms on any intermodal container that is not abutted by another intermodal container and other security measures are working as intended.

iii) check the intermodal container storage area immediately adjacent to the ADR Plant and surrounding walkways for corrosion, cracks, build-up and deterioration of structure and concrete.

iv) check that there are no hazardous or incompatible waste/materials present in the area.

d) Check the IBC storage area within the ADR Plant and determine if a transfer from the intermodal container directly adjacent to the ADR Plan is needed.

i) check the IBCs and surrounding walkways for corrosion, cracks, build-up and deterioration of structure and concrete.

ii) check that there are no hazardous or incompatible waste/materials present in the area.

2.1.2.2 Cyanide Mixing and Storage Area

a) Cyanide bag cutter arrangement, mixing and storage tanks, and secondary containments

i) Ensure that all aisles and walkways around the sodium cyanide mixing tank and storage tank are clear of obstructions and tripping hazards.

ii) Ensure that all warning and safety signs are clearly visible.

b) Check for structural integrity, cracks, spalling, or deterioration of concrete impoundments

c) Check that the emergency safety shower and eye wash stations are in working order.

i) Ensure the stations are easily accessible.

ii) Ensure the fresh-water valve to the shower is open.

d) Ensure presence of and functionality of PPE and emergency response equipment

i) presence of properly rated fire extinguishers

ii) functionality of fixed HCN alarms and video monitors

iii) condition and use of appropriate operator PPE during mixing operations

iv) temperature, cleanliness, and condition of cyanide antidote kits and first aid storage cabinets

e) Check the condition of chain hoist and bag lifting bridle

f) Check the sodium cyanide transfer pump (5530-PP-035).

i) Check all inlet and outlet connections for signs of leaks and other damage.

ii) When in operation, listen to the motor for unusual sounds that may indicate mechanical problems.

iii) Check the transfer pump for signs of leaks, corrosion, and other damage. Check the transfer lines for leaks and other damage.

g) Check the sodium cyanide mixing (5530-TK-016) and storage tank (5530-TK-017).

i) Check the tank for signs of leaks, corrosion, and other damage.

ii) Check all inlet and outlet connections for signs of leaks and other damage.

iii) Check the feed line for leaks and other damage.

iv) Check the functionality of tank level indicators

h) Visually inspect the sodium cyanide mixing area sump pump (5530-PP-039).

i) Ensure that all safety guards are in place and securely fastened.

ii) Check the level switch for signs of damage.

iii) Check the sump level and ensure that the sump pump is operating if the level is high. When in operation, listen to the pump and motor for unusual sounds that may indicate mechanical problems.

2.1.2.3 Incinerator Area

a) Inspect Pre-incineration checks if an incineration batch is planned or confirm that the incineration log book includes check off on:

i) The adequacy and integrity of security fencing, gate, and lock

ii) Legibility of hazard warning signage including cyanide packaging ash storage container

iii) Evidence of animal intrusion

iv) After incineration, ensure the completeness of combustion of packaging residues

v) Volume of ash in the cyanide packaging ash storage container.

2.1.2.4 ADR Plant and Secondary Containments

a) Visually inspect secondary containment

i) structural integrity, cracks, spalling, or deterioration of concrete impoundments

b) Visually inspect tanks, valves, pumps, and other piping system components for

i) structural integrity,

ii) signs of corrosion,

iii) buildup of cyanide salts, or

iv) leakage and

v) ensure the functionality of tank level indicators

c) Ensure presence of and functionality of PPE and emergency response equipment

  i) functionality of fixed HCN alarms and video monitors

  ii) functionality of eyewashes/emergency showers and water supply line pressure

  iii) temperature and condition of cyanide antidote kits

  iv) condition of emergency response equipment and PPE

  v) legibility of hazard warning and direction flow signage

d) ensure good maintenance and housekeeping, including physical separation from chemically incompatible materials

2.1.2.5 Pregnant and Barren Solution Pipelines and Pumping Stations/Containments

a) Visually inspect pipelines and pumping stations for

  i) structural integrity,

  ii) signs of corrosion,

  iii) buildup of cyanide salts, or

  iv) leakage

b) Ensure presence of and functionality of PPE and emergency response equipment

  i) functionality of fixed HCN alarms and video monitors

  ii) functionality of eyewashes/emergency showers and water supply line pressure

  iii) temperature and condition of cyanide antidote kits

  iv) condition of emergency response equipment and PPE

  v) legibility of hazard warning and direction flow signage

2.1.2.6 HLF Earthworks, Risers, Distribution Lines, Emitters, and Leak Detection and Recovery System

a) Visually check the HLF for signs of erosion, slumps, or cracks in earthworks and the ore pile

b) Check for signs of pipeline/flange leakage, and associated ponding

c) Check functionality of leak detection system

d) Ensure legibility of hazard warning and direction flow signage

e) Check the in-heap pond for adequacy of freeboard daily (comparison to surveyed markers).

f) Check the functionality of leak detection system and maintenance of associated detection logs

g) Check the HLF spillway to ensure that there are no blockages or signs of deterioration

2.1.2.7 Events Pond and Leak Detection and Recovery System

a) Check the events pond for adequacy of freeboard daily (comparison to surveyed markers).

b) Check for tears or holes in liner material or signs of erosion or slumps in underlying earthworks

c) Check for signs of pipeline/flange leakage, and associated ponding

d) Check the functionality of leak detection system and maintenance of associated detection logs

e) Check that hazard warning and direction flow signage are legible

f) Check adequacy of screening or other appropriate avian exclusion devices signs of animal trails or intrusion

g) Check the events pond spillway to ensure that there are no blockages or signs of deterioration

2.1.2.8 Surface Water Interceptor Ditches

a) Check for signs of ponding of runoff water from upgradient catchment in ditch.

b) Check to ensure that there are not blockages

2.1.3 Coordination with the Environmental Team

The Process Manager or their designate is responsible for retrieving relevant inspection information from the Environmental Team. For example, visual monitoring of upgradient water inceptor ditches for their effectiveness in preventing uncontrolled run-on to the HLF are monitored regularly, and meteorological monitoring conducted by the Environmental Team as outlined in the *Environmental Monitoring Surveillance and Adaptive Management Plan*.

The Process Manager or their designate is responsible for responding to request for corrective action that may arise as a result of Environmental inspections.

The Process Manager or their designate is responsible for notifying the Environmental Manager or their designate if signs of wildlife are observed during inspections, and immediately documenting and reporting any observed wildlife fatalities in accordance with SGC-CMP_SOP-011 *"Wildlife Mortality Reporting/Investigation".*

2.1.4 Timely Reporting on Inspections

The designated personnel performing the inspection must report all conditions imminently dangerous to life, health or the environment to the supervisor of the work area, who shall take immediate action resulting in either permanent or interim correction of the condition reported.

The designated personnel must complete a written inspection report detailing the findings of the inspection, and recommendations for corrective action follow-up.

2.1.5 Recommendations from Inspection

The work area Manager, Supervisor and Health, Safety and Security department must review workplace inspection reports and consider the report recommendations for corrective action.

The work area Manager, Supervisor and Health, Safety and Security department must establish follow-up procedures for all recommendations.

2.1.6 Regular Review of Inspection Results

The Process Manager or their designate is responsible for reviewing cyanide facility inspection records. Additionally, the Health, Safety and Security Manager or their designate is responsible for reviewing the results of cyanide facilities routine inspections on at least a weekly basis.

Review of inspection results will involve assessing whether there is a need for corrective maintenance activities or response. Reviews will determine where whether:

- performance meets design expectations;
- conditions require adjustment to design, operation, maintenance or surveillance; or
- there is a Potential Emergency Response Alert.

2.1.7 Initiating a Maintenance Work Order

The observer and/or their supervisor will be able to create a maintenance work order request, if required as a result of failed inspection.

Additionally, the Process Manager and Health, Safety and Security Manager are responsible for ensuring work order requests have been created by observers if required, or creating maintenance work order requests as a result of their review as needed.

Work order requests should clearly indicate that the failed inspection is with regard to a cyanide facility. The maintenance program is designed to ensure that cyanide facility-related actions receive the highest priority over all other maintenance actions.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review
International Cyanide Management Code: Auditor Guide for Mines	SHE	As needed

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 PURPOSE

The purpose of this procedure is to establish the guidelines for selection, use, inspection, maintenance, and storage of personal protective equipment (PPE).

1.2 SCOPE

This procedure applies to all employees and contractors at the Eagle Gold Mine (EGM) performing tasks involving cyanide.

1.3 RESPONSIBILITY

1.3.1 Mine General Manager or their designate:

- Conduct overall management of the EGM sites and workforce; and
- Coordinate the accident prevention activities.

1.3.2 Department Managers or their designates:

- Instruct workers on safety and risk management;
- Ensure that a worker uses or wears the equipment, protective devices, or clothing required by regulations or the nature of the work;
- Alert workers of the existence of any known potential danger to the health or safety of the worker; and
- Provide workers with written instructions as to the measures and procedures to be taken as required.

1.3.3 Health, Safety and Security Manager or their designate:

- Monitor the implementation of this procedure; and
- Ensure this procedure is maintained.

1.3.4 Supervisors:

- Instruct workers on safety and risk management;
- Ensure that a worker uses or wears the equipment, protective devices, or clothing required under regulations or the nature of the work;
- Alert workers of the existence of any known potential danger to the health or safety of the worker; and
- Provide workers with written instructions as to the measures and procedures to be taken as required.

1.3.5 All Employees:

- Take all necessary precautions to ensure their own health and safety and that of any other person in the workplace;
- Use the safety devices and wear the safety clothing or equipment provided by the employer required by regulations or the nature of their work.
- Comply with health and safety procedures and with instructions given for their own or any other person's health or safety by a person having authority over them;
- Report immediately to their immediate supervisor any situation which they have reason to believe would present a hazard and which they cannot correct; and
- Report any accident or injury that arises in the course of or in connection with their work.

1.4 DEFINITIONS

HCN: Hydrogen Cyanide

IDLH: Immediately Dangerous to Health

NIOSH: National Institute for Occupational Safety and Health

STEL: Short-term exposure limit

2 OPERATING PROCEDURE

2.1 HIERARCHY OF CONTROLS

2.1.1 Logic for Controls

Personal protective equipment (PPE) is the last line of defense for protecting workers. The best methods of mitigating risk are engineering, administrative, or other controls. Personal protective equipment is to be used:

1. When such equipment is necessary to protect the safety and health of the worker, where risk have not been adequately controlled by other means;
2. Where its use could not be substituted by other means, such as:
    - In an emergency situation or rescue work
    - During fire-fighting activities
    - Where close or direct contact is necessary to carry out work (e.g., in welding operations or manual handling of chemicals)
    - In situations where there is a possibility of heavy or sharp object falling or knocking against hard objects
    - In situations where there is a possibility of stepping onto sharp objects
    - During cleaning or maintenance operations
    - For certain intermittent or short-term operations where installing engineering controls would be economically impractical
3. As a temporary measure while another control measure, such as engineering control, is being introduced; or
4. As a backup or to complement other measures.

2.1.2 Engineering Controls

Engineering controls at the ADR (adsorption, desorption and recovery) Plant include local extraction fans where tasks involving sodium cyanide in both solution and powdered form are conducted. The ADR Plant has been designed to minimize employee interaction with WAD (weak acid dissociable) cyanide through using piping and containment measures. Hydrogen cyanide (HCN) gas monitors are located in areas where HCN gas has the potential to be present in the case of a system malfunction. HCN gas monitors will alert personnel of HCN gas prior to the buildup of dangerous concentrations.

2.1.3 Administrative Controls

Cyanide Hazard Recognition training is mandatory for all employees and contractors who will be handling cyanide or working in and around the processing facilities, including members of the EGM Emergency Response Team and all personnel in the Health, Safety and Security Department. Annual refresher training is also required. Employees will use a Buddy System procedure when performing work in potentially hazardous circumstances.

2.1.4 Personal Protective Equipment Levels

The Process Manger and the Health, Safety and Security Manager or their designates are responsible for working with personnel to ensure that the appropriate PPE is selected, considering the location and tasks to be performed by an individual.

The EGM has adopted four PPE “levels” to protect workers who may encounter cyanide as described below.

2.2 GENERAL PPE REQUIREMENTS (LEVEL D)

2.2.1 Task Description

Level D tasks are those being conducted in the ADR facility or other locations where cyanide may be present.

2.2.2 Personal Protective Equipment

All employees and visitors on site will be required to comply with site PPE requirements.

Employees working with and/or around cyanide will be required to wear additional cyanide-specific PPE. General cyanide PPE will be the minimum amount of PPE required when working in areas or on tasks that may contain cyanide compounds.

The general cyanide PPE corresponds to National Institute for Occupational Safety and Health (NIOSH’s) Level D, or Green Zone, rating and may only be used in areas when cyanide concentrations are known and below a STEL (short-term exposure limit) of 4.7 ppm. Level D general PPE is as follows:

- A hardhat;
- Steel toe boots;
- Coveralls or other work clothes covering the full body;
- Gloves;
- Safety glasses; and
- Hearing protection, where appropriate.

2.3 CYANIDE RESPONSE / DECONTAMINATION PPE (LEVEL C)

2.3.1 Level C Task Descriptions

NIOSH Level C, or Yellow Zone, PPE is used for tasks where the level of HCN gas or cyanide particulate is known and it is below the HCN IDLH (immediately dangerous to health) value of 50 ppm. Level C tasks may include decontamination, first aid, or minor spill response.

2.3.2 Level C PPE

To perform Level C class cyanide activities the following PPE will be required:

- Hearing protection if applicable;
- A two-piece, hooded chemical resistant suit;
- Rubber, steel toe boots;
- Chemical resistant outer gloves;
- Chemical resistant inner glovers;
- Chemical resistant face shield;
- A personal HCN gas detector.
- A hard hat; and
- A full-face air purifying respirator (APR) mask with an appropriate HCN gas cartridge.

Figure 2.3-1 provides an example of Level C class cyanide PPE.

Figure 2.3-1: Level C Cyanide PPE

2.4 CYANIDE HANDLING PPE (LEVEL B)

2.4.1 Level B Tasks Descriptions

Level B cyanide handling tasks are classified as tasks where the concentrations of HCN gas that could be produced are unknown or greater than 50 ppm. Such tasks include cyanide mixing or sparging, cyanide equipment maintenance, or any other activities where an employee may encounter toxic concentrations of WAD cyanide.

2.4.2 Level B PPE

In Level B class cyanide activities, the following PPE will be required:

- A two-piece, hooded chemical resistant suit;
- Hearing protection if applicable;
- Rubber, steel toe boots;
- Chemical resistant outer gloves;
- Chemical resistant inner glovers;
- Chemical resistant face shield;
- A hard hat;
- Self-contained breathing apparatus (SCBA); and
- A personal HCN gas detector.

Figure 2.4-1 provides an example of Level B cyanide handling PPE.

Figure 2.4-1: Level B Cyanide PPE

2.5 LARGE SPILL RESPONSE PPE (LEVEL A)

2.5.1 Level A Task Descriptions

NIOSH Level A, or High Red Zone, PPE is used for tasks that require the greatest levels of skin, respiratory, and eye protection. The Level A protection will be used in hazardous response environments where HCN gas is at extremely toxic concentrations or cyanide is present in sizable, uncontrolled liquid quantities. Such hazards will not be present in normal operations and the use of Level A protection would be practiced for emergency spill response procedures.

2.5.2 Level A PPE

Level A PPE would include all of the same PPE as Level B; however, instead of a two-piece chemical resistant suit, the individual would wear a Totally-Encapsulating Chemical Protective (TECP) suit. The TECP suit provides a full-body airtight seal to ensure that no cyanide liquids may enter within the suit and be absorbed into the skin. See Figure 2.5-1 for an example of Level A PPE.

Figure 2.5-1: Level A Cyanide PPE

2.6 ADDITIONAL PPE TOOLS

2.6.1 Dry Chemical Fire Extinguishers

Dry chemical fire extinguishers will be located and identified with signage in any location containing cyanide. The use of dry chemical fire extinguishers will be prioritized in areas containing cyanide to prevent the creation of HCN gas through sodium cyanide reacting with water. Refer to SGC-CMP_SOP-009 “Fire Prevention Protection Program” for the procedure on dealing with cyanide-related fires.

2.6.2 Eyewash / Safety Showers

An ANSI approved safety drench shower will be made available within 10 seconds travel time from any location containing cyanide. Eye wash stations will also be set-up in locations containing cyanide. Both safety drench showers and eye wash stations will be identified with signage as per SGC-CMP_SOP-019 “Cyanide Workplace Signage Requirements” and regularly tested and maintained.

2.6.3 First Aid / Cyanide Antidote Stations

Cyanide-specific first aid stations will be set-up in any areas containing cyanide. Along with general first aid tools and substances, these stations will contain a Cyanokit (Figure 2.6-1). The Cyanokit uses hydroxocobalamin to treat cyanide poisoning by deactivating free cyanide ions within the body.

Figure 2.6-1: Contents of a Cyanokit

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review
ASME. (2015). *Scheme for Identification of Piping Systems.* ASME	ADR Plant	Annually

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

In the case of a fire in an area containing cyanide, water, carbon dioxide, or foam use is strictly prohibited.

DANGER

Fires involving cyanide salts or solutions are not combustible, but may generate highly toxic, flammable, corrosive and explosive hydrogen cyanide gas if in contact with water, carbon dioxide fire extinguishers, or some foam fire extinguishers if these contain acidic agents.

HCN gas is explosive at concentrations between 5.6% and 40.0% and immediately life-threatening at concentrations over 100 ppm.

Dry chemical fire extinguishers will be the primary fire suppression tools to fight any fire that may possibly contain cyanide.

1.2 PURPOSE

The purpose of this procedure is to establish guidelines on how to prevent fires in areas containing cyanide and how to properly and safely extinguish fires that contain cyanide.

1.3 SCOPE

This procedure applies to all employees and contractors working with cyanide and all emergency response personnel working at the Eagle Gold Mine (EGM).

1.4 RESPONSIBILITY

1.4.1 Mine General Manager or designate:

- Verify training procedures are implemented;
- Verify fire prevention measures are implemented and fire suppression tools are maintained;
- Act as incident commander; and

- Acquire additional equipment or technical resources for the response team.

1.4.2 Department Managers or their designates:

- Approve emergency response training plans and keep training records;
- Approve fire prevention measures;
- Implement fire suppression tool maintenance schedules;
- Mobilize required equipment and operators for response team; and
- Relay information to incident command.

1.4.3 Health, Safety and Security Manager or designate:

- Monitor the implementation of this procedure; and
- Ensure this procedure is maintained.

1.4.4 Supervisors:

- Ensure employees are trained to recognize and report hazards;
- Allocate qualified employees to the emergency response team;
- Make recommendations on emergency training programs and plans;
- Conduct or delegate scheduled fire suppression tool maintenance;
- Ensure workers submit job hazard analysis sheets; and
- Manage fire prevention measures.

1.4.5 All Employees:

- Make recommendations on emergency training programs and plans;
- Report any hazards;
- Take part in emergency response activities if qualified; and
- Ensure their professional training is up to date.

1.5 DEFINITIONS

Emergency Responder	Individual, generally a First Aid Attendant, responsible for monitoring Channel 1 for a Code 1 emergency broadcast
Emergency Response Coordinator	Individual in charge of overall response to the emergency and the Emergency Response Team.
Emergency Response Team	Group of trained individuals who prepare for and respond to any incident.

First Aid Attendants	Individuals certified with Level 3 Occupational Health and Safety
HAZMAT	Hazardous Materials
Incident Commander	The individual responsible for all incident activities, including the development of strategies and tactics and the ordering and the release of resources. The Incident Commander has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site.
Incident Control Center	the physical location at which the coordination of information and resources to support an emergency response normally takes place.
Muster Point	A designated place/location where employees in an area are ordered to go when there is an emergency.
NIOSH	National Institute for Occupational Safety and Health

2 OPERATING PROCEDURE

2.1 HAZARD RECOGNITION & EMERGENCY TRAINING

All employees that may encounter cyanide in the work place will be required to complete Cyanide Hazard Recognition training and annual refresher training.

In addition to Cyanide Hazard Recognition training, SGC will have a certified mine rescue team trained to respond to accidents, fires, and incidents involving hazardous materials. The emergency response team will also contain selected members who have a valid Hazardous Materials (HAZMAT) Response Certification.

SGC will conduct mock emergency drills for response to fires in areas where cyanide is stored or used. The drills will be used to provide additional training to employees working with or around cyanide and give emergency responders the opportunity to deploy their cyanide-specific firefighting procedures.

Additional information is included in SGC-CMP_SOP-020 “Cyanide Emergency Response Procedures”.

2.2 PERSONAL PROTECTIVE AND RESPONSE EQUIPMENT

Employees performing activities with risk of cyanide exposure such as cyanide mixing or cyanide equipment maintenance are required to wear appropriate PPE for the task being performed.

SGC-CMP_SOP-008 “PPE for Cyanide Facility Operations”, provides additional details on selecting PPE that is appropriate for the task being performed.

2.2.1 Fire Response PPE

In the event of a fire, response personnel using dry chemical fire extinguishers, should be wearing PPE appropriate for the scenario (see SGC-CMP_SOP-008), and may include:

- A two-piece, hooded chemical resistant suit;
- Rubber, steel toe boots;
- Chemical resistant outer gloves;
- Chemical resistant inner glovers;
- Chemical resistant face shield;
- Hard hat;
- Full face respirator with appropriate HCN cartridges; and
- A personal HCN gas detector.

In the event of a large fire in the ADR Plant, emergency response may be required to wear a Totally-Encapsulating Chemical Protective (TECP) suit and Self-contained breathing apparatus (SCBA) if increased levels of skin, respiratory, and eye protection are required.

2.2.2 Fire Response Equipment

General purpose dry chemical fire extinguishers will be provided at locations in the ADR Plant as shown on Figure 1. The ADR facility also contains four emergency shower / eyewash stations. Locations of the shower / eyewash stations can be found in Figure 1.

The ADR Plant has a firewater ring main around the perimeter of the ADR plant. This ring main will supply water to the fire hose cabinets. However, as described in Section 2.4.4, below, the use of water to extinguish fires involving cyanide is strictly prohibited.

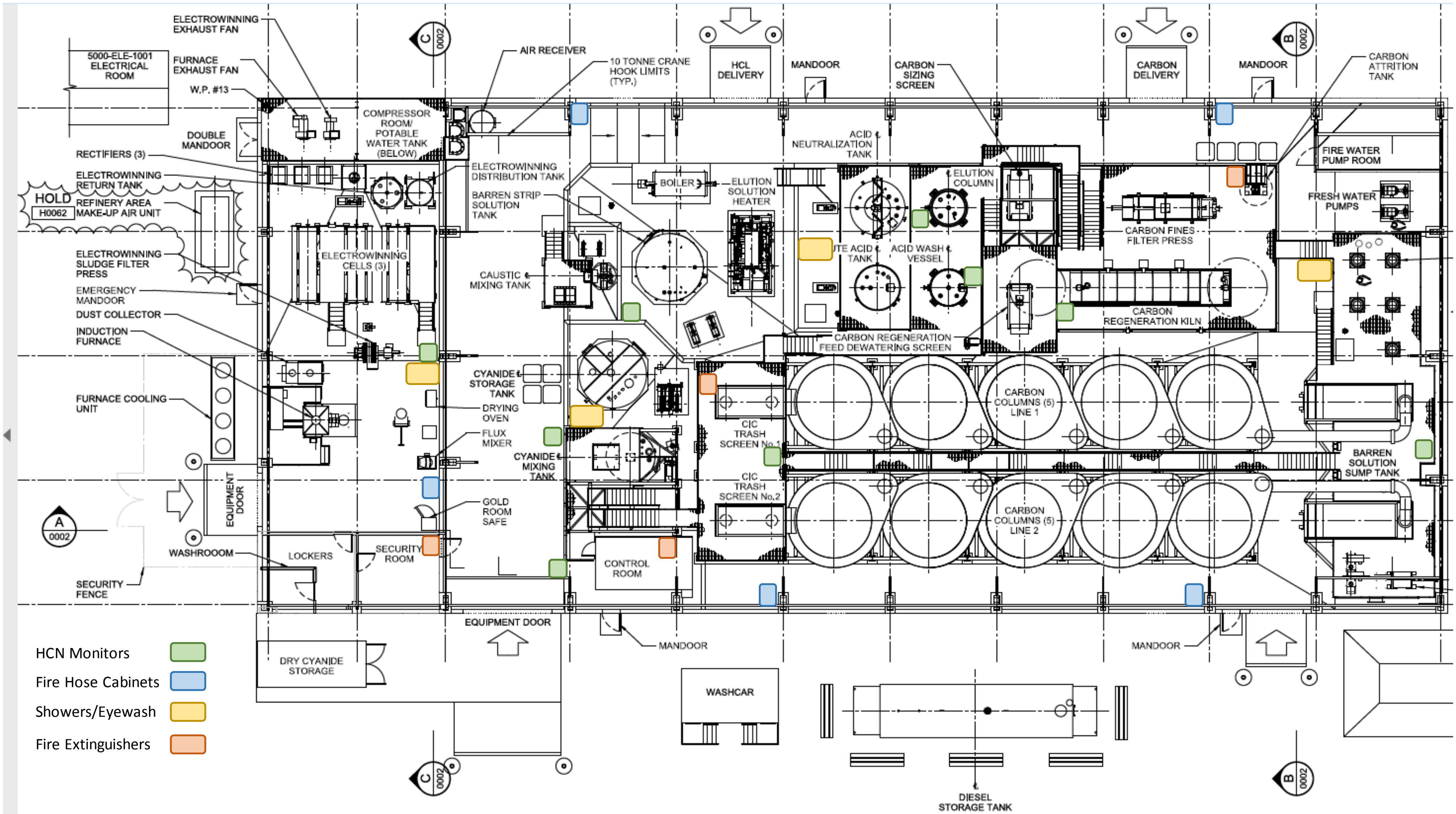


Figure 1: Locations of Key Safety Equipment in the ADR Facility

2.3 FIRE PREVENTION MEASURES

To reduce the risks of a fire hazard, personnel are responsible for fire prevention measures including:

- Practicing proper housekeeping and regularly disposing combustible debris and scrap from work areas
- Only using approved containers and tanks for storage, handling, and transport of combustible and flammable liquid
- Conducting pre-operational safety checks and evaluations before performing activities that present fire hazards
- Regular inspection and maintenance of firefighting equipment
- Prohibition of smoking and any other sources of open flames within the ADR facility and any area where cyanide is used or stored

2.4 FIRE IN PROXIMITY TO CYANIDE

2.4.1 Initial Response Procedure

Initial response actions in the event of fire in ADR Plant or areas that that may contain cyanide

1. **Evacuate**: ensuring safe and expedient evacuation of all individuals is critical. Accounting for all personnel needs to be organized quickly so that any individual who may be at risk can be identified quickly and rescue efforts put forth.
2. **Activate Alarm and Initiate "Code 1" Emergency Response:** Activate the nearest fire pull station, alerting all those in the area to proceed to the designated Muster point. A "Code 1" will be initiated by Security as per "Initial Response Code 1" Procedure.

Upon hearing the alarm, all individuals will shut down equipment, where practical and immediately evacuate the ADR Plant by the closest available exit.

3. **Extinguish:** Only if safe to do so, properly trained and equipped personnel may attempt to extinguish the fire provided there is no risk to themselves or others.

WARNING

ONLY USE DRY CHEMICAL FIRE EXTINGUISHERS

4. **Remove Sodium Cyanide:** Only if safe and practicable to do so, remove sodium cyanide containers from path of fire.

5. **Rescue:** Use air supplied breathing apparatus and full body protective clothing to rescue anyone overcome by poisonous gases or trapped by the fire.
6. **Decontamination:** Equipment (including PPE) should be thoroughly decontaminated after use. After intervention, take shower, remove clothing carefully, clean and check equipment.

2.4.2 Emergency Response Team

The Emergency Response Team (ERT) will attend the scene, the Incident Control Center will be activated, and all traffic on the site will stop to ensure safe and efficient travel of the emergency response vehicles.

Isolation Zone: In the event that the fire cannot be controlled using dry chemical fire extinguishers and/or if the concentrations of HCN gas reach the lower explosive range of 5.6%, an isolation zone of at least 50 m will be enforced where all personnel will be restricted from entering unless otherwise guided by Incident Command.

Building Sweep: Once the ERT has responded, they will **conduct a building sweep:** Only If it is safe to do so, wearing appropriate PPE, ensuring complete evacuation, and a head count will be taken at the Muster Station by the Process Manager or their designate.

2.4.3 Incident Command

Incident command will be run on site by the Mine General Manager or their designate.

Upon notification of a fire involving cyanide, incident command will follow SGC-CMP_SOP-020 “Cyanide Emergency Response Procedures” and:

1. **Contact the Emergency Response Team**
2. **Deploy Emergency Response Team Personnel** who have the appropriate fire response and valid Hazardous Materials (HAZMAT) response certification to the scene.
3. **Isolation Zone:** Install perimeter guards at major access points within at least 200 m of the isolation zone.
4. **Guide Response** actions by personnel within the Isolation Zone.

IF FIRE IS UNCONTROLLABLE REQUEST SUPPORT FROM
CYANCO EMERGENCY RESPONSE ASSISTANCE PLAN ACTIVATION PHONELINE
1-800-567-7455

Mayo Fire Department or other agencies may be able to provide assistance; however, **it must be recognized that support would be at least 60-90 minutes**. In this circumstance, the priority will be to ensure that the fire does not spread further.

5. **Initiate Planning for Site Evacuation (if required)**

2.4.4 Restriction of Water Use

WARNING

In the case of a fire containing cyanide, the use of water, CO_2, or foam is strictly prohibited.

In the case of a fire containing cyanide, the use of water, CO2, or foam will be strictly prohibited to prevent the creation of HCN gas.

In the unlikely event a fire is uncontrollable, the decision to use fire hose water will rest with appropriately trained emergency response personnel only. In the event that fire water is to be used, Response Personnel will only do so:

1. If they are properly trained in fighting fires and hazardous materials management;
2. Taking special protective precautions, such as wearing full body protective clothing (PVC [Polyvinyl Chloride] jackets and pants, PVC gloves and chemical resistant boots), using self-contained breathing apparatus with a full-face piece operated in pressure-demand or positive pressure mode;
3. Once the Isolation Zone is properly established and enforced.

Additional measures to control the pH of the water/cyanide mixture created may also be used as directed by the Incident Commander.

If fire water is used within areas containing cyanide, water will be collected using ADR containment or appropriate berms, troughs, and partitions. The collected water will be tested and decontaminated after the emergency event.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review
SGC-CMP_SOP-008 PPE for Cyanide Facility Operations	ADR Plant	Monthly
SGC-CMP_SOP-020 Cyanide Emergency Response Procedures	ADR Plant	Monthly
ADR Plant Operations Plan	ADR Plant	Monthly
Emergency Response Plan	ADR Plant	Monthly

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

The ADR Plant and Heap Leach Facility (HLF) operate by circulating barren and pregnant solution through the HLF and ADR Plant process using electrically powered pumps. Electricity to the mine, which powers these pumps, is supplied via the Yukon Energy Corporation grid.

To avoid disruption to mine operations in the event of a power grid failure or outage, the mine has a back-up generator system that is capable of supplying power to the pumping stations and other critical project components. These generators will be able to provide sufficient power to all of the ADR Plant and HLF pumps so that solution withdrawal and application can continue to operate in the event of a grid power failure. This will allow for solution to continue to be circulated through the HLF which will maintain free capacity within the Events Pond for extreme climatic events.

1.2 PURPOSE

This procedure establishes the process for using back-up generators in the event of temporary loss of grid power. The procedure is to to ensure that power is provided for essential facilities and equipment (e.g., solution circulation pumping stations and critical camp facilities) in the event of disruption to electrical supplies, as well as ensuring back-up generators are properly maintained and available for emergency use as necessary.

1.3 SCOPE

This procedure applies to all employees and contractors at the Eagle Gold Mine (EGM) who may use or work on emergency electrical generating supplies and equipment

1.4 RESPONSIBILITY

1.4.1 Mine General Manager or designate:

- Conduct overall management of the EGM site and workforce

1.4.2 Department Managers or their designates:

- Ensure this procedure is communicated to their employees;

- Ensure their employees have received the appropriate training; and
- Ensure this procedure is implemented.

1.4.3 Process Manager or designate

- Monitor the implementation of this procedure; and
- Ensure this procedure is maintained.

1.4.4 Maintenance Manager or designate

- Ensure that cyanide facility-related maintenance actions receive the highest priority
- Perform preventative maintenance on back-up power generators.

1.4.5 Health, Safety and Security Manager or designate:

- Ensure this procedure is maintained and followed.

1.4.6 Supervisors:

- Implement these procedures; and
- Ensure these procedures are followed.

1.4.7 All Employees:

- Understand and practice this procedure as required; and
- Ask their supervisor for clarification if they are unsure of any aspect of this procedure

2 OPERATING PROCEDURE

Back-up power generation for the ADR Plant and HLF will be supplied by three diesel generator sets, each rated for 1650 KW output; engine model 16V4000G83. Additional back-up generator capacity for the site can also be provided by the generators listed in Table 1 as necessary.

Personnel operating generator sets will be familiar with and operate equipment in accordance with the manufacturers operating instructions. Equipment is identified by nameplate, model designation or serial number and must match with the information on the manual. Manuals must be issued to all personnel involved in operation, maintenance, repair, assembly, installation, or transportation and will be handy in the vicinity of the product such that it is accessible to operating, maintenance, repair, assembly, installation, and transport personnel at all times.

Table 1: Additional Back-up Generators Available on Site

Tag No.	Make	Model	Description	Vendor
GN-001	CAT	C27	680ekW Standby Power Diesel Generator Set	Finning (Canada)
GN-101-AT1	Stamford	UCI224E	Generator	Frontier Power Products
GN-102	Kubota	KS2300-T3ET	Genset	Frontier Power Products
GN-102-AT2	Stamford	PI144F	Generator	Frontier Power Products
GN-103	Frontier	KS1200-T3	10kW Generator Set	Frontier Power Products
GN-103-AT1	Kubota	V1505BG-4	10kW Generator Set - Engine	Frontier Power Products
GN-105	Frontier	6068HF285	125kW 600V Open Generator	Frontier Power Products
GN-106	Frontier	PI144H1	Generator	Frontier Power Products

2.1 GENERATOR SET AUTHORIZATION AND ACCESS

2.1.1 Permit to Work System

Appropriately trained personnel conducting operation or maintenance activities on back-up generator sets, must follow the Electrical Low Voltage Permit to Work system in place for working on the emergency standby generator systems.

All electrical work, maintenance and the inspection and testing of the back-up generator systems shall be covered by the appropriate method statements (Table 2). The person carrying out the work must be familiar and fully understand the method statement and risks for the task or works to be undertaken.

Authorization is provided by sign-off of the method statements (Table 2) and issuance of a safety document by the department manager and the site supervisor.

No person other than an authorized person may enter a generator or switch room unless they are accompanied by an authorized person or have receipt of a safety document issued by an authorized person.

Table 2: Method Statement Template

Department Manager:		Site Supervisor:
Originator:	Position:	Date:
STRICT ADHERENCE TO THIS METHOD STATEMENT IS CRITICAL TO THE HEALTH AND SAFETY OF ALL ENGAGED IN THE WORK. ANY DEVIATION MUST FIRST BE AUTHORIZED BY THE SITE SUPERVISOR.		
Planned Task/Activity Description:		
Location and Access: (attached plan as appropriate)		
Working Environment & Restrictions:		
Protection of others:		
Emergency Procedures:		
Operatives/Competence:		
Personal Protective Equipment:		
Plant & Equipment:		
Materials Handling/Storage & Safety Information:		
Critical Stages: (must be undertaken in correct sequence)		
Final Clearance: (Work/Activity completed to satisfaction)		
Name	Position	Date

2.1.2 Access to Generator & Switch Rooms

All access doors to each generator or switch room must be kept securely locked when unattended.

Each authorized person will be issued a key when a safety document is issued,

2.1.3 Log Book

For each generator set or system, a bound, hard-covered logbook tracking authorized access will be maintained at all times.

2.2 GENERATOR SET START-UP AND OPERATION

CAUTION

Parts of the electrical equipment are live (i.e. under voltage / high tension) during operation. Follow the applicable warning instructions pertaining to such devices. Smoking is prohibited in the area of generator sets.

2.2.1 Safety Precautions during Equipment Start-up

Prior to starting any back up power generating equipment, the responsible person must ensure that:

- All personnel are clear of the danger zone surrounding moving parts of the machine. Electrically-actuated linkages may be set in motion when the Engine Control Unit is switched on.
- All maintenance and repair work have been completed.
- All loose parts have been removed from rotating machine components.
- All safety equipment is in place.
- No persons wearing pacemakers or any other technical body aids are present.
- The service room is adequately ventilated. In the first few hours of operation, the product emits gases as a result of smoldering e.g. lacquers or oil. These gases may be hazardous to health. Always wear respiratory protection in the operating room during this period.
- The exhaust system is leak-tight and that the gases are vented to atmosphere.
- Protect battery terminals, generator terminals or cables against accidental contact.
- Check that all connections have been correctly allocated (e.g. +/- polarity, direction).
- Clean up any leaked or spilled fluids and lubricants immediately.

Additionally, before any back up power generating equipment is started, the responsible person must ensure that appropriate hearing protection is being worn.

2.2.2 Safety Precautions during Equipment Operations

During back up power generating equipment operation, the responsible person must:

- Immediately after putting equipment into operation, make sure that all control and display instruments as well as the signaling and alarm systems work properly.
- Observe display instruments and monitoring units with regard to present operating status, violation of limit values and warning or alarm messages.
- Not remain in the operating room when equipment is running for any longer than absolutely necessary.
- Keep a safe distance away from equipment to the greatest extent possible.
- Not touch equipment unless expressly instructed to do so following a written procedure.
- Not inhale the exhaust gases of the equipment.

2.3 GENERATOR INSPECTIONS AND MAINTENANCE

2.3.1 Generator Inspections & Maintenance Work Orders

The generating set and associated equipment will be maintained and serviced as per manufacturer's recommendations and the service contract that is in place.

Generator set inspections will be in accordance with the manufacturer's specifications and as schedule through the ERP system managed by the Maintenance Department. The basic requirements in a routine check are as follows:

- Log Book is in place and is completed and up to date.
- Engine unit
    - Batteries and battery charger are satisfactory
    - Radiator heaters are working
    - Block heaters are working
    - Check hoses for signs of cracks, any leaks at connections, tightness of connections
    - Oil level are satisfactory
    - Coolant levels are satisfactory
    - There are no signs of leakage from the engine
- <u>Electrical Panel</u>
    - Panel instrumentation and dials are reading correctly
    - No obvious smells of burning
- <u>Room Location</u>

- o Automatic louvres / shutters are operating correctly
- o Room heaters are working correctly
- o Emergency lighting is operational
- o Good housekeeping of the room is being observed
- o Firefighting equipment is in place and is serviceable
- o All safety notices are in place
- o Emergency exit signs and access are satisfactory

The Maintenance Manager or designate is responsible for maintaining detailed inspection records and test results for the standby electrical generator equipment.

Inspection results indicating a maintenance requirement will be entered into the management system (ERP), and the appropriate work order and work flow will be generated.

NOTE
Generator sets are critical to ensure power is maintained to cyanide facilities.
In accordance with the International Cyanide Management Code and the ADR Plant Maintenance Plan cyanide facility-related maintenance actions, including maintenance of the back-up generator sets, must receive the highest priority.

2.3.2 Generator Testing Off Load

The Maintenance Department are responsible for operating the emergency back-up generators off load for no longer than 15 minutes per week. The off load operation of the generators will include monitoring the equipment and panel while plant is running and the subsequent completion of the log book entry. The completion of this task and all relevant observations will be entered in the ERP by the Maintenance Department upon completion.

2.3.3 Generator Testing On Load

The Maintenance Department are responsible for operating the emergency back-up generators on load for two hours each month or as per manufacturer's recommendations. The on load operation of the generators will include monitoring the equipment and panel while plant is running and the subsequent completion of the log book entry. The completion of this task and all relevant observations will be entered in the ERP by the Maintenance Department upon completion.

2.3.4 Safety Precautions during Equipment Maintenance

Servicing, repairs, and certain emergency actions shall be carried out by an approved and specialist contractor. Prior to maintenance being undertaken on the emergency backup power generation equipment, personnel must:

- Allow the equipment to cool down to less than 50 °C (to minimize the risk of explosion due to oil vapors, fluids and lubricants, and the risk of burning).

- Relieve pressure in fluid and lubricant systems and compressed-air lines which are to be opened.
- Use suitable collecting vessels of adequate capacity to catch fluids and lubricants.
- When changing the oil or working on the fuel system, ensure that the service room is adequately ventilated.
- Follow Lock-out/Tag-out procedures

2.3.5 Isolation of Supplies

Before any work can begin, the electrical equipment and conductors need to be identified and then proved dead at the point-of-work by means of an approved voltage testing device, which must itself be tested in an approved manner immediately before and immediately after its use.

When work is to be carried out on the system made dead, all reasonably practicable steps must be taken to prevent the electrical equipment and/or conductors being made live inadvertently during the course of the work, including locking-off any switchgear, removal of any fuses, links or similar approved methods. Unless a key safe is used, the person working on the equipment should retain any locking-off keys, fuses and links. When working on electrical circuits these shall be isolated and locked off before work commences

2.3.6 Voltage Test Indicators

Authorized Maintenance Department personnel must prove electrical equipment dead by using a voltage test indicator before working on the system.

Test indicators for use on 230/415 V systems should be suitable for use up to 500 V and should indicate a live supply down to 50 V. It should also be able to differentiate between alternating current and direct current. Test indicators must be proved before and after use from a known supply

2.3.7 Precautions for Working on a Standby Generating plant

When work is carried out on generating plant and directly connected equipment, the following additional precautions should be taken:

- The generator must be at rest and isolated from all sources of supply;
- The prime mover providing the motive power to the generator, and any associated valves controlling the flow of fuel should be isolated and locked off;
- In the case of an internal combustion engine prime mover, the starting equipment should also be made inoperative;
- Danger and caution signs should be prominently displayed at all points-of-isolation.
- To ensure a safe system of work, the permit-to-work procedures identified shall apply.

2.3.8 Precautions for Working on Battery Installations

The output from the battery should be isolated when working on the equipment it supplies unless for safety reasons the battery output needs to be instantly and permanently available.

The battery charger should be isolated. Where it is necessary to use tools for working on a battery, they should be of an approved insulated type.

The requirements to implement any or all of the precautions for work on live equipment to control maintenance work on battery installations should be determined by the authorized person.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review
HLF Contingency Water Management Plan	ADR Plant	Yearly
MTU Friedrichshafen GmbH. 2016. Operating Instructions Diesel engine 12V4000Gx3x 16V4000Gx3x Available online at: https://www.mtu-online.com/fileadmin/fm-dam/mtu-global/technical-info/operating-instructions/neu_15_07_2016/M015710_05E.pdf	Maintenance Shop	Monthly

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

Department:	Environment	**Document No.:**	***SGC-CMP-SOP-011***
Section:		**Effective Date:**	January 1, 2019
Revision:		**Replaces:**	
Approved:	David Rouleau, Vice President Operations & General Manager		

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

Under normal operating conditions, wildlife should have no interaction with process solution contained in the Heap Leach Facility (HLF), Events Pond and ADR Plant areas. While regular inspections of the Events Pond area are undertaken to ensure measures to restrict and deter waterfowl and other animals from the Events Pond remain in place (SGC-CMP-SOP-014 "Monitoring and Maintenance of Solution Pond Avian Protection System"), in the unlikely event of wildlife mortality or an incident involving within or nearby the HLF, Events Pond and ADR Plant areas, this Wildlife Mortality and Incident Reporting and Investigation procedure must be used.

1.2 PURPOSE

The purpose of this procedure is to describe the steps required if an injured or dead animal is found while performing inspections in accordance with SGC-CMP-SOP-007 "Cyanide Facility Inspections". The objectives are to gather information on the observed injured or dead wildlife, to assess whether there is an imminent risk to personnel or additional wildlife, establish if mitigative actions are necessary, and to notify and report to the required regulatory agencies.

1.3 SCOPE

This procedure applies to all employees, visitors and independent contractors working at the Eagle Gold Mine (EGM) site who may be performing cyanide facility inspections, or who encounter or witness a wildlife incident or mortality related to any structures in the Heap Leach, Events Pond or ADR Plant areas.

1.4 HEALTH AND SAFETY

The health and safety of personnel must be a priority in any wildlife incident investigation. Importance must also be placed on a timely response to any wildlife incident potentially involving cyanide, and steps must be taken to prevent future incidents or mortalities.

1.5 RESPONSIBLITIES

1.5.1 Mine General Manager (MGM) or designate:

- Overall management of EGM sites and workforce;

- Ensuring full investigations in the event of wildlife mortality are completed in a thorough and timely manner.

1.5.2 Department Managers or their designates:

- Ensuring this procedure is communicated to their employees;
- Ensuring their employees have received the appropriate training;
- Conducting full investigations in the event of wildlife mortality in proximity to their work area; and
- Ensuring this procedure is implemented.

1.5.3 Supervisors:

- Implementing these procedures; and
- Ensuring these procedures are followed.

1.5.4 Environmental Manager or Environmental Superintendent:

- Monitoring the implementation of this procedure and ensuring that it is maintained;
- Communicating with the Mayo District Conservation Officer, or their designates, to notify and/or arrange the removal of the animal;
- Maintaining records of wildlife activities through the Wildlife Observation Form and Wildlife Incident Form;
- Working with other Department Managers to ensure that investigations are completed in a thorough and timely manner;
- Ensuring this procedure and results of investigations are communicated to their employees; and
- Reporting on wildlife management issues in regular environmental reports.

1.5.5 All Employees:

- Understanding and practicing this procedure as required;
- Asking their supervisor for clarification if they are unsure of any aspect of this procedure;
- Following the Wildlife Encounter Procedure; and
- Reporting and recording wildlife sightings through the Wildlife Observation Form as soon as reasonably possible.

1.6 DEFINITIONS

Wildlife Incident: dead/injured wildlife, problem/nuisance wildlife (e.g., waterfowl in ponds, bears in camp or waste management areas), vehicle – wildlife collision, and wildlife observation/interaction with humans when wildlife is observed within 1 km from the camp perimeter, and less than 100 m from any area of human activity.

Wildlife Observation: wildlife or signs of wildlife (e.g., tracks, scat, etc.) is observed further than 1 km from the camp perimeter, and more than 100 m from any area of human activity.

2 OPERATING PROCEDURE

2.1 AWARENESS AND TRAINING

Employees performing cyanide facility inspections should be appropriately trained to work around cyanide and have signed off on the required procedures.

2.2 EQUIPMENT

Supplies needed for this procedure include proper Personal Protective Equipment, SGC Wildlife Incident Form, camera, GPS, gloves, radio.

2.3 DETERMINING A WILDLIFE INCIDENT INVOLVING CYANIDE

If a carcass is discovered or wildlife is observed acting unusually near a cyanide facility it must be reported using this procedure. Unusual activity may include:

- Staggering
- Falling
- Inability to move all or part of the body
- Disinclination to move, slow reactions, disinterest in human presence
- Labored breathing

2.4 IMMEDIATE RESPONSE

If a carcass is discovered, or if unusual wildlife activity is observed during an inspection the following steps must be followed:

- Leave the area immediately
- Notify the Facility Supervisor and the Environmental Manager or their designates
- Restrict access to the area

Do not touch the animal, unless instructed to do so by the Mayo District Conservation Officer, the Environmental Manager or their designates.

The Environmental Manager or their designate will:

- In the case of a wildlife mortality that may pose a significant threat to the health and safety of staff or the animal, the Environmental Manager will advise onsite staff of the appropriate action to be taken (e.g. shutting down work area, buffer zone implementation)
- If the response to an incident is not clear, contact the Environmental Manager and/or the Mayo District Conservation Officer to discuss the appropriate response;

  Mayo Conservation Office - 867-996-2202

  Mayo Conservation Officer Cell - 867-993-3453

  Yukon Conservation Officer Services Hotline - 1-800-661-0408 ext. 8005

  Whitehorse Conservation Office - 867-667-8005

- If the Mayo District Conservation Officer is unavailable, the Environmental Manager or their designates will contact the 24-hour Yukon Conservation Officers Services hotline at 1-800-661-0408 ext. 8005.

2.5 REPORTING

The discoverer and Department Manager for the area involved, led by the Environmental Manager or their designate, will gather the information required for reporting the incident, including:

- Date and time of discovery
- Person who discovered mortality or unusual wildlife activity
- Species and number of animals involved
- Location of the incident
- Description of event including details of any contact made with external agencies
- Witnesses statements
- Corrective actions suggested
- Photos

The Environmental Manager or their designate is responsible for completing the SGC Wildlife Incident Form and reporting to the Mayo District Conservation Officer.

2.6 INVESTIGATION

If a wildlife mortality is discovered, a more thorough investigation may be required, and must be completed by the Department Manager involved in conjunction with the Mine General Manager and the Environmental Manager or their designates.

Employees and other involved parties must not disturb the area until the investigation is complete, and clearance is given by the Mine General Manager and the Environmental Manager or their designates.

2.7 FOLLOW-UP PROCEDURE

The Environmental Manager or their designate will ensure the SGC Wildlife Incident Form or SGC Wildlife Observation Form is complete and implement follow-up responses, if required, and document follow-up actions.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review
SGC Wildlife Protection Plan	Environment Office	Annually
Wildlife Encounter Procedure (SOP)	Environment Office	Annually
Wildlife Incident Form	Environment Office	Annually
Wildlife Observation Form	Environment Office	Annually
SGC-CMP-SOP-007 “Cyanide Facility Inspections”.	Environment Office	Monthly
SGC-CMP-SOP-014 “Monitoring and Maintenance of Solution Pond Avian Protection System”	Environment Office	Monthly
Australian Antarctic Division (2017). *Unusual Animal Mortality Response Plan*. Available online at: http://www.antarctica.gov.au/__data/assets/pdf_file/0015/134007/2013-2017-Unusual-Animal-Mortality-Response-Plan.pdf . Accessed November, 2018.	Online	

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

In accordance with the International Cyanide Management Code (ICMC), management systems must include procedures to identify when the initial design and operating practices at the site have or will be changed, and require a change in cyanide management practices. This procedure requires that proposed changes be reviewed through a systematic process to ensure that changes do not cause injury to people, damage to the environment, interfere with production, or cause damage to physical assets.

1.2 PURPOSE

The purpose of this procedure is to establish a systematic process for reviewing changes to cyanide facilities that will be followed at Eagle Gold Mine (EGM), with intent to ensure that changes do not cause injury to people, damage to the environment, interference with production or damage to physical assets.

1.3 SCOPE

This procedure applies to all employees and contractors at the EGM.

1.4 RESPONSIBILITY

1.4.1 Mine General Manager or their designate:

- Overall management of the EGM site and workforce.

1.4.2 Department Managers or their designates:

- Ensuring this procedure is communicated to their employees;
- Ensuring their employees have received the appropriate training; and
- Ensuring this procedure is implemented.

1.4.3 Health, Safety and Security Manager or their designate:

- Monitor the implementation of this procedure; and
- Ensure this procedure is maintained.

1.4.4 Supervisors:

- Implementing these procedures; and
- Ensuring these procedures are followed.

1.4.5 All Employees:

- Understanding and practicing this procedure as required; and
- Asking their supervisor for clarification if they are unsure of any aspect of this procedure.

1.5 DEFINITIONS

Change: A deviation from a current established baseline, whether planned or unplanned, sudden or gradual, permanent or temporary; to alter a current state to obtain a desired improvement.

Change of technology: Any change to the documented technology (design of original equipment by manufacturer) or change to the original process design (material, equipment and processes) as was designed by the original design engineer(s).

Change management team: Group of two or more competent persons, chosen based on skills and knowledge, which are given responsibility by operations management to assess and/or implement changes.

Designate: individual employee or contractor identified and empowered to act within the process.

Emergency changes: Situations which may have potential to pose an immediate risk to health, life, property or environment.

Facility: Applies to fixed or mobile equipment, buildings within the footprint of the EGM including the mine or processing plant.

Management of Change (MOC) - Project Scope: A form that is used by employees to initiate a management of change process and to track related reviews deemed necessary for the change to be implemented (e.g., Health and Safety, Environment, Maintenance, etc.).

Post-implementation review: A review, including physical inspection, conducted by an individual or team selected by the functional area department head to assess the actual impact of the change against the intended impact and the reasons for any deviation.

Pre-start-up-review: A pre-operational review including physical inspection conducted by an individual or team selected by the functional area department manager to determine the operational readiness of the facility and personnel.

Replacement-in-kind: If a proposed change is considered to be a replacement-in-kind, such as a replacement by an identical part or piece of equipment, an MOC is not required.

Subtle change: Any change within the documented technology (original design) but which is not a replacement-in-kind.

2 OPERATING PROCEDURE

2.1 DETERMINING WHEN TO USE MANAGEMENT OF CHANGE

The most important part of managing change is first recognizing what change is. Change requiring initiation of the Management of Change procedure can be defined as follows:

- A modification to the original design of equipment, parts or materials. An example is, if the equipment assembly is designed with Grade 5 bolts and you want to re-assemble using a different grade of bolt.
- Use of different replacement parts or materials other than that specified in the original design specifications. An example would be replacement of a 6-inch heavy gauge pipe with a pipe of smaller or larger diameter and different gauge.
- Modification of specified process consumables or materials including changing consumable types and quantities other than specified by the designer. An example of change might be changing chemical reagent type or the quantity used in a process.

Change includes the introduction of new equipment, parts, and materials different than that specified by the original designer. Change also includes the modification or introduction of an operating or maintenance procedure or engineering standard including the changing of operating set points, alarm set points, or inspection frequencies.

Change may be required in response to inspections and monitoring results that require implementation of additional mitigation or adaptive management measures.

Proposed changes to established standards, processes or other designed criteria require the attention and rigor to satisfy a due diligence defense should the need arise as the result of a negative impact caused by the change.

2.2 INITIATING A PROPOSAL FOR CHANGE

Any employee, contractor or external stakeholder can identify an opportunity for change.

When an opportunity for change has been identified the first step is to discuss the opportunity with your supervisor and relevant department head to explore interest in supporting the “idea” or “opportunity” for the change.

If the idea or opportunity is supported by the second line Supervisor, the supervisor will initiate further investigation of the idea to determine feasibility of the change with their department.

Work with your supervisor to complete a Change Proposal Worksheet (Table 1). The completed worksheet will then be provided to the Mine General Manager for consideration, and approval to proceed.

Table 1: Change Proposal Worksheet

Department:	**Date Created:**
Initiator:	**Version Date:**
Department Manager:	**Version No.**

CASE FOR CHANGE
Proposed Change *Provide a detailed overview of proposed change*
Why Change is Required *Provide an overview of reasons necessitating the change*
Intended Outcome: *Provide an overview of resulting achievements and benefits*
Estimated Timeframe: *Anticipated time frame for preparation, planning, consultation, implementation, and evaluation*
Estimated Cost: *High-level overview of anticipated costs (consider staffing, consultation/training, assets, technology, etc.); more detailed costs are prepared later in the process.*

DEPARTMENT IMPACT	**Identify departments potentially impacted by the change, and the potential benefits and adverse effects for each**	
	POTENTIAL BENEFIT	**POTENTIAL ADVERSE EFFECT**
Health and Safety		
Environment		
Mining		
Process		
Maintenance		
Procurement		
Site Services		

APPROVALS	
Department Manager	Signature
General Manager (if required)	Signature

2.3 APPROVAL TO PROCEED WITH MOC PROCESS

Following approval of the Change Proposal Worksheet by the General Manager, further investigation of the proposed change is completed by those who initiated for the change (see Section 2.4).

The Process Manager will record the proposed change in the MOC log registry (example provided below in Table 2), and be responsible for ensuring further analysis of the change is presented and discussed at the next mine general meeting.

Table 2: MOC Log Registry

Id #	Initiating Dep't	Requested change			Approvals			Implementation Steps	Current Status	Priority
		Description	Date	Type	Proposal	Risk	Budget			

2.4 IMPACT AND BUDGET ASSESSMENT

The initiator or a designate, as assigned by the Department Manager, will be responsible for preparing an impact assessment (Table 3), detailed budget and cost/benefit analysis.

The impact assessment should be developed in consultation with Managers of Departments that were identified as potentially being impacted during the initial proposal development.

If the risk assessment and budget are considered acceptable, the initiator of the change will acquire approval signatures from affected Department Managers on both the impact assessment and budget.

After all signatures have been acquired, the Change Proposal Worksheet, Impact Assessment and Budgetary Cost Estimate will be sent to the Process Manager or General Manager, as required for approval to proceed.

Table 3: Impact Assessment

Department:		**Date Created:**
Initiator:		**Version Date:**
Department Manager:		**Version No.**
IMPACT ASSESSMENT		
Current State:		
Resulting State:		
Key Risks:		
IMPACT OVERVIEW		
Summary of Impacts:		
Impact (positive or negative)	**Affected Department**	**Mitigation/Enhancement**
CHANGE REQUIREMENTS		
Communication:		
Training:		
Leadership:		

2.5 APPROVAL TO PROCEED WITH IMPLEMENTATION

Once approved, a meeting with approval signees and affected Department Managers may be required to coordinate implementation of the change and identify as responsible and/or accountable. Department Manager(s) will complete a RACI Matrix (Table 4), and assign tasks required for implementation of the approved change.

Table 4: RACI Matrix

Description of Tasks	Position				
	Mine General Manager	Maintenance Manager	Process Manager	Safety, Health & Security Manager	Environmental Manager
(e.g., Training)	I or A	R	A	R	I

NOTES: R= Responsible (performing); A = Accountable (managing); I = Inform

2.6 IMPLEMENTATION OF CHANGE

Prior to implementation of the change, appropriate information shall be communicated and training provided to those affected.

Prior to handing over a change, a pre-start-up review shall be carried out to ensure:

- The changes have been carried out in accordance with the authorized change proposal;
- All actions from the review process or required studies have been satisfactorily completed and all outcomes included;
- The change has not introduced any unforeseen risks; and
- The review has been documented.

A post-implementation review shall be conducted by the initiating department to assess the actual impact of the change against the intended impact and the reasons for any deviation.

Where applicable, changes to the existing quality assurance processes shall be implemented.

Revisions to risk register, working drawings, approvals, parts lists, vendor lists, inspection checklists, planned maintenance schedules, quality assurance schedules, training materials, operating procedures, maintenance procedures or emergency procedures that may apply shall be completed.

All pre-start-up and post-implementation reviews shall be documented if/as required.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

Process solutions impounded in solution ponds can attract birds and other wildlife.

There should be no potential interaction between wildlife and process solution containing sodium cyanide in the Heap Leach Facility (HLF) in-heap pond as there is no open solution accessible to wildlife.

There is some risk to wildlife from cyanide containing process solution that may be temporarily stored in the Events Pond.

A concentration of 50 mg/l WAD cyanide or lower in solution is typically viewed as being protective of most wildlife other than aquatic organisms. The Eagle Gold Mine (EGM) uses low concentrations of cyanide for heap leaching, which limit the concentration of WAD cyanide in the HLF to below 50 mg/l.

To mitigate the potential for wildlife to be exposed to dilute sodium cyanide solution, the Events Pond will be fenced, vegetation will be controlled, and bird deterrent techniques will be implemented.

1.2 PURPOSE

The purpose of this document is to establish a procedure for ensuring appropriate measures are implemented to protect birds and other wildlife from the adverse effects of cyanide process solutions.

1.3 SCOPE

This procedure applies to the Environment Department personnel, and supervisors or managers of other departments at the Eagle Gold Mine who may be involved in monitoring and maintenance activities associated with avian protection.

1.4 RESPONSIBILITY

1.4.1 Mine General Manager or their designate:

- Overall management of EGM sites and workforce;

1.4.2 Department Managers or their designates:

- Ensuring this procedure is communicated to their employees;

- Ensuring their employees have received the appropriate training; and
- Conducting full investigations in the event of wildlife mortality in proximity to their Department.
- Ensuring this procedure is implemented.

1.4.3 Supervisors or their designates:

- Implementing these procedures; and
- Ensuring these procedures are followed.

1.4.4 Environmental Manager or their designate

- Monitoring the implementation of this procedure and ensuring that it is maintained;
- Maintaining records of inspections and corrective actions
- Ensuring this procedure and results of investigations are communicated to their employees; and

1.4.5 All Employees

- Following the Wildlife Encounter Procedure; and
- Reporting and recording wildlife sightings through the Wildlife Observation Form as soon as reasonably possible.

1.5 DEFINITIONS

Effigy: Sculptures or devices that look like a human, predatory or dead bird hung nearby or deployed on surface water to deter birds from an area.

Scare Cannon: Acoustic devices that may be electric or gas powered used to deter birds from an area.

WAD cyanide: Weak acid dissociable cyanide.

2 OPERATING PROCEDURE

2.1 MONITORING

The purpose of the Events Pond monitoring by Environmental personnel is to ensure wildlife access is restricted from the area to mitigate the possibility of wildlife being exposed to process solution. The Environmental Manager or their designate will conduct regular inspections of the area to ensure fencing is not compromised, that vegetation growth is limited, and that bird deterrent measures remain in place.

2.1.1 Routine Visual Inspections and Maintenance

Visual inspections will be completed regularly. The visual inspections will be conducted during routine environmental monitoring rounds, which are completed weekly. Items relevant to avian protection during routine environmental monitoring are inspections of areas where process solution may be accessible.

- **Design and Construction:** In order to protect birds and other wildlife, ponds and associated ditches are designed and built to reduce potential for entrapment of wildlife (minimum of 2H:1V side slopes). As the HLF expands through operation, and new ditching is created, Environmental personnel will ensure new ditching has been built to reduce entrapment of wildlife.
- **Ponding:** Environmental personnel will note signs of solution in the Events Pond or unusual ponding on or around the HLF surface, and work with the Process Department to ensure that solution does not accumulate and is recirculated back to the heap as necessary.
- **Fencing:** During regular inspections, Environmental personnel will visually inspect wildlife fencing around the Events Pond and work with EGP Site services to ensure the fencing is maintained as necessary.
- **Vegetation Control:** During regular inspections, Eenvironmental personnel will visually inspect areas around the Events Pond and HLF for vegetation growth. Environmental personnel will ensure vegetation is controlled in these areas, and work with Site Services to have vegetation cleared as needed
- **Wildlife Observations:** During regular inspections, Environmental personnel will note any wildlife observations including signs of animal intrusion such as tracks or scat. In accordance with the Wildlife Protection Plan.

2.1.2 Bird Deterrents

Bird deterrent systems will be used to discourage birds from entering the Events Pond area. Deterrent systems used on the Events Pond may include the use of:

- **Shore-based effigies:** Effigies should be hung from a pole in a head down position with their wings just above ground level. Routine monitoring will ensure effigies remain in place.
- **Scare Cannon:** A bird scare cannon will be set up at the Events Pond. Cannons may be used on demand in response to a wildlife observation. Use of scare cannons should follow the manufacturers' instructions.

2.2 IF SOLUTION IS OBSERVED IN EVENTS POND

The Events Pond will be maintained empty except to contain and temporarily store exceptional rainfall events or overflows from the in-heap pond. After these events, the retained water will be cycled into the process circuit as soon as possible and be used as make-up water until the pond is emptied.

If for operational or other reasons the Events Pond cannot be evacuated quickly, stored water will be monitored on a daily basis. If monitoring data indicate that Events Pond water contains WAD cyanide in concentrations $\geq$50 ppm, the installed avian deterrent systems will be increased as necessary and may include:

- **Scare Cannon:** Programming the bird scare cannon according to manufacturers' instructions to deploy at regular intervals.
- **Floating effigies**: Deploy floating effigies on the surface of the pond.

The bird deterrent system will be monitored for effectiveness.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review
Wildlife Protection Plan	Environment Office	Annually
Environmental Monitoring, Surveillance and Adaptive Management Plan	Environment Office	Annually
SGC-CMP_SOP-011 Wildlife Mortality Reporting and Investigation	Environment Office	Monthly

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

Eagle Gold Operating Procedures			
Assessment and Mitigation of Workplace Cyanide Exposure			
Department:	Health, Safety & Security	**Document No.:**	***SGC-CMP-SOP-016***
Section:		**Effective Date:**	
Revision:		**Replaces:**	
Approved:	David Rouleau, Vice President Operations & General Manager		

1 PURPOSE, SCOPE, & RESPONSIBILITY

1.1 INTRODUCTION

The Eagle Gold Mine (EGM) uses weak cyanide solution to extract gold from the crushed ore. This extraction method is stable and generally safe; however, if the solution's pH drops below a certain point, hydrogen cyanide (HCN) gas can be produced and is highly toxic. The release of HCN gas in the ADR (adsorption, desorption and recovery) Plant is an indicator of the failure of a process control.

The ADR Plant features fixed HCN gas monitors at strategic locations that were determined based on an assessment of the processing steps during the detailed design phase of the ADR Plant. Fixed HCN gas monitors are installed in areas of potential exposure to cyanide (Figure 1), including the:

- cyanide receipt and storage areas,
- the mixing area,
- the barren solution tank sump,
- the acid wash vessel,
- carbon strip/wash area,
- carbon regeneration area,
- carbon screens, and
- the electrowinning area.

To support and supplement this assessment as the EGM moves into production, a risk assessment will be performed prior to startup and at least annually, thereafter to ensure that the number and location of fixed HCN monitors provide adequate and effective monitoring coverage in zones that present some risk for the production, release or concentration of HCN gas.

1.2 PURPOSE

This procedure establishes the assessment process to evaluate the risk of cyanide exposure from HCN gas generation throughout the ADR Plant, and to use results to ensure fixed HCN gas monitors are installed in areas determined to present a risk to workers.

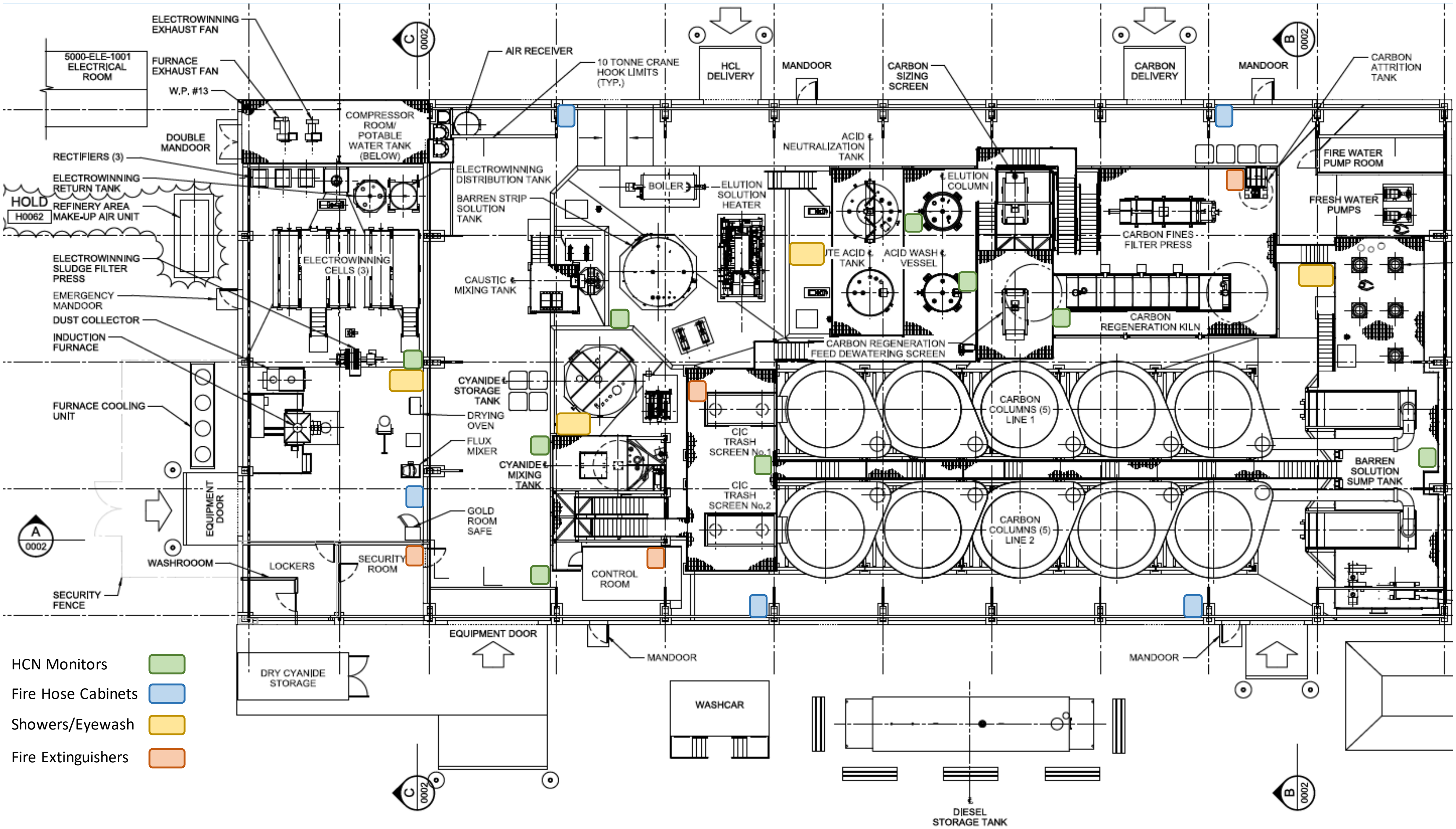


Figure 1: Locations of Key Safety Equipment in the ADR Facility

1.3 SCOPE

This procedure applies to all employees and contractors working at the EGM ADR Plant.

1.4 RESPONSIBILITY

1.4.1 Mine General Manager or their designate:

- Conduct overall management of the EGM site and workforce.

1.4.2 Department Managers or their designates:

- Ensure this procedure is communicated to their employees;
- Ensure their employees have received the appropriate training; and
- Ensure this procedure is implemented.

1.4.3 Health, Safety and Security Manager or their designate:

- Monitor the implementation of this procedure; and
- Ensure this procedure is maintained.

1.4.4 Supervisors:

- Implement these procedures; and
- Ensure these procedures are followed.

1.4.5 All Employees:

- Understand and practice this procedure as required; and
- Ask their supervisor for clarification if they are unsure of any aspect of this procedure.

1.5 DEFINITIONS

HCN: hydrogen cyanide

Hazard Identification: This is the process of examining each work area and work task for the purpose of identifying all the hazards which are "inherent in the job". This process is about finding what could cause harm in a work task or area.

Risk: The likelihood, or possibility, that harm (injury, illness, death, damage, etc.) may occur from exposure to a hazard.

Risk Assessment: Is defined as the process of assessing the risks associated with each of the hazards identified so the nature of the risk can be understood. This includes the nature of the harm that may result from the hazard, the severity of that harm and the likelihood of this occurring.

Risk Control: Taking actions to eliminate health and safety risks so far as is reasonably practicable. Where risks cannot be eliminated, then implementation of control measures is required to minimize risks so far as is reasonably practicable. A hierarchy of controls has been developed and is described below to assist in selection of the most appropriate risk control measures.

2 OPERATING PROCEDURE

Prior to start-up, a risk assessment focused on cyanide exposure risk in the ADR Plant will be conducted to identify those areas where there is a risk of cyanide exposure from HCN gas generation. The assessment will be informed by the experience of operational staff and personnel prior to the introduction of cyanide to the facility. Assessment focus areas include:

- the cyanide receipt and storage areas,
- the mixing area,
- cyanide storage and transfer points,
- carbon strip/wash area,
- carbon screens,
- electrowinning area, and
- any other area identified by operational staff and personnel.

Once work begins, risk assessments will be supported by periodic ambient HCN gas surveys of the ADR Plant. Follow up risk assessments will be conducted annually, and following any changes to cyanide equipment, processes, or operations to ensure that the number and location of fixed HCN monitors provide adequate and effective monitoring coverage. Fixed HCN monitors will be installed, or adjustments made to the HCN gas detection system in those areas determined to present a risk to workers.

2.1 RISK ASSESSMENT PROCESS

The risk assessment process steps are illustrated in Figure 2. Information gathered and evaluated at each step of the risk assessment process is and recorded in a Risk Matrix (Table 1).

Figure 2: Risk Assessment Process Steps

Table 1: Risk Matrix

Step 1. Identify Hazard			Step 2. Assess Risk			Step 3. Control Risk			Step 4. Review		
Plant Area	Task	Hazard Description	Existing Control Measure Effectiveness	Severity	Likelihood	Risk Rating	Additional Control Measures	Responsibility	Urgency (Deadline)	Implemented (Y/N)	Next Scheduled Review

CONSULTATION
Hazard identification, risk assessment, selection and implementation of control measures must involve consultation with the Process Manager and personnel performing tasks in the ADR Plant, including Process and Maintenance Department employees.

2.2 STEP 1 – IDENTIFY HAZARDS

Step 1 is to identify hazards in the area being assessed. A hazard assessment is performed to establish the most likely sources of HCN gas generation for each area of the ADR Plant. Hazard identification will consider:

- The physical work area/location.

- Presence of cyanide (solid, liquid, cyanide concentration) and other reagents such as acids.
- Work activity being performed and equipment used.

Information is gathered using the following methods:

- **Activity and Work Area Review:** Review existing information on operating procedures and equipment (including safety and emergency response equipment). Work areas should be inspected and examined, to evaluate spatially where hazards exist in relation to employees performing tasks.
- **Review Existing Control Measures:** Review the layout of existing HCN gas monitors as well as safety and emergency response equipment (including ventilation systems).
- **Incident Review:** Review incidents and near misses, including all those where both fixed or portable HCN alarms have been triggered.
- **ADR Plant monitoring review:** Review ADR Plant monitoring logs, such as daily pH logs, which may indicate ADR Plant areas or processes that may be hazardous.
- **Periodic ambient HCN gas surveys:** studies to quantify the ambient HCN gas concentration in each area of the ADR Plant will be undertaken periodically to support ADR Plant hazard identification.

Information gathered during this step is then used in the hazard description columns in the Risk Matrix (Table 2 above). Each hazard is then assessed in Step 2.

2.3 STEP 2 – ASSESS RISK

The process of assessing the risk is undertaken by reviewing any available information about the hazard and by using your personal work experience about the hazard severity and how likely this would be to happen. A key component of assessing risk is looking at existing control measures, and considering the following questions:

- How is the work completed?
- Where is the physical work completed in relation to the HCN gas production hazard?
- Do current HCN gas monitoring locations reduce the severity or likelihood rating of detecting HCN gas?

The outcome of the risk assessment is a determination of:

- The severity of the potential risk;
- The likelihood of the risk realization; and
- Whether existing control measures (including HCN gas detectors) are effective.

Severity rating considers the harm that could result from the hazard, the number of people exposed, possible chain effects from exposure to this hazard. Likelihood ratings may be affected by how often the task is completed, in what conditions, how many people are exposed to the hazard and for what duration

Each hazard identified in Step 1 is evaluated for severity and likelihood of the potential risk. Table 2 provides a guide for consistently rating hazards in relation to the risk of HCN gas production in the ADR Plant. Table 3 shows risk assessment ratings. This evaluation should be recorded in the Risk Matrix (Table 1 above).

Table 2: Risk Rating

Severity		Likelihood	
5. Catastrophic	Multiple fatalities; Permanent evacuation of ADR Plant and surrounding mine site area (e.g., large, uncontained, uncontrollable HCN gas release)	E. Expected	Event is expected to occur at ADR Plant (e.g., annually)
4. Major	Fatality; Permanent evacuation of ADR Plant (e.g., contained but uncontrollable HCN gas release)	D. Probable	Event is likely to occur at ADR Plant sometime within the life of the mine (once in 1-10 years)
3. Moderate	Lost time injury or injuries; Temporary evacuation of ADR Plant (e.g., large but contained HCN gas release)	C. Remote	Event could occur at ADR Plant (once in 10-100 years)
2. Minor	Medical aid; Temporary evacuation of ADR Plant (e.g., small, contained, and controlled HCN gas release)	B. Rare	Event could occur at ADR Plant (once in 100-1000 years)
1. Marginal	First aid injury	A. Extremely Rare	Event could happen but it is extremely unlikely at ADR Plant (once in > 1000 years)

Table 3: Risk Level

Catastrophic 5	5A	5B	5C	5D	5E
Major 4	4A	4B	4C	4D	4E
Moderate 3	3A	3B	3C	3D	3E
Minor 2	2A	2B	2C	2D	2E
Marginal 1	1A	1B	1C	1D	1E
	Extremely rare A	Rare B	Remote C	Probable D	Expected E

2.4 STEP 3 – CONTROL RISK

The management of risks in the workplace requires eliminating risks if possible. Where elimination is not possible, then risks should be minimized. While this risk assessment process has a focus on verifying the adequacy of the HCN gas detection system, a broad approach to control measures that considers the hierarchy of controls (Figure 3) should be considered through the risk assessment process.

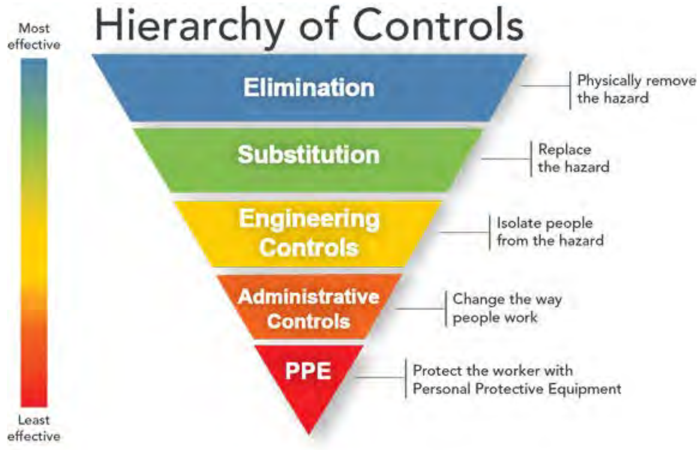


Figure 3: Hierarchy of Controls

This broad approach should look at other actions that could be implemented to eliminate or control the risk, in addition to evaluation of the HCN gas detection system. Other actions, could include adjustments to how and/or where tasks are performed in relation to a hazard. Consider the following questions, as you evaluate the hazards identified:

- Can reagents or pH (adding caustic or lime) be adjusted within the process to reduce the risk of HCN gas generation at certain steps in the process?
- Can a task be performed away from areas identified as having a higher risk of HCN gas generation?
- Can tasks that must be performed in proximity to areas with higher risk of HCN gas production be automated?
- Are PPE requirements adequate?
- Does the HCN gas monitoring system require adjustments (Section 2.4-1)?

Consultation with workers is required in the selection and implementation of control measure in the workplace. Controls may involve initiating the change management process (SGC-CMP-SOP-012 “Cyanide Facility Change Management Process”). The level of urgency for the implementation of a risk control measure, as well as an individual responsible for implementation should be indicated in the Risk Matrix (Table 1).

2.4.1 HCN Gas Monitoring System Considerations

A focused approach to evaluating the layout of the ADR Plant and the location of HCN gas detectors should be taken. Evaluation of the HCN detector system should consider the following:

- Purpose:
  - **Life Safety:** HCN gas is directly hazardous to personnel and so the HCN gas monitors are placed based on the normal operating zone for the people present.
  - **Plant Protection:** HCN gas generation can be used to monitor process function. Results may be used to adjust reagents, process and/or to bring on additional ventilation. Monitors should be placed strategically where the gas has a risk of being generated, and where it is expected to accumulate.
- Location:
  - Any area where portable HCN monitors have sounded that are not currently equipped with a fixed monitor will have a fixed monitor installed and the source will be identified.
  - Sensors should be close to the source where HCN gas generation is most likely to occur.
  - Locations such as pits, alcoves, and roof peaks, and where gas is likely to accumulate should be considered.
  - Calibration and maintenance of the gas detections system is an ongoing requirement. Sensors must be located so that they are accessible for calibration and maintenance.
- Ventilation:
  - When planning and arranging gas detection systems both natural and forced air ventilation patterns within the plant must be considered. It is critical to understand how gases can be carried along natural air currents, as well as through the plant's ventilation system, to various areas of the facility.
  - Where forced ventilation is used, gas detectors should be sited at the inlet.
  - HCN gas monitor locations should be selected between the furthest potential HCN gas source and the air extraction point, based on the reaction time and time needed for the air movement/extraction to take effect.
- Coverage Density:
  - Density between HCN gas monitors should consider that a gas monitor is typically capable of providing up to 75 m^2 area coverage based on a 5 m radius of operation. There are however many factors affecting this, ventilation air flows, gas characteristics, equipment in the area, geometry of a room, etc.
  - Areas where fixed HCN monitor alarms have been triggered should be considered for higher density of fixed monitors.
  - Consider the results of the ambient HCN gas survey.
- Redundancy:

  - The number of sensors should ensure that failure, or maintenance removal of an individual sensor does not compromise the safety of the area being monitored.

- Sensor Height:

  - HCN gas is lighter than air and as a result, gas detectors need to be sited where gases can accumulate (e.g., in ceiling voids, etc.).

  - HCN monitors specifically installed to protect the safety of workers should be placed based on the normal operating zone for the people present such that they monitor the breathing zone. Life Safety Protection zone is between 1 m and 1.8 m off the ground or working level in areas where people are present and work activities are being conducted.

2.5 STEP 4 – REVIEW

Risk assessment is an on-going process to evaluate the effectiveness of hazard assessment and control measures. Risk assessments that review workplace cyanide exposure risk should be conducted:

- annually, and
- following any changes to cyanide equipment, processes, or operations; or
- as warranted by incidents or near misses.

Maintaining records of the risk management process Risk Matrix (Table 1) assists when undertaking subsequent reviews to demonstrate decision making processes, document how controls were intended to be implemented, and can indicate if control measures are reducing severity and likelihood of a hazard over time.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

1 PURPOSE, SCOPE, & RESPONSIBILITY

1.1 INTRODUCTION

In keeping with the StrataGold Corporation's (SGC) Occupational Health and Safety Policy, all employees are considered to be accountable for their own safety and for the safety of their fellow workers. Eagle Gold Mine (EGM) personnel and contractors are encouraged to provide input on occupational health and safety issues to assist with maintaining a safe working environment.

SGC will consider this input in developing, evaluating and reviewing operating procedures and during formal safety meetings and informal pre-work safety sessions.

1.2 PURPOSE

The purpose of this procedure is to outline the content, schedule, and expectations of cyanide workplace safety meetings.

1.3 SCOPE

This procedure applies to all employees and contractors working at the EGM.

1.4 RESPONSIBILITY

1.4.1 Mine General Manager or designate:

- Conduct overall management of the EGM site and workforce

1.4.2 Department Managers or their designates:

- Ensure this procedure is communicated to their employees;
- Ensure their employees have received the appropriate training; and
- Ensure this procedure is implemented.

1.4.3 Health, Safety and Security Manager or designate:

- Monitor the implementation of this procedure; and

- Ensure this procedure is maintained.

1.4.4 Supervisors:

- Implement these procedures; and
- Ensure these procedures are followed.

1.4.5 All Employees:

- Understand and practice this procedure as required; and
- Ask their supervisor for clarification if they are unsure of any aspect of this procedure.

2 OPERATING PROCEDURE

2.1 TOOLBOX MEETINGS

Toolbox Meetings will be held daily by each foreman or supervisor with his/her entire crew prior to each work shift. The meeting will consist of a short presentation on a workplace safety topic (see Section 2.1.1 for ideas) followed by input on the topic by the employees. Employees are encouraged to actively participate in each Toolbox Meeting.

The supervisor will then outline the work plan for the day for the crew and discuss any safety considerations. The crew will review the work plan considering the following questions:

- **Check your Personal Protective Equipment (PPE):**
  - Is PPE appropriate for the job being performed that day?
  - Check the PPE condition (e.g., proper fit, no tears in protective clothing or gloves, respirators are working, etc.).
  - Ensure that personal HCN monitors are calibrated, sufficiently charged and working.
- **Check emergency stations:**
  - review of the location of emergency showers.
  - check that emergency showers are working.
  - locate the nearest fire extinguisher.
  - locate the nearest first aid kit and oxygen.
  - ensure that fixed HCN monitors are calibrated.

  - locate the nearest exit.
- **Review decontamination procedures**
  - For tools; and
  - For PPE.
- **Review the location of spill response equipment**
- **Review emergency response procedures**
  - Review procedures for calling appropriate response personnel including those trained and qualified for the administration of cyanide antidotes.

Consider that personnel participating in meetings may not work in the ADR Plant everyday (e.g., specialized maintenance).

Toolbox Meetings will be documented on a Toolbox Meeting form (see below).

2.1.1 Workplace Safety Topic Ideas

Toolbox Meetings held by crews who will be working with cyanide will feature topics that will help refresh employees on their cyanide handling training.

Cyanco Corporation has produced a seven-module series named the Cyanco SafetyNet which includes informative cyanide training videos. Such videos are an example of training materials that will be presented during the General Safety Meetings. Consider reviewing the cyanide training videos during Toolbox Meetings.

Toolbox Meeting □ / Tailgate Meeting □

Department:		Date:	
Supervisor Name:		Contact No.:	

Guidelines for Conducting Meetings

1. Purpose:	**Scope of work – what needs to be done?**	7. First Aid:	**Identify first aiders on the site**
2. Duration:	**How long is the job going to last?**	8. Smoking:	**Review smoking policy**
3. Manpower:	**Number of workers involved.**	9. Eating/Drinking:	**Review eating and drinking policy**
4. Equipment:	**What equipment/tools are required?**	10. Permits:	**Identify who issues permits to work, if applicable.**
5. PPE Required:	**PPE required as well as additional PPE.**	11. Housekeeping:	**Review requirements and possible problem areas.**
6. Hazards:	**What are the hazards? Document on the Task Hazard Assessment and Control**	12. Emergency:	**Identify muster point, routes, alarm system.**

Meeting Minutes **(Discuss scope of work)**

Designated First Aider:		Contact No.:	

Attendee Signatures **(print name and sign beside)**

		x			**x**
		x			**x**
		x			**x**
		x			**x**
		x			**x**

Task Hazard Assessment & Control

Basic Steps	Existing Hazards	Initial Risk	Current Hazard Control	Hazard Control Recommended	Final Risk

Foreman/Crew Lead:	
Manager:	

2.2 JOINT OCCUPATIONAL HEALTH & SAFETY COMMITTEE

2.2.1 JOHSC Committee

A Joint Occupational Health & Safety Committee (JOHSC) will be formed on site consisting of no less than four persons with at least half being employees functioning in non-supervisory activities. The committee will be chaired and co-chaired by one worker representative and one management representative. Representatives will be rotated and they will not chair for two consecutive meetings.

Department Managers will encourage personnel working at the Process Plant, or engaged in work procedures that may requires working around cyanide, to join the JOHSC. If a concern or issue is identified with a work process or potential safety hazard during daily tool box meetings, this should be brought to the attention of the JOHSC.

2.2.2 JOHSC Monthly Meetings & Minutes

The meetings will be held monthly and the minutes of the meeting will be recorded by a member other than the current committee chair. The JOHSC meetings will consist of:

- Investigations of accidents and incidents;
- Communication of work process or environment changes that may impact health and safety; and
- Identification of potential safety hazards and recommendations for corrective action.

Minutes for each meeting will be recorded and posted in a visible location for at least three months. The minutes will be retained and accessible by employees for at least two years. Training will be provided to JOHSC members in accordance with YWS&HB regulatory requirements.

Share recommendations from the monthly minutes with Process Plant personnel

Encourage personnel working at the Process Plant to join the JOHSC.

2.3 GENERAL SAFETY MEETING

A General Safety Meeting will be held monthly for all personnel on site and will act as a forum for safety concerns to be addressed. The General Safety Meeting will review the minutes from the monthly JOHSC meeting. Employees responsible for conducting safety meetings will receive documented, onsite training regarding policy, procedure, employee instruction, and site-specific details.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review

REVISION CONTROL TABLE

Version No.	Date	Pages(s)	Section(s)	Purpose of the Modification

Department:	Health, Safety and Security	**Document No.:**	***SGC-CMP-SOP-019***
Section:		**Effective Date:**	January 1, 2019
Revision:		**Replaces:**	N/A
Approved:	David Rouleau, Vice President Operations & General Manager		

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

The International Cyanide Management Code (ICMC) recommends that warning signs should be placed where cyanide is used to alert workers that cyanide is present, that smoking, open flames, eating and drinking are not allowed and that the necessary cyanide-specific personal protective equipment must be worn. Tanks and piping containing cyanide should be identified by color code, signs, labels, tags, decals or other means to alert workers of their contents. The direction of cyanide flow in pipes should also be labeled, marked or otherwise designated.

1.2 PURPOSE

This procedure establishes the minimum requirements for cyanide signage placement at the Eagle Gold Mine (EGM).

1.3 SCOPE

This procedure applies to all employees and contractors working at the EGM.

1.4 RESPONSIBILITY

1.4.1 General Manager or their designate:

- Overall management of the EGM site and workforce;

1.4.2 Department Managers or their designates:

- Ensuring this procedure is communicated to their employees;
- Ensuring their employees have received the appropriate training; and
- Ensuring this procedure is implemented.

1.4.3 Health, Safety and Security Manager or designate:

- Monitor the implementation of this procedure; and
- Ensure this procedure is maintained.

1.4.4 Supervisors or their designates:

- Implementing these procedures; and
- Ensuring these procedures are followed.

1.4.5 All Employees

- Understand and practice this procedure as required; and
- Ask their supervisor for clarification if they are unsure of any aspect of this procedure.

1.5 DEFINITIONS

Globally Harmonized System of Classification and Labelling of Chemicals(GHS): the internationally agreed-upon standard managed by the United Nations that was set up to replace the assortment of hazardous material classification and labelling schemes previously used around the world.

MSDS: A “Material Safety Data Sheet” is a document that contains information on the potential hazards (health, fire, reactivity and environmental) and how to work safely with the chemical product.

NFPA 704: Standard System for the Identification of the Hazards of Materials for Emergency Response is a standard maintained by the U.S.-based National Fire Protection Association which defines the "fire diamond" or "safety square" used by emergency personnel to quickly and easily identify the risks posed by hazardous materials. This helps determine what, if any, special equipment should be used, procedures followed, or precautions taken during the initial stages of an emergency response. The briquette form of cyanide will be imported from the U.S., and will feature labels that are compliant with both WHMIS and NFPA 704 standards.

WHMIS: Workplace Hazardous Materials Information System Regulations are Canada’s national workplace hazard communication standard. The key elements of the system are cautionary labelling of containers of WHMIS controlled products, the provision of material safety data sheets (MSDSs) and worker education and site-specific training programs. WHIMIS 2015 incorporates the GHS for workplace chemicals.

2 OPERATING PROCEDURE

2.1 PERIMETER SIGNAGE

2.1.1 Warning Signs

Warning signs (Figure 1) will be placed along perimeter fencing at the ADR Plant and in conspicuous locations at the cyanide storage area, as well as at entrances to the ADR facility and any other areas where high concentration cyanide will be stored and/or used.

Figure 1: Cyanide Warning Signs

2.1.2 General Personal Protective Equipment & Restriction Signs

Signs indicating required PPE and restricted activities will be placed at entrance locations to the ADR Plant (Figure 2), the heap leach facility (HLF) and the Events Pond (Figure 3). Where cyanide may be present, signs at the entrance will prohibit smoking, eating, drinking, and open flames within the area.

Figure 2: ADR Plant PPE and Restricted Activity Signs

Figure 3: HLF and Events Pond PPE and Restricted Activity Sign

2.1.3 Emergency Response Signage

The emergency response signage will include signs identifying emergency exits, emergency shower/eyewash stations, dry chemical fire extinguishers, cyanide antidote kits, and first aid stations. In addition to the identifying signs, laminated maps of the emergency shower/eyewash stations, dry chemical fire extinguishers, and fire hose cabinets will be posted (Figure 4).

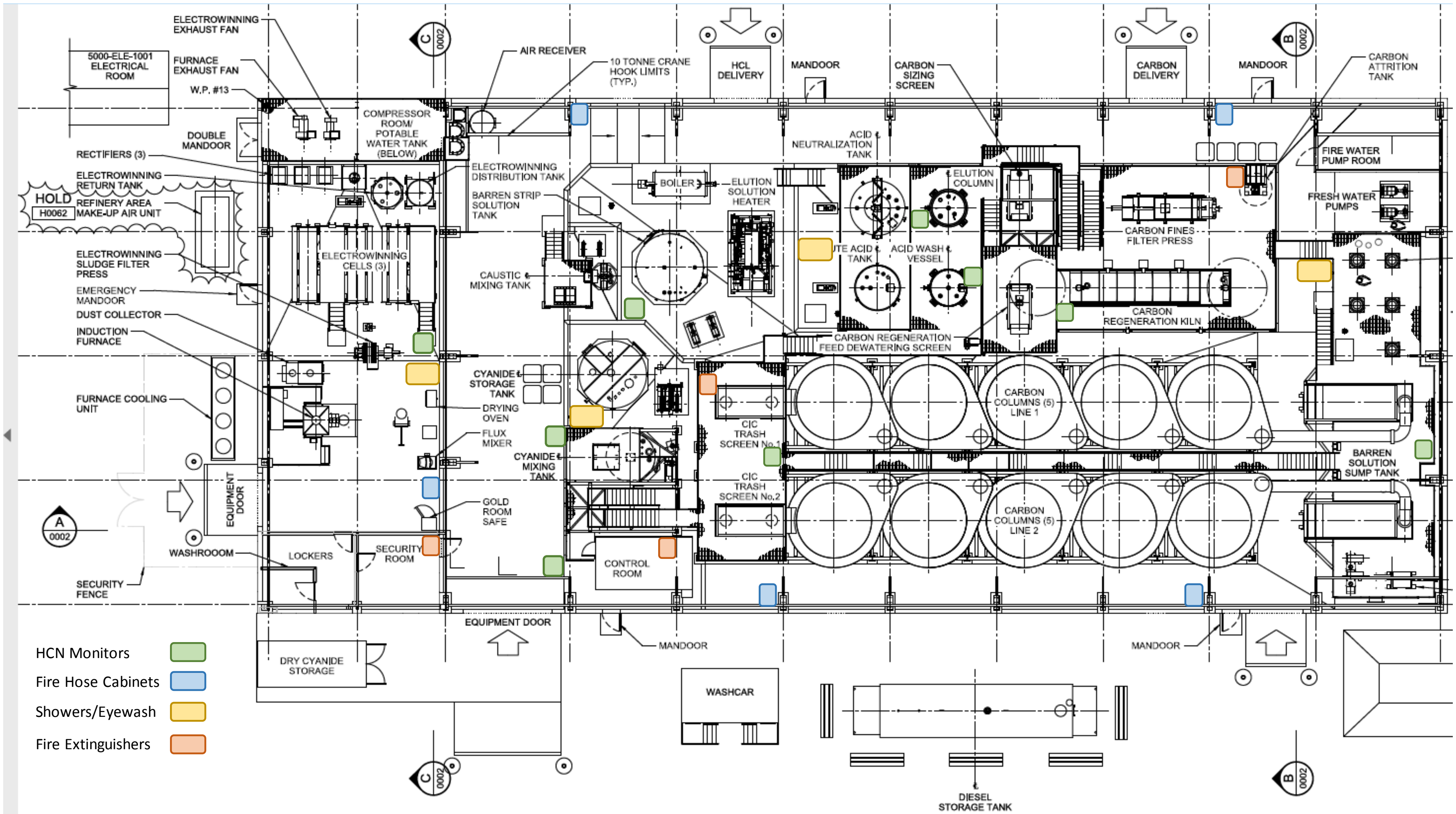


Figure 4: ADR Plant Safety Equipment Location

2.1.4 Hazardous Materials Transport and Storage Labeling

The EGM, and our suppliers and transporter of cyanide, will follow the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) on all imported, hazardous chemicals to site. Tanks and vessels containing cyanide will be clearly marked to identify their contents and capacity. The briquette form of cyanide, will be imported and stored at site in compliance with WHMIS and NFPA 704 standards (see Figure 5 for example signage). Material safety data sheets will be available to all workers for all hazardous materials that will be on site and the workers will be trained on the location and use of the sheets.

Figure 5: Example of Labeling for Transport, Storage and Use of Hazardous Materials

2.1.5 Piping Labels & Signage

Piping containing WAD (weak acid dissociable) cyanide at concentrations >10 ppm will be colour-coded and labeled at prominent locations such as flanged junctions and/or valves. The labels will indicate the contents and flow direction of the piping. Colour-coding and label location will follow the guidelines of ANSI/ASME 13.1-2015 (ASME, 2015), therefore piping containing appropriate WAD cyanide concentrations will be given orange background and black text labels. See Figure 6 for examples.

Figure 6: Example of Proposed Labeling for WAD Cyanide Piping

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 PURPOSE

The purpose of this procedure is to describe the response procedures, roles, and responsibilities for each of several potential cyanide release scenarios. For each emergency scenario, specific measures are considered to ensure that appropriate mitigation measures, remediation actions, and monitoring programs are implemented to prevent or minimize potential impacts to the health and safety of Eagle Gold Mine (EGM) personnel, contractors, EGM site visitors, local communities and the environment.

1.2 SCOPE

This procedure applies to all employees, visitors, and contractors at the EGM.

1.3 RESPONSIBILITY

1.3.1 Chief Operating Officer or their designate

- Provides overall management of StrataGold Corporation (SGC) activities related to the EGM; and
- Is responsible for communicating nature and extent of any emergency to regulatory bodies, potentially affected communities, media, and other stakeholders as necessary.

1.3.2 Mine General Manager or their designate:

- Provides overall management of the EGM site and workforce;
- Will be appointed Incident Commander or will designate an Incident Commander;
- Immediately reports to the Incident Command Center (ICC) when a Code 1 response is initiated; and
- Is responsible for communicating the nature and extent of any emergency to other members of SGC senior management.

1.3.3 Department Managers or their designates:

- Ensure this procedure is communicated to their employees;
- Ensure their employees have received the appropriate training; and
- Ensure this procedure is implemented.

1.3.4 Health, Safety and Security Manager or their designate:

- Monitor the implementation of this procedure;
- Ensure this procedure is maintained; and
- Reporting to the ICC to support the Incident Commander and manage communication with the Emergency Response Team Captain (ERTC).

1.3.5 Incident Discoverer:

- Is any individual witnessing an emergency on the EGM site; and
- Is responsible for initiating a Code 1 emergency response by calling “Code 1, Code 1, Code 1” on the emergency radio channel and clearly stating the nature and location of the emergency.

1.3.6 Emergency Response Team Captain:

- Mobilizes to the scene and assumes control to direct the response of all personnel at scene;
- Briefs and directs the Emergency Response Team (ERT), Paramedics and other personnel as may be necessary;
- Appoints appropriate ERT members to roles; and
- Reports to the ICC and briefs Incident Commander.

1.3.7 Emergency Response Team:

- Mobilizes to the scene, assumes control, and conducts the initial assessment of the incident;
- Reports to the Emergency Response Coordinator; and
- Each individual ensures they are properly trained on all aspects of emergency response and that they do not expose themselves to situations that are beyond their level of training or experience.

1.3.8 All Employees:

- All site personnel that are not directly involved in emergency response efforts will
  - cease work, unless the cessation of their work could result in an emergency situation; and
  - Obey the radio silence policy during an emergency situation and will not use radio communications until an “All Clear” has been given.

2 OPERATING PROCEDURE

Safety of personnel and the protection of the environment we work in is the number one priority for operations at the EGM. If any facility, event or work practice appears unsafe or if you are unsure of any standard operating procedure, report it to your immediate supervisor.

All employees and contractors at the EGM have the right to:

- Refuse hazardous work if it involves machinery or a situation that would pose a danger to you or others.
- Identify health and safety hazards and to recommend solutions to supervisors.

The right for an employee or contractor to refuse hazardous work is specifically protected by the *Occupational Health and Safety Act* (Yukon).

If an emergency situation develops at the EGM, or along the transportation route to the EGM, and you are unsure of what response should be undertaken then you should always warn others and remove yourself from any potential harm. The EGM site has trained, experienced and dedicated emergency response personnel that can identify, manage and respond to any emergency scenario to ensure that people and the environment are safe.

EGM operations within the ADR (adsorption, desorption and recovery) Plant include activities that present the highest potential for the release for cyanide in solid and liquid forms. The ADR Plant is also the area with the highest likelihood of the generation of hydrogen cyanide (HCN) gas. Administrative and engineering controls have been considered during the design phase of the ADR Plant and will be instituted during the operation of the facility to reduce the likelihood of any unplanned release of any hazardous substances. These administrative and engineering controls include task specific training including hazard recognition, strategically located safety equipment for the identification of, and response to, emergency events (Figure 1). Additionally, task specific Personal Protective Equipment (PPE) will be available for use by all personnel or EGM visitors as may be appropriate for the locations they will be in and the hazards that may be present.

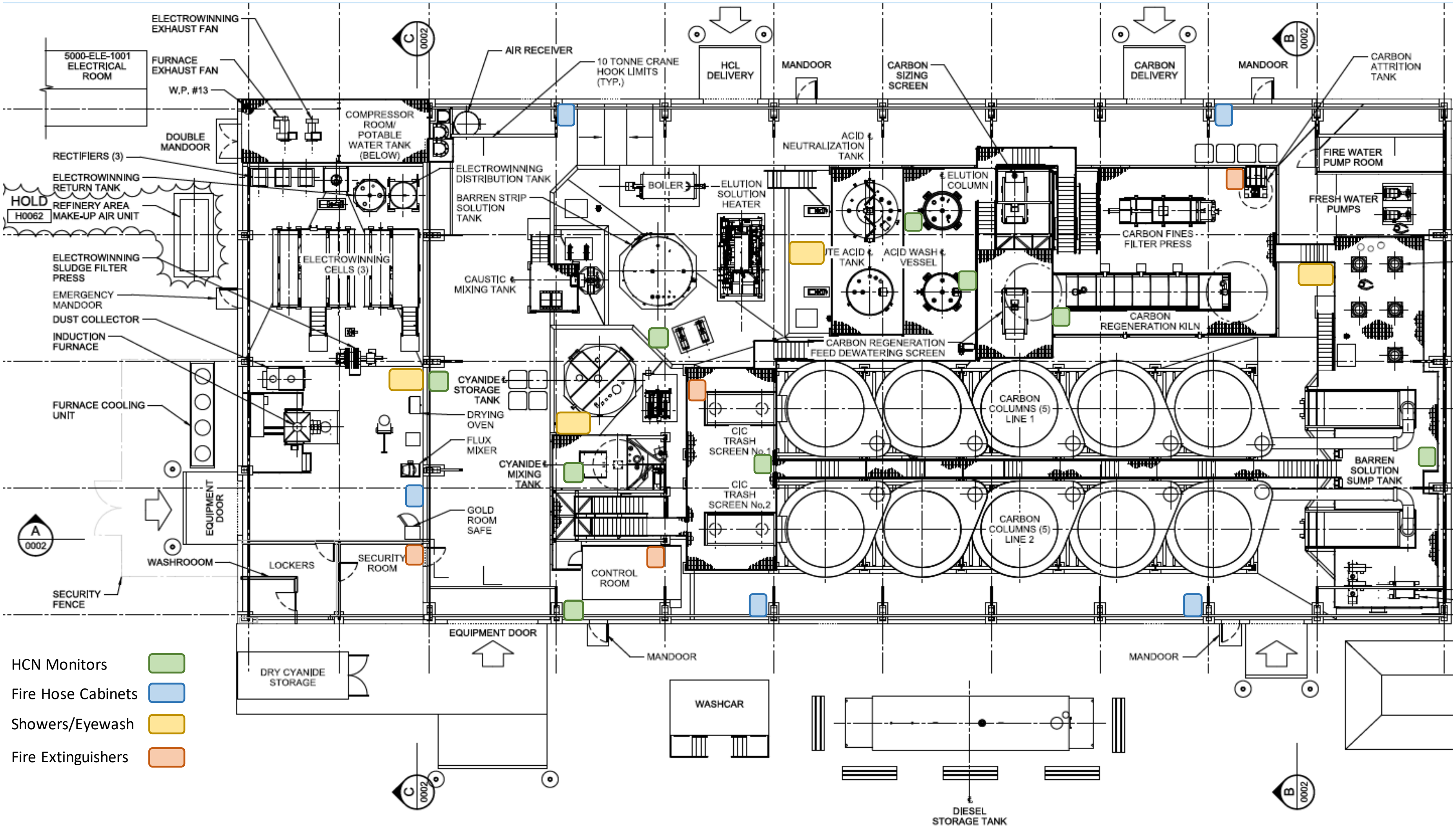


Figure 1: Locations of Key Safety Equipment in the ADR Facility

2.1 RELEASE OF CYANIDE IN ADR PLANT

2.1.1 Event Description

The following applies to any release of cyanide inside the ADR Plant that is above exposure limits. Cyanide includes HCN liquid and gas, ionic cyanide, or metal cyanide complexes and others with similar low dissociation constants. For specifics on ADR Plant Operations, see the *ADR Plant Operations Plan*.

2.1.2 Release Detection

Routine inspection of the ADR Plant will be undertaken by personnel involved in activities in the area of the facility as discussed in SGC-CMP_SOP-007 “Cyanide Facility Inspections” and with additional effort following an event.

Personnel conducting ADR Plant inspections will be trained for the tasks they are responsible for and to support release detection including:

- how to identify possible cyanide release hazards;
- location and function of engineering controls;
- emergency response procedures; and,
- PPE requirements.

As shown in Figure 1 above, the ADR Plant is designed with fixed HCN monitors that detect releases of HCN gas. The number of HCN monitors may be increased and the locations may be changed following risk assessments and review to ensure that adequate monitoring coverage is maintained in accordance with SGC-CMP_SOP-016 “Assessment and Mitigation of Workplace Cyanide Exposure”.

The HCN monitors have a detection range of 0-10 ppm with a HCN High Alarm at a concentration over 4.7 ppm and a High High Alarm over 6.7 ppm. The HCN monitors include two hardwired local beacons. An amber beacon warning indicates that an HCN concentration of 4.7 ppm or greater has been detected, a red beacon warning indicates that the instrument has detected an internal error or fault. All measurements from the monitors will be displayed, trended, and alarmed on the control system.

Additionally, personnel working in the ADR Plant are required to wear portable HCN monitors to provide additional monitoring within the specific area they may be working in.

The use of both fixed and portable HCN monitors and the visual observations required of ADR Plant personnel will provide the mechanism for the detection of a release of cyanide within the ADR Plant.

2.1.3 Neutralization and Cyanide Destruction

A neutralization and cyanide destruction circuit is included in the ADR Plant. The destruction circuit includes hydrogen peroxide, copper sulphate, and five pressurized air hose agitators. The full cyanide destruction process is found in the *ADR Plant Operations Plan*.

The cyanide destruction circuit is provided for emergency cyanide destruction if required. Sufficient volumes of reagents for the destruction circuit will be available on site for the volume of sodium cyanide for draindown of the Heap Leach Facility (HLF) and reagent suppliers have provided definitive timelines for the ordering, packaging and delivery of additional reagents as may be necessary. Additionally, cyanide destruction can be accomplished with the use of lime, soda ash, sodium hypochlorite, or high pH water for neutralization response to spills on site where the neutralization agents will not come into contact with aquatic systems.

Cyanide released in the ADR Plant will collect in sumps designed within the ADR Plant and pumped back into the HLF. If the barren solution pump and pipelines are inoperable, the lined ADR overflow trench will allow for the passive drainage of cyanide substances back into the HLF. All equipment used in response will be decontaminated using sodium hypochlorite or high pH water with flows returning into the circuit.

2.1.4 Site Response

1. Incident Discoverer initiates a Code 1 emergency response by calling “Code 1, Code 1, Code 1” on the emergency radio channel and clearly stating the nature and location of the emergency.
2. ERT and Incident Command are activated.
3. Emergency response will evacuate the area as per the following criteria:
   - For a small spill containing Cyanobrik (NaCN [sodium cyanide]) in an unreactive location, evacuate 50 m in all directions.
   - For a small spill containing WAD cyanide, evacuate 50 m in all directions and 400 m downwind.
   - For a large spill, evacuate 390 m in all directions and 1.3 km downwind during the day or 4.9 km during the night.
   - In each situation cyanide containers will be moved, if possible, out of the emergency area.
4. The ERT will extract and administer first aid to affected personnel.
5. The Paramedic will provide additional first aid assistance so that the ERT can return to the ADR Plant for additional extractions or to begin the cyanide destruction process.
6. The ERT or other trained and equipped personnel will then attempt to stop the release and eliminate the spill. Methods for eliminating the spill depend on the cyanide compound and the size of the spill and are as follows:
   - For a spill containing Cyanobrik in an unreactive location, the spill will be collected and placed in well-marked containers for introduction into the cyanide mixing tank.
   - For a spill containing WAD cyanide, the spill will collect in the sumps and will be contained by the berms and bund walls in the ADR Plant. Individual containment areas are designed to accept 110% of the volume of the largest tank within the impoundment. If a particular area containment fails, the ADR Facility has a backup containment measure with a lined foundation that drains to a lined ditch that flows passively back into the HLF. Cyanide collected in the sumps will be pumped back into the HLF using the barren solution pump and pipelines.

Remaining cyanide will be neutralized using hypochlorite or high pH water and reintroduced to the circuit.

7. Follow-up will include notifying the appropriate authorities, ensuring legislation compliance, root cause analysis, and implementation of the Remedial Action Plan as per SGC-CMP-SOP-024, “Incident Investigation and Reporting”.

2.1.5 Significant Pipe, Valve or Tank Leaks or Ruptures

In the event of a significant leak or rupture, the affected ADR Plant cyanide circuit will be isolated by closing the valves to the circuit. The area containment has been designed to hold 110% of the capacity of each system. If the containment berms fail, the ADR Facility has a lined foundation and drains to a lined trench that flows passively back into the HLF.

After the release has been controlled, the leaking or ruptured system will be neutralized for investigation before repair.

2.1.6 Power Outages and Pump Failures

In the event of a power outage, the mine has a back-up generator system that is capable of supplying power to the pumping stations and other critical EGM components would be activated in accordance with SGC-CMP-SOP-010 Backup Generator Operations and Maintenance.

In the event of a pump failure that prevents the draining of the ADR Plant sumps, the affected ADR Plant cyanide circuit will be isolated. ADR Plant solution management systems include redundancy in the various pumping systems, and an available back-up pump or a pump re-purposed from elsewhere on site will be used in place of the failed pump.

If there is a significant release within the ADR Facility paired with a power outage and pump failure, then cyanide released will be contained within the 110% containment areas. If the containment fails, the ADR Facility has a lined foundation and drains to a lined trench that flows back into the Heap Leach Facility.

2.1.7 Failure of Cyanide Treatment, Destruction, or Recovery Systems

The *ADR Plant Operations Plan* describes the required materials and procedures for the operation of the cyanide destruction circuit. All components of the cyanide destruction circuit will be regularly maintained and inspected including both chemical and mechanical components.

In the event of a complete failure of the cyanide destruction circuit. The five agitators used for preparing and adding cyanide destruction reagents to the system may be substituted with manual agitation and reagent dosing to operate the circuit.

An ADR bypass line has been included in the design of the HLF, which can also enable a reduction in flow rates to the cyanide destruction circuit, if needed (e.g., to allow for the arrival of additional cyanide destruction reagents to arrive on site in the event of an extended cyanide destruction period).

The double containment provided by the berms, and the ADR Facility pad liner will also prevent cyanide from entering the environment during an extended cyanide destruction period.

2.2 TRANSPORTATION ACCIDENTS

2.2.1 Event Description

The following applies to the release of dry sodium cyanide during transit to the EGM site.

2.2.2 Mitigation

SGC has established a supply contract with Cyanco Canada Inc., an International Cyanide Management Code (ICMC)-certified cyanide producer. As discussed in the *Cyanide Management Plan*, Cyanco Canada Inc., as a requirement of the supply contract, has been responsible for ensuring the supply route is ICMC certified and have assumed responsibility for management of the entire delivery chain, pursuant to the requirements of the ICMC.

Cyanco Canada Inc. will be contractually obligated to provide emergency response for the entire transportation route to the EGM site. Cyanco's response to an emergency situation during transport is governed by their Global Transportation Emergency Response Plan (GTERP). The GTERP is a confidential document, the reproduction of which is only able to be undertaken by Cyanco, that guides Cyanco's emergency response, and dispatch of appropriate response and regulatory notifications around the globe, and in Canada, on all ICMC certified supply routes.

On request from Cyanco, EGM will deploy the ERT to the scene to provide emergency response support.

2.2.3 Site Response

1. The transportation company's Dispatcher requests help from the EGM, or the accident takes place on the EGM site and a Code 1 is activated.
2. ERT and Incident Command are activated.
3. The ERT will evacuate 390 m in all directions and 1.3 km downwind during the day or 4.9 km during the night.
4. The ERT will extract and administer first aid to affected personnel.
5. The ERT or other trained and equipped personnel will then attempt to stop and contain the release. If possible, the area around the spill will be built-up with sand or earth for containment. Any water flowing through the area will be collected via berm or ditch and treated with hypochlorite for neutralization. The neutralized liquid will be contained with the earthen containment until it can be pumped to a suitable solution storage vessel and incorporated into the process or otherwise managed at the EGM or transported to a licensed disposal facility.
6. Once contained, released material will be immediately collected in well-marked containers or bags and covered to prevent contact with rainwater. The dry spilled material will be transported to the EGM for use in leaching operations.

7. Follow-up will include working with the producer and transporter to notify the appropriate authorities, ensure legislation compliance, and conduct root cause analysis as per SGC-CMP-SOP-024, "Incident Investigation and Reporting".

2.3 RELEASES DURING UNLOADING, STORAGE, OR MIXING

2.3.1 Event Description

The following applies to a release of cyanide during unloading, storage, or mixing at the EGM.

2.3.2 Release Detection

The unloading, storage, and mixing of cyanide are categorized as hazardous tasks and therefore are subject to the site Buddy System policy. Workers unloading, storing, or mixing cyanide will work in pairs with appropriate PPE as per SGC-CMP_SOP-008, "PPE for Cyanide Facility Operations".

Cyanco will transport sodium cyanide to the EGM in accordance with ICMC requirements for transport. The solid sodium cyanide briquette product is packaged in one metric ton boxes (Intermediate Bulk Containers [IBCs]) that are lined and sealed to prevent exposure to the environment. IBCs are transported in intermodal containers that provide extremely robust containment and protection of the product.

During inspection of each shipment, EGM personnel will inspect the intermodal containers and IBCs for damage. In the event that damaged IBCs or intermodal containers are identified, EGM will proceed as described in section 2.3.3.

2.3.3 Site Response

1. If the cyanide packaging is damaged during transport, unloading, or storage and sodium cyanide is released, the released product will be collected in clearly marked, covered containers and immediately used in the next cyanide mix. Personnel will ensure that no water or liquid comes in contact with the sodium cyanide.
2. The incident will be reported to Process supervisors and the Health, Safety and Security Department for follow-up and investigations as per SGC-CMP-SOP-024, "Incident Investigation and Reporting".
3. If sodium cyanide comes into contact with water or liquid during unloading or storage and produces HCN gas, or if there is a release of HCN gas during mixing in the ADR Facility, a Code 1 will be called.
4. Follow procedures considered in Section 2.1, Release of WAD Cyanide in ADR Plant

2.4 RELEASES DURING FIRES OR EXPLOSIONS

2.4.1 Event Description

The following applies to cyanide releases during a fire or explosion event. The applicable events may include a release of cyanide in the ADR Plant (Section 2.1) or a transportation accident (Section 2.2).

2.4.2 Site Response

1. If a release of cyanide is caused by a fire or explosion in the ADR Plant, refer to Section 2.1.4, Site Response to stop the release or contain the spill, and follow the steps described in SGC-CMP-SOP-009, “Fire Prevention Protection Program. Do not attempt to fight the fire with water as the water may create large, toxic, and explosive concentrations of HCN gas.
2. If a transportation accident causes a fire or explosion involving cyanide and the transportation company’s Dispatcher has requested support from the EGM ERT, refer to the SGC-CMP-SOP-009, “Fire Prevention Protection Program”. Do not attempt to fight the fire with water as the water may create large, toxic, and explosive concentrations of HCN gas.
3. Incidents involving cyanide and fire will have follow-up reports and investigations as per SGC-CMP-SOP-024, “Incident Investigation and Reporting”.

2.5 EVENTS POND AND HLF FAILURES

2.5.1 Event Description

The following applies to a failure of the Events Pond leading to a release of cyanide solution into the environment. Failures could include liner failure, overtopping of the events pond, or geotechnical failure.

2.5.2 Release Detection

The possible release of cyanide solution from the Events Pond to the environment is regularly monitored at the Events Pond leak detection and recovery system (LDRS) sump. Additionally, tracking of Events Pond elevations and/or visual inspections are conducted regularly.

2.5.3 Liner Failure Alert Levels

The EGM site will use an alert level system in order to coordinate a measured response to a liner leakage emergency. The alert level for Events Pond liner leakage is dependent on the pond elevation and liters lost per day. The alert level limits for Events Pond elevations are provided below in Table 2.5-1.

Table 2.5-1: Events Pond Liner Leakage Alert Levels

Event Elevation (masl)	Alert Level 1 (L/day)	Alert Level 2 (L/day)
883	4,700	150,000
884	7,800	250,000
885	11,000	350,000
886	14,000	460,000
887	18,000	580,000
888	22,000	700,000
889	26,000	830,000
890	31,000	970,000
891	35,000	1,100,000
892	40,000	1,300,000
893	45,000	1,400,000
894	51,000	1,600,000
895 (spillway invert 894.5)	57,000	1,800,000
895.5 (crest)	60,000	1,900,000

2.5.4 Site Response to Level 1 Leakage

1. Lower solution volumes in the Events Pond by returning solution into circulation or pumping to mine water treatment.
2. Isolate the leak if possible and locate the damaged area. Complete repair of the damage as necessary.
3. Conduct follow-up reports and investigations as per SGC-CMP-SOP-024, “Incident Investigation and Reporting”.
4. Increase the monitoring frequency of the Events Pond until the response to the event is assured.
5. Conduct proper environmental remediation if cyanide solution has been released into the environment.

2.5.5 Site Response to Level 2 Leakage

1. Lower solution volumes in Events Pond by returning process solution into circulation or pumping to mine water treatment.
2. Isolate the leak if possible and locate and repair the damaged area.
3. Remove and replace the liner system.
4. Conduct follow-up reports and investigations as per SGC-CMP-SOP-024, “Incident Investigation

and Reporting”.

5. Increase the monitoring frequency of the Events Pond until the response to the incident is assured.
6. Conduct proper environmental remediation if process solution is released into the environment.

2.5.6 Site Response to Events Pond Geotechnical Failure resulting in a Spill to the Environment

1. Incident Discoverer initiates a Code 1 emergency response by calling “Code 1, Code 1, Code 1” on the emergency radio channel and clearly stating the nature and location of the emergency.
2. Emergency Response Team and Incident Command are activated.
3. The ERT will extract and administer first aid to affected personnel.
4. Notify Mine General Manager to initiate communication protocol.
5. Immediately lower solution volumes by returning solution into circulation or pumping to mine water treatment for release.
6. Excavate an emergency down gradient pond in the reserved area to act as a temporary events pond until repairs have been made.
7. Restore freeboard by placing sandbags and buttress embankment with structural fill.
8. After spill is contained and ground is stable, inspect and repair any damaged liner and solution collection components.
9. Conduct follow-up reports and investigations as per SGC-CMP-SOP-024, “Incident Investigation and Reporting”.
10. Increase the monitoring frequency of the Events Pond until the response to the incident is assured.
11. Conduct proper environmental remediation if cyanide solution has been released into the environment.

2.6 HEAP LEACH FACILITY FAILURE

Failures of the Heap Leach Facility are considered in the *Heap Leach and Process Facilities Emergency Response Plan*.

2.7 CONTACT LIST

2.7.1 24 Hour Emergency Response Numbers

Contact	Phone Number
Cyanco Emergency Response Assistance Hotline	1-800-567-7455
Transport Canada CANUTEC	613-996-6666
Yukon Emergency Medical Service	867-667-3333
Mayo RCMP	867-996-5555
Mayo Fire and Ambulance	867-996-2222
Yukon Spill Report Centre	867-667-7244
SGC Chief Operating Officer	778-888-4010
SGC Vice President of Operations	604-562-2846
SGC Health, Safety and Security Manager	TBD
SGC Safety Coordinator	604-424-9745 xt 127
SGC First Aid Station	604-424-9745 xt 127
SGC Environmental Department	604-424-9745 xt 132

3 REFERENCES & RELATED DOCUMENTS

Document	**Primary File Location**	**Frequency of Review**
Heap Leach and Process Facilities Emergency Response Plan	ADR Plant	Monthly
ADR Plant Operations Plan	ADR Plant	Monthly
SGC-CMP_SOP-016 “Assessment and Mitigation of Workplace Cyanide Exposure”	ADR Plant	Monthly
SGC-CMP_SOP-007 “Cyanide Facility Inspections”	ADR Plant	Monthly
SGC-CMP-SOP-024, “Incident Investigation and Reporting”	ADR Plant	Monthly
SGC-CMP_SOP-008, “PPE for Cyanide Facility Operations”	ADR Plant	Monthly
SGC-CMP-SOP-009, “Fire Prevention Protection Program”	ADR Plant	Monthly

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

	Eagle Gold Operating Procedures		
	HCN Monitors		
Department:	Health, Safety and Security	**Document No.:**	***SGC-CMP_SOP-022***
Section:		**Effective Date:**	January 1, 2019
Revision:		**Replaces:**	
Approved:	David Rouleau, Vice President Operations & General Manager		

1 PURPOSE, SCOPE, & RESPONSIBILITY

1.1 INTRODUCTION

The Eagle Gold Mine (EGM) uses weak cyanide solution to extract gold from crushed ore placed on the Heap Leach Facility (HLF). This extraction method is stable and generally safe; however, if the solution's pH drops below a certain point, hydrogen cyanide (HCN) gas can be produced and is highly toxic.

The ADR Plant features fixed HCN gas monitors at strategic locations throughout the ADR Plant that are used both to monitor process function and to alert personnel to production and release of HCN gas that may be dangerous.

In addition to fixed HCN monitors, personnel working in the ADR Plant will be required to wear personal, portable HCN gas monitors. Personnel will be responsible for ensuring the proper operation, calibration and maintenance of their portable HCN monitors.

1.2 PURPOSE

This procedure establishes the minimum guidelines for the operation, calibration and maintenance of portable HCN monitors.

1.3 SCOPE

This procedure applies to all employees and contractors working at the EGM ADR Plant.

1.4 RESPONSIBILITY

1.4.1 Mine General Manager or designate:

- Conduct overall management of the EGM site and workforce.

1.4.2 Department Managers or their designates:

- Ensure this procedure is communicated to their employees;
- Ensure their employees have received the appropriate training; and
- Ensure this procedure is implemented.

1.4.3 Health, Safety and Security Manager or designate:

- Monitor the implementation of this procedure; and
- Ensure this procedure is maintained.

1.4.4 Supervisors:

- Implement these procedures; and
- Ensure these procedures are followed.

1.4.5 All Employees:

- Understand and practice this procedure as required; and
- Ask their supervisor for clarification if they are unsure of any aspect of this procedure.

1.5 DEFINITIONS

HCN – hydrogen cyanide

Bump Test (Function Check) – A qualitative function check where gas is passed over the sensor(s) at a concentration and for an exposure time sufficient to activate all alarm indicators to present at least their lower alarm setting. The purpose of this check is to confirm that gas can get to the sensor(s) and that all the alarms present are functional.

Calibration Check – A quantitative test utilizing a known traceable concentration of test gas to demonstrate that the sensor(s) and alarms respond to the gas within manufacturer's acceptable limits. This is typically ±10-20% of the test gas concentration.

Full Calibration – The adjustment of the sensor(s) response to match the desired value compared to a known traceable concentration of test gas.

STEL – Short term exposure limit

TWA – Time Weighted Average

2 OPERATING PROCEDURE

Personal HCN monitors (Figure 1) must be worn by personnel working with or near cyanide in the ADR Plant. The EGM will use a portable gas monitor set up to detect Hydrogen Cyanide (HCN), and display the gas concentration in parts per million (ppm) on the measuring page.

> ATTENTION:
> This product is supporting life and health. Inappropriate use may affect the function of the device and thereby seriously compromise the user's safety.

These devices are exclusively for monitoring and not for measuring gas concentrations in the ambient air. The instrument will warn personnel with audio and visual warnings if there is detection of the gas above safe concentrations.

The following information provides minimum procedures to be followed to ensure proper operation, calibration and maintenance of these portable HCN gas monitoring devices, and associated record keeping requirements. Personnel must also read and carefully observe the manufacturer's operating manual for these devices, and undergo training specific to their use prior to operation.

Figure 1: Portable HCN Monitor

2.1 HCN MONITOR DESCRIPTION

Standard features of the portable HCN monitoring unit include:

- A sensor that is both fast-responding and reliable
- A triple alarm system that alerts users to possible gas hazards regardless of hearing or visual impairments:

  - Audible alarms of greater than 95 decibels
  - Ultra-bright LED lights, and
  - Vibration alerts.
- Monitored information is prominently displayed on the unit's large backlit LCD screen.

The portable HCN monitors feature a compact and rugged design, rated for protection against dust and water, with one-button operation. The devices provide continuous real-time gas reading during alarm. They have a range of 0 – 30 ppm with a resolution of 0.5 ppm and includes datalogging as a standard feature.

2.1.1 Alarms

There are four alarm setpoints in the instrument, with HCN response levels set at the factory, as follows:

  - High Alarm - 10.0 ppm
  - Low Alarm - 4.5 ppm
  - STEL Alarm - 10.0 ppm
  - TWA Alarm - 4.5 ppm

ATTENTION:

If an alarm is triggered while using this instrument as a monitor, advise all other potentially affected personnel and leave the area immediately.

2.1.2 Battery Life Indicator

The Battery life indicator is displayed on the screen. When the instrument battery is running low, the device should be removed from service and a request should be made to the Maintenance Department to replace the battery (see Section 4.4, below).

A battery warning indicates that a nominal two days of operation remain before the instrument's battery is depleted.

ATTENTION

If a Battery Shutdown condition occurs, stop using the instrument and leave the area immediately. The instrument can no longer alert you of potential hazards since it does not have enough power to operate properly.

2.2 HCN MONITOR OPERATION

Portable HCN monitors should be operated according to the manufacturer's operating manual. Personnel must read, understand and observe the manufacturer's operating instructions prior to use.

The safety and precautionary measures during operation of the portable gas monitor are:

- The HCN gas monitor sensor must not be blocked during use.
- Check function and alarm before each use - In case of failed function tests, the instrument must be removed from use and a request should be made to the Maintenance Department (see Section 4.4, below).
- Conduct additional tests after any significant impact - The instrument function should be checked after severe mechanical stress (dropping, impact, etc.) and when the instrument or the sensors have been exposed to silicon, silicates, lead-containing substances, hydrogen sulphide or contaminated compounds.
- Defective vibration alarm is possible - At ambient temperatures < 0°C, the vibration alarm can give a false alarm or can fail completely. In such conditions, do no rely solely on the vibration alarm.

> ATTENTION
>
> Before use, the product operability must be verified. The product must not be used if the function test is unsuccessful or the instrument shows evidence of damage.

An instrument is ready for operation if the battery warning indicator does not display and after a successful pre-operation function and bump testing (Section 2.2-1).

2.2.1 Pre-operation Function and Bump Testing

Once the instrument is turned on, the alarm LEDs and the confidence indicator in the display must flash every 60 seconds after starting the instrument. This indicates the instrument is operating correctly.

Alarm Test:

The alarm test must be conducted before each use. The test triggers:

- temporary display indicators;
- alarm LEDs flash;
- acoustic signal sounds briefly; and
- vibration alarm is triggered briefly.

Bump Test (or "calibration check"):

A bump test should be conducted before each day's use to verify proper instrument operation. The bump test exposes the detector to a gas concentration that exceeds the alarm set-points to confirm the sensor's ability to respond.

- Set the instrument to complete a bump test following instructions in the operating manual
- Refer to the MSDS for the gas cylinder before using it for bump testing or calibration. Feed test

gas into the instrument from a calibration gas cylinder via regulator with calibration adaptor.

ATTENTION

Regulators and tubing used for bump testing and calibrating HCN should be labeled by the user for that specific gas and must only be used for that gas exclusively in the future.

- If gas is detected "OK" is displayed
- After five seconds, a "✓" is displayed for 24 hours to indicate that the test was successful.

Figure 2: Calibration Gas Cylinder

<u>Bump Test Error:</u>

- If the "✓" does not appear and "ERR" is displayed, check:
    - o whether the sensor is dirty,
    - o whether the correct test gas was used,
    - o whether the test gas cylinder is empty or the date has expired,
    - o whether the test gas was fed in at the right moment,
    - o whether the test gas hose was connected to the sensor.
- Repeat the bump-test if necessary.
- If the self-bump-fails, the instrument must be calibrated.
- Repeat the bump-test after the calibration.

2.3 CALIBRATION

A full calibration should be conducted at regular intervals in accordance with instructions specified by the instrument's manufacturer. Calibration of portable HCN Monitors must be carried out in the following cases:

- if the bump-test failed,
- after major shocks,
- any extreme changes in the atmospheric temperature,
- after use under high gas concentrations,
- at least every six months.

> Caution
> Always perform calibration in a gas-free environment.

If calibration is due, the instrument beeps and flashes "CAL" "DUE" every minute until instrument calibration is performed. Make sure that the calibration is carried out in clean, non-contaminated ambient air

- Set the instrument to complete a calibration following instructions in the operating manual
- Feed test gas into the instrument from a calibration gas cylinder via regulator with calibration adaptor. Refer to the MSDS for the gas cylinder before using it for bump testing or calibration.
- The value for the test gas in ppm is displayed. Ensure the concentration of the test gas matches the stipulated value on the device.
- If calibration is successful, after 90 seconds "OK" is displayed and the instrument returns to normal operating mode.

Calibration Error:

If calibration fails, "ERR" will be displayed on the devise. Check:

- whether the correct test gas was used,
- whether the test gas cylinder is empty or the date has expired,
- whether the test gas hose was connected to the sensor,
- whether the flow governor on the regulator is set to 0.25 l/min.

If necessary, repeat the calibration.

If "OK" is displayed. Conduct the pre-operational tests to confirm the calibration to display the "✓".

If the calibration continues to fail, the instrument must be taken out of service.

Records must be kept for manual calibrations. Table 1 provides a calibration log sheet that is kept for each instrument.

Table 1: Calibration Log Sheet

Instrument:			HCN Monitor/Serial No.:		
Calibration Gas Required: 10 ppm Hydrogen Cyanide; when bump checking instrument check to: 8-12ppm Hydrogen Cyanide (+/- 20%)					
Calibration Gas (Lot # / Expiration Date) Lot #______/__________					
Date	**Name**	**Confirm Fresh Air Zero**	**HCN Reading Before Adjustment**	**HCN Reading After Adjustment**	**Comments**
Record Date, Name of Tester, Response Before and After Calibration Adjustment, Cylinder Lot # (Verify Expiration Date), Confirm cleanliness of Monitor and Indicate Speed of response.					

2.4 MAINTENANCE

HCN monitors must be only be serviced and repaired by qualified and authorized personnel. If irregularities occur during operation, error codes are displayed to determine how to proceed further.

The EGM Maintenance Department are responsible for entering maintenance requests into the management system (ERP), and the appropriate work order and work flow will be generated. If the error occurs during the warranty period, maintenance personnel should contact the manufacturer. Otherwise, the instrument must be put out of operation.

ATTENTION

Inappropriate maintenance or servicing may affect the function of the device and thereby seriously compromise the user's safety. Genuine spare parts must be used.

Battery and sensor replacement should follow the manufacturers' instructions. After sensor replacement, the instrument MUST be calibrated.

2.5 RECORD KEEPING

The detector has the capability of recording 50 of the most recent events and can be transferred to a computer (see manufacturer's operating manual).

Stored events include:

- Alarms and associated values;

- Alarm Clear;
- Calibration;
- Self-test; and
- Errors.

Additionally, the instrument can be set up to periodically log peak gas readings. Information stored in the device should be downloaded regularly to ensure it is not lost. Information stored in the device does not replace manual record keeping requirements for pre-operation testing and calibration in Table 1.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review
MSA (Mine Safety Appliances Company). 2006. Operating Manual. ALTAIR PRO Single Gas Detector. MSA AUER GmbH, Prepared July 2006: Berlin, Germany.		

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

StrataGold Corporation	Eagle Gold Operating Procedures		
	Cyanide Exposure Symptoms and First Aid		
Department:	Health, Safety and Security	**Document No.:**	***SGC-CMP-SOP-023***
Section:		**Effective Date:**	
Revision:		**Replaces:**	
Approved:	David Rouleau, Vice President Operations & General Manager		

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

All employees that work with cyanide and able to respond to a cyanide exposures emergency will be trained in cyanide exposure recognition, first response and basic first aid procedures including the application of medical oxygen, and antidote, as available and as suitably qualified. As hydroxocobalamin requires intravenous injection, this antidote should only be administered by qualified medical personnel.

1.2 PURPOSE

To ensure the safe handling of cyanide and establish first aid procedures in response to a cyanide exposure incident at the Eagle Gold mine (EGM).

1.3 SCOPE

This procedure applies to all employees and contractors at the EGM.

1.4 RESPONSIBILITY

1.4.1 Mine General Manager or their designate:

- overall management of the EGM sites and workforce.

1.4.2 Department Managers or their designates:

- ensuring this procedure is communicated to their employees;
- ensuring employees have received the appropriate training; and
- ensuring this procedure is implemented.

1.4.3 Supervisors or their designates:

- implementing these procedures; and
- ensuring these procedures are followed.

1.4.4 Health, Safety and Security Manager or designate:

- monitoring the implementation of this procedure; and
- ensuring this procedure is maintained and updated as necessary.

1.4.5 All Employees:

- understanding and practicing this procedure as required; and
- asking their supervisor for clarification if they are unsure of any aspect of this procedure.

2 OPERATING PROCEDURE

As part of the safety induction process, all employees and contractors that may encounter cyanide on the EGM will be required to read the Material Safety Data Sheet (MSDS) for sodium cyanide and hydrogen cyanide prior to working in the processing plant, or other areas where cyanide may be in use. Additional site-specific training will be necessary for anyone who is specifically designated to handle sodium cyanide briquettes or concentrated solutions.

Solutions throughout the processing areas of the facility contain free cyanide. In these solutions, it is absolutely necessary to maintain an operating pH that will prevent the formation of hydrogen cyanide gas. In weak cyanide solutions, the pH should be at a minimum of 10.5. In strong cyanide solutions (such as in cyanide makeup), the pH should be at a minimum of 12.

Symptoms of cyanide poisoning are listed below. Watch for these effects, as they pertain to personal health and the health of others:

MILD EXPOSURE	SEVERE EXPOSURE
• Red eyes/skin	• Numbness
• Headache	• Collapse
• Irritated throat	• Gasping for breath
• Nausea	• Loss of consciousness
• Giddiness	• Cardiac arrest
• Salivation	• Convulsions
• Difficulty breathing	• Possible death
• Heart palpitations	
• Weakness in limbs	

Progressively higher cyanide intake causes unconsciousness and respiratory failure. Use extreme caution when near cyanide solution. Do not allow cyanide solution to contact any part of the body. Cyanide solution is extremely alkaline and burns any part of the body that it contacts. If skin contacts cyanide solution, proceed to an emergency shower immediately.

2.1.1 Safety Gear

All persons performing tasks involving cyanide, in any form, are required to use the following special equipment:

- Chemical resistant gloves
- Chemical resistant goggles
- Rubber boots
- Coveralls and jacket

- Approved respirator with particulate cartridges (when working with solid cyanide)
- Personal HCN monitor

Required PPE is further described in SGC-CMP-SOP-008 “PPE Required for Cyanide Facility Operations”. Guidelines for operating personal HCN monitors are outlined in SGC-CMP-SOP-022 “HCN Monitors”.

2.1.2 Instructions

a. Before beginning work, learn the location of the closest emergency shower and eyewash station.

b. Do not breathe sodium cyanide dust, solution mist, or HCN gas. Wear an approved respirator when there is danger of inhaling cyanide dust or mist. Additional protection is required for HCN gas.

c. Avoid skin contact with cyanide dust or solutions, particularly contact with open wounds or skin abrasions. Wash skin promptly and thoroughly if contact occurs. Wear protective gloves when handling cyanide briquettes and solutions.

d. Do not get cyanide in eyes. Wear approved chemical resistant goggles when handling cyanide solutions. Contact lenses may not be worn when working with cyanide.

e. Have available and wear other protective clothing as needed for job safety. Protective clothing must be washed thoroughly after use. Do not take contaminated clothing from the job site.

f. Take every precaution to keep acids from contacting sodium cyanide. Do not store cyanide with acids or weak alkalis.

g. In the event of any spill, powder or solution, it must be immediately reported to the Health, Safety and Security department.

h. Immediately sweep up any spilled cyanide and place it in a suitable container. Wash and/or treat any contaminated area with dilute sodium or calcium hypochlorite solution to destroy the cyanide.

i. Do not eat, drink, or smoke in areas where cyanide is present. Do not handle or store food or beverages in cyanide areas. After working with cyanide, wash hands thoroughly before eating.

j. Before beginning work, learn the location of the closest first aid kit, oxygen tank, and a medical supply kit (cyanide antidote kit that must be administered by qualified first aid personnel).

2.1.3 Health Hazards

Sodium cyanide is a fast-acting poison. It can be fatal at low levels of exposure. Sodium cyanide inhibits cell use of oxygen, particularly in the cells of the brain and heart. Poisoning can result from breathing cyanide gas, dust, or solution; from absorption through the skin; and from ingestion. Contact with the skin may cause irritation and poisoning, especially if prolonged contact, open wounds, skin abrasions, or mucous membranes are involved. Sodium cyanide is alkaline and causes burns.

Cyanide is not a cumulative poison, and it is not a carcinogen. Cyanide has no known chronic effects except when repeated, prolonged exposure occurs. With prompt treatment, recovery from overexposure is normally quick and complete.

2.1.4 First Aid

Treatment requires immediate action to prevent harm or death. First aid must initially be given. Experience shows that, when given promptly, first aid is usually the only treatment needed for typical accidental poisonings.

First aid treatment requires that a first responder administer oxygen and an antidote before medical help arrives. In case of cyanide poisoning, start first aid treatment immediately, and then seek medical assistance. Remove the exposed person from the contaminated area. Remove contaminated clothing and wash off the individual. If HCN is present or suspected, the rescuer must wear a SCBA (self-contained breathing apparatus) and other necessary equipment.

- If no symptoms are evident, treatment is not necessary. Decontaminate the victim.
- If the victim is conscious but experiencing symptoms, give oxygen.
- If consciousness is impaired, or if the victim is unconscious but breathing, use a respirator to give oxygen and an antidote (e.g. amyl nitrite) should be administered by suitably qualified first aid personnel.
- Suitably qualified first aid personnel should administer the antidote, and follow the instructions for administering it properly.
- Administer oxygen continuously.
- If not breathing, immediately use a positive pressure respirator to give oxygen and an antidote if available. Qualified first aid attendants should administer the antidote as described previously. If a massive exposure occurred, consider keeping the first one or two ampules in the lip of the mask continuously.

2.1.4.1 Eye Contact

Hold the eyelids apart, and immediately flush the eyes with large quantities of water for a minimum of fifteen minutes, occasionally lifting the upper and lower eyelids. Do *not* try to neutralize with acids or alkalis. Continue rinsing the eyes during transport to either the EGM First Aid room or a health care facility.

2.1.4.2 Ingestion

If consciousness is impaired, oxygen and an antidote must be administered as indicated previously if they are available. If the victim is conscious, immediately administer activated charcoal slurry if it is accessible. *Never* give anything by mouth to an unconscious person. Seek medical assistance and continue to give oxygen if available. Do *not* administer syrup of Ipecac or other emetics since they will induce vomiting, which could interfere with resuscitator use.

To prepare activated charcoal slurry, thoroughly mix 1.8 ounces (50 grams) of activated charcoal in 13.5 ounces (400 milliliters) of water. Give 0.075 ounces per pound (5 milliliters per kilogram) of body weight, or about 12 ounces (350 milliliters) for an average adult.

2.1.4.3 Inhalation

If consciousness is impaired, oxygen and an antidote must be administered as indicated previously. Carry the victim to an uncontaminated atmosphere. Keep the victim warm and calm. Seek medical assistance.

2.1.4.4 Skin Contact

If consciousness is impaired, oxygen and an antidote must be administered as indicated previously if they are available. Immediately flush affected area with large quantities of water for up to five minutes after contact and remove all clothing. Seek medical assistance.

2.1.4.5 Contact with Clothing

In the event that sodium cyanide comes in contact with clothing:

- If wet remove all contaminated clothes immediately and use an emergency shower.
- If dry brush off as much chemical as possible, remove all contaminated clothing immediately, use emergency shower if required.
- If either wet or dry and it has been in contact with skin, wash with copious amounts of water.

2.1.5 Medical Treatment

2.1.5.1 Medical Treatment Facilities

- The nearest Hospital is the Dawson City Community Hospital which is approximately 300 km by road from the EGM. Overland travel to this facility will involve a driving time from the EGM of approximately 3.5 hours. Dawson City Community Hospital can provide emergency care 24/7 but is limited to only 6 beds.
- Whitehorse General Hospital is approximately 500 km by road from the EGM. Overland travel to this facility will involve a driving team from the EGM of approximately 6 hours. Whitehorse General Hospital can provide emergency care 24/7 and unless conditions make reaching the facility impossible should be considered the prime facility for any treatment beyond that which can be provided at the EGM site.
- The Mayo Nursing Station is the closest health care facility and has 2 nurse practitioners on call 24/7. Overland travel to this facility will involve a driving team from the EGM of approximately 1 hour.
- Medical Director contracted to Victoria is available for 24/7 consultation.
- The EGM First Aid Room is equipped with medical supplies, equipment and personnel that will allow for the treatment of cyanide exposures on the EGM site. The EGM First Aid Room is provided for the treatment of routine injuries and exposures on site and is not equipped to provide long term care.
- If there is a cyanide incident and a patient/patients are transported to the nearest hospital, EGM medical staff must accompany them. <u>At least one Cyanide Antidote kit will be transported with the patient for use by EGM medical staff during transport.</u>

- For emergency treatment scenarios, the Health, Safety and Security Manager or their designate will immediately arrange for air transport to the Whitehorse General Hospital.

2.1.5.2 Medical Treatment at Site

- 1 Advanced Care Paramedic
- 1 Primary Care Paramedic – IV endorsed
- Both have the training and are endorsed to administer Cyanide Antidote Kit

2.1.5.3 Medical Supplies on Site for Treatment of Cyanide Exposures

- Cyanide Antidote Kits (minimum of 6 available at all times). Each kit contains:
  - 2 vials Sodium Nitrite Injection USP 300mg/10ml of sterile water
  - 2 vials Sodium Thiosulfate Injection USP 12.5g/50ml of sterile water
  - 12 Ampoules Amyl Nitrite Inhalants USP every 5min (0.3ml)
  - 1 sterile 10ml syringe with 22 g needle
  - 1 sterile 60ml syringe
  - 1 sterile 20 g needle
  - 1 stomach tube
  - 1 non sterile 60ml syringe
  - 1 tourniquet
- The kit comes complete along with proper treatment instructions for cyanide poisoning

2.1.5.4 Medical Treatment Absolutes

- Your safety is most important!
- Remove yourself or patient from contaminated area if possible
- Inform Supervisor or initiate Emergency Response which will inform First Aid of incident
- Decontaminate with copious amounts of water if possible
- Cyanide antidote kit stationed just outside of the mixing room for emergency use

2.1.5.5 Amyl Nitrite Procedure:

- If semi-conscious break AMYL NITRITE ampule (at neck of ampule) with gauze pad provided
- If in a drafty area, provide some kind of coverage for vapors
- The objective is to get the patient to breath in and get the vapors to the lungs
- Avoid inhaling vapors yourself to avoid becoming dizzy and losing consciousness
- Lay patient down or in a semi prone position as the amyl nitrite dilates blood vessels and lowers

blood pressure

- Hold under nose for 15 secs then remove for 15 secs DO NOT OVERUSE
- Continue this procedure until Medical Aid arrives
- Each Amyl Nitrite amp MUST be replaced every 3 mins
- Caution: Amyl Nitrite is highly volatile and flammable

Cyanide poisoning may occur as the result of accidental exposure in the occupational setting. There are no distinct signs and symptoms suggestive of cyanide poisoning other than the odour of almonds on the patient's breath, yet this is frequently absent even in case of severe poisoning. The patient seldom survives many hours. The prevention of death demands a quick diagnosis and the prompt use of specific antidotes. Fortunately, the most important aspect of treatment is the administration of 100% oxygen.

2.1.5.6 Cyanide Antidote

Actions: Sodium Nitrite reacts with haemoglobin to form methemoglobin. The latter removes cyanide ions from various tissues and couple with them to become cyanmethemglobin, which has a relatively low toxicity.

The function of Sodium thiosulfate is to convert cyanide to thiocyanate. The combination of Sodium Nitrite and Sodium Thiosulfate is the best therapy against cyanide and hydrocyanic acid poisoning.

Warning: both Sodium Nitrite and Amyl Nitrite in excessive does induce dangerous Methemoglobinemia and can cause death. The doses in Cyanide Antidote packages are not excessive for an adult when used correctly.

Personnel should acquire some skill in the proper method of administering the contents of the antidote package prior to an emergency.

- Instruct assistant how to break an ampoule of Amyl Nitrite, one at a time, in a handkerchief or cloth and hold it in front of the patient's mouth for 15 seconds, remove for 15 seconds, and this cycle should be repeated continuously using a new ampoule every 3 minutes. The Amyl Nitrite should be continued until the patient regains consciousness OR up to a max of six ampoules. Making sure the individual administering the Amyl Nitrite avoids inhaling substance as it may cause drowsiness.
- Record vital signs after each ampoule of Amyl Nitrite, constant monitoring of cardiac status.
- While the above process is being administered draw up 300mg (10ml of a 3% solution) of Sodium Nitrite and inject IV at a rate of 2.5 – 5ml/min.
- Immediately thereafter, inject IV with 12.5g (50ml of a 25% solution) of Sodium Thiosulfate.
- The same needle and vein can be used.
- If the poison was taken by mouth, gastric lavage should be performed as soon as possible, but this should not delay the treatments outlined above. Lavage can be done concurrently by a third person if possible.
- The patient should be transported to hospital as quickly as possible.

- If the patient can not be transported to hospital, they must be watched closely for 24 hours post treatment. If signs of poisoning reappear, IV injection of Sodium Nitrite and Sodium Thiosulfate should be repeated. The dose will be decreased by half of the original dose.
- Sodium Nitrite IV injection 2nd dose 150mg (5ml of a 3% solution)
- Sodium Thiosulfate IV injection 2nd dose 6.25g (25ml of a 25% solution)

2.1.5.7 Basic Life Support

- Remove the victim to an uncontaminated area. Rescuers should wear appropriate PPE and breathing apparatus (SCBA).
- Remove any contaminated clothing and shower or wash thoroughly any areas of contaminated skin.
- If there are no symptoms, no treatment is required.
- If symptoms or signs of cyanide poisoning develop such as:
  - Nausea, tachypnea, shortness of breath, dizziness, confusion, sleepiness, general malaise, breathing may be rapid then slowing rapidly to gasping, increased pulse, vomiting, cyanosis can be a late sign.
  - Administer 100% oxygen
- If consciousness becomes impaired administer 100% oxygen and amyl nitrate.
- If breathing stops administer 100% oxygen and amyl nitrate by positive pressure resuscitator (Bag valve mask; BVM).
- If the practitioner is at the level of Emergency Medical Technician (EMT) who has completed the Primary Care Paramedic bridge or has successfully completed a learning module approved by the Medical Director, the practitioner may insert a King LT [Laryngeal tube] airway device if the patient is apneic.

2.1.5.8 Advanced Life Support

- Follow above procedures, administering basic life support skills first.
- Monitor cardiac status and vital signs every 3-5 mins
- Make critical interventions as needed, intubation (ET [endotracheal] intubation, King LT, LMA [laryngeal mask airway]), begin CPR (Cardiopulmonary resuscitation), follow Advanced Cardiac Life Support protocols, and be prepared for cardiac arrest, seizure activity, and cardiac arrhythmias.
- Administer Cyanide Antidote as directed below.

2.1.6 Storage

Store in properly labeled containers in dry, ventilated, secured areas. Keep containers closed and contents dry. Do not store with acids or acid salts, containers with water or weak alkalis, or oxidizing agents. Do not handle or store food, beverages, or tobacco in cyanide areas. Do not store near combustibles or flammables; subsequent firefighting with water could lead to cyanide solution runoff. Do not store under sprinkler systems.

3 REFERENCES AND RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

Department:	Health, Safety and Security	**Document No.:**	***SGC-CMP-SOP-024***
Section:		**Effective Date:**	
Revision:		**Replaces:**	
Approved:	David Rouleau, Vice President Operations & General Manager		

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

Certain duties at the Eagle Gold Mine (EGM) involve work tasks, use of substances, or equipment that present a hazard to employees, contractors and the environment we work in. The EGM has been designed and built to mitigate hazards to health, safety and the environment to the greatest extent possible by the use of administrative and engineering controls. The administrative and engineering controls are intended to prevent all occurrences of occupational injuries, diseases or environmental damage.

The development and use of a robust incident investigation and reporting procedure is considered a key administrative control for the EGM. If an incident or near miss event occurs, it is essential that they be analyzed in a systematic manner to determine the root causes so that additional administrative and engineering controls can be put in place to prevent reoccurrence.

Importantly, all employees and contractors at the EGM have the right to:

- Refuse hazardous work if it involves machinery or a situation that would pose a danger to you or others.
- Identify health and safety hazards and to recommend solutions to supervisors.

The right for an employee or contractor to refuse hazardous work is specifically protected by the *Occupational Health and Safety Act (Yukon)*.

1.2 PURPOSE

The purpose of this procedure is to establish a systematic process for investigating and reporting any incident at the EGM with the intent to ensure that reoccurrence of any incident is not experienced and that regulatory agencies and other stakeholders are provided with a complete and impartial record of events as may be necessary.

1.3 SCOPE

This procedure applies to all employees and contractors at the EGM.

1.4 RESPONSIBILITY

1.4.1 Mine General Manager or their designate:

- Overall management of the EGM site and workforce

1.4.2 Department Managers or their designates:

- Ensuring this procedure is communicated to their employees;
- Ensuring their employees have received the appropriate training; and
- Ensuring this procedure is implemented.

1.4.3 Supervisors or their designates:

- Implementing these procedures; and
- Ensuring these procedures are followed.

1.4.4 Health, Safety and Security Manager or designate:

- Monitoring the implementation of this procedure; and
- Ensuring this procedure is maintained.

1.4.5 All Employees

- Understanding and practicing this procedure as required; and
- Asking their supervisor for clarification if they are unsure of any aspect of this procedure.

1.5 DEFINITIONS

Board: means the Yukon Workers' Compensation, Health and Safety Board

Safety Officer: means an industrial health and safety officer or a mines health and safety officer designated under the *Occupational Health and Safety Act (Yukon)*

Serious Accident: means:

a) an uncontrolled explosion,

b) failure of a safety device on a hoist, hoist mechanism, or hoist rope,

c) collapse or upset of a crane,

d) collapse or failure of a load-bearing component of a building or structure regardless of whether the building or structure is complete or under construction,

e) collapse or failure of a temporary support structure,

f) an inrush of water in an underground working,

g) fire or explosion in an underground working,

h) collapse or cave-in, of a trench, excavation wall, underground working, or stockpile,

i) accidental release of a controlled product,

j) brake failure on mobile equipment that causes a runway,

k) any accident that likely would have caused serious injury but for safety precautions, rescue measures, or chance;

Serious injury: means:

a) an injury that results in death,

b) fracture of a major bone, including the skull, the spine, the pelvis, or the thighbone,

c) amputation other than of a finger or toe,

d) loss of sight of an eye,

e) internal bleeding,

f) third degree burns,

g) dysfunction that results from concussion, electrical contact, lack of oxygen, or poisoning, or

h) an injury that results in paralysis (permanent loss of function);

2 OPERATING PROCEDURE

2.1 INVESTIGATION PROCEDURE

The basis for an effective investigation should be considered as fact finding and not fault finding. The goals can be summarized as:

- Identification of all causes, events, equipment, materials, people and environmental factors that contributed to the incident. Identification should be supported by facts and not assumptions.
- Evaluation of common causes, trends potential losses and likelihood of recurrence.
- Consideration of long-term controls and not simply short-term fixes.
- Being considerate of and showing concern for other employees, health and safety, the environment and any other stakeholders.
- Being proactive rather than reactive.

2.1.1 Immediately After Occurrence

The procedures provided in this section 2.1.1 are not intended to replace any procedure or guidance related to responses to an emergency situation. In the event of an emergency, the Code 1 procedures for the site must be followed and emergency specific procedures must be followed.

1. All incidents, injuries, near misses or employee refusal to work or do particular work due to a belief that there is an undue hazard will immediately be verbally reported to the Health, Safety and Security Manager or their designate.
2. Work activities in the area considered in the verbal report shall cease immediately unless the cessation of the work would lead to a worsened hazard or additional hazard.
3. Work cannot resume until the Health, Safety and Security Manager or their designate has provided the all clear.

NOTE

If a serious injury or a serious accident has taken place, no person may, except insofar as is necessary for the purpose of saving life, relieving suffering or protecting property that is endangered as a result of the accident, interfere with anything connected with the serious injury or serious accident until a Safety Officer (of the government) or a member of the RCMP has provided authorization.

4. Upon the execution of all emergency response procedures related to a specific incident, and the information gathering procedures described therein, the following investigation procedures may commence.

2.1.2 Upon Completion of Emergency Response Procedures or as advised by the Health, Safety and Security Manager

While gathering the information considered in this incident investigation process, the investigating parties should consider the three-stage incident report system for the EGM. The report templates are provided in Section 2.2 of the SOP.

1. **Secure the scene.** The goal of this step is to preserve evidence by minimizing the disturbance of the site to the greatest extent possible. This may involve the use of physical barriers, signage, deployment of personnel or contractors, or exclusion directives provided over the site radio communication network.
2. **Inspect the site.** Inspection of the site should be undertaken by an investigation team comprising of the Health, Safety and Security Manager, the Department Manager for the affected area, and key personnel involved in the day to day work functions that the incident may have involved.

   During the inspection of the site, the Health, Safety and Security Manager will be responsible for recording all findings of the inspection. The inspection of the site should consider the following:

   - What tools, equipment, materials or supplies were directly involved and what of these areas may have been a secondary factor to the initial incident.
   - What work environment factors such as noise, snow, ice, smoke, dust, darkness, temperature may have contributed to the incident.
   - What Personal Protective Equipment (PPE) was being used, was it sufficient, was it being used correctly, was it in a suitable operating condition.
   - What other safety equipment in the area was involved, was it sufficient, was it being used correctly, was it in a suitable operating condition.
   - Does the investigation team have the required knowledge of the design, construction, operation or the areas involved, is external professional expertise required.
   - Does equipment or material need to be collected for analysis.
3. **Interview witnesses**. Personnel involved in the incident should be interviewed as quickly as possible after the incident. Depending on the type of incident, people may intentionally avoid being interviewed or their memory and perception of the incident may be altered by time or interaction with others. It is critical that all witnesses be identified and interviewed in a timely but respectful manner. The Health, Safety and Security Manager will be the primary interviewer of witnesses to ensure that any confidential information is treated properly and in accordance with StrataGold Corporation (SGC) policies and regulatory requirements.

   The interview should not be conducted at the scene of the incident. The interviewer should find a location that provides a comfortable, relaxed and secure setting. The interviewer should explain that the interview is being conducted to find facts and to make sure that the health, safety and security of personnel, contractors and the environment we work in is protected.

Open ended questions should be used with the interviewer taking notes. Before the completion of any interview, the interviewee must be given the opportunity to review the notes so that the information provided is accurate from their perspective. The interviewee should also be encouraged to provide any additional thoughts or recollections at a later date.

4. **Conduct drug and alcohol testing of any party involved in a serious accident or serious injury.** As a part of EGM orientation, all employees or contractors have been informed that drug and alcohol testing is mandatory after a serious accident or serious injury. The Health, Safety and Security Manager must make it clear when testing is requested of anyone involved that this is company policy and is not targeted in any way. Regardless of the person involved, drug and alcohol testing is mandatory.

2.2 DOCUMENTATION

The EGM uses a three-stage incident report system. This documentation is intended to support the internal and external reporting considered in Section 2.3 of this SOP. The timing of the completion of each document is critical to ensure that reporting to internal and external stakeholders occurs in a timely manner and contains consistent and reliable information. The three-stage incident report system allows for continual flow of information to interested and involved parties while an incident investigation advances.

A Preliminary Incident Report is provided as Table 1. This report is to be completed within 4 hours of the incident and is to support notification of SGC Senior Management and the Safety Officer in the case of a serious injury or serious accident.

A Basic Incident Report is provided as Table 2. This report is to be completed within 24 hours of the incident. This report allows for the investigation team to gather more detailed information on the incident or near miss and develop a greater understanding of the situation, causes, and possible mitigation measures or administrative and engineering controls.

A Detailed Incident Report is provided as Table 3. This report is to be completed within 72 hours of the incident. This report is intended to provide a summary of all information related to the incident and may close out the investigation and reporting process if SGC senior management and regulatory agencies consider that the incident has been fully investigated by SGC.

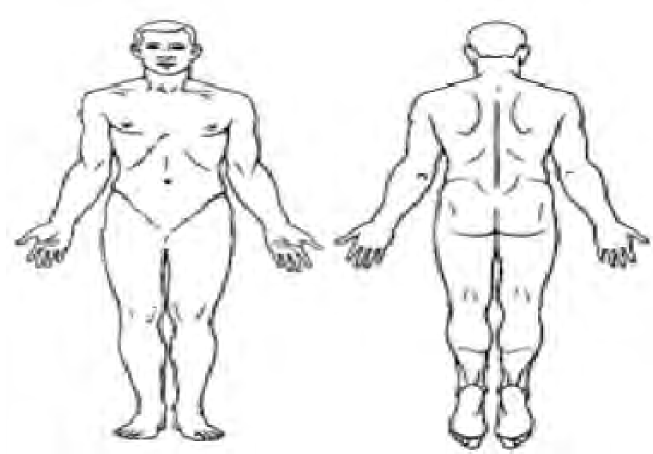
All documentation should be supported by observations of the investigating team, witness statements, results of onsite or offsite laboratory or other testing, photos, site sketches and any other information that in the opinion of the Health, Safety and Security Manager, SGC senior management or regulatory agencies consider necessary.

Table 1: Preliminary Incident Report Template

PRELIMINARY INCIDENT REPORT			
PRELIMINARY REPORT TO BE COMPLETED WITHIN 4 HOURS OF INCIDENT			
Incident Location:			
Incident Date:			
Incident Type:			
Actual Consequence:			
Potential Consequence:			
Parties Involved:			
Supervisor Name:			
External Reportable:		Agencies to Notify:	
Brief Description of Events			
Brief Description of Loss / Harm			
Probable Direct Causes - Acts	**Description**		
Probable Direct Causes - Conditions	**Description**		
Immediate Corrective Actions			
Immediate Preventative Actions			

Table 2: Basic Incident Report Template

BASIC INCIDENT REPORT			
BASIC INCIDENT REPORT TO BE COMPLETED WITHIN 24 HOURS			
Incident Location:			
Incident Date:			
Incident Type:			
Actual Consequence:			
Potential Consequence:			
Parties Involved:			
Supervisor Name:			
External Reportable:		Agencies to Notify:	
Description of Events			
Injury Details			
Injury Body Part:			
Nature of Injury:			
Injury Classification:			
Description of Injury			



Environmental Damage Details			
Contaminant:			
Area Impacted:			
Volume Lost:		Volume Recovered:	
Clean up Method:			
Additional Details:			

BASIC INCIDENT REPORT

BASIC INCIDENT REPORT TO BE COMPLETED WITHIN 24 HOURS

Property Damage/Process Loss Details			
Property Type:		Property Reference:	
Make:		Model:	
Hours Lost:		Approximate Cost:	
Additional Details:			

Direct Causes - Acts	**Description**

Direct Causes - Conditions	**Description**

Corrective Actions	**Person Responsible**	**Due Date**	**Completion Date**

Preventative Actions	**Person Responsible**	**Due Date**	**Completion Date**

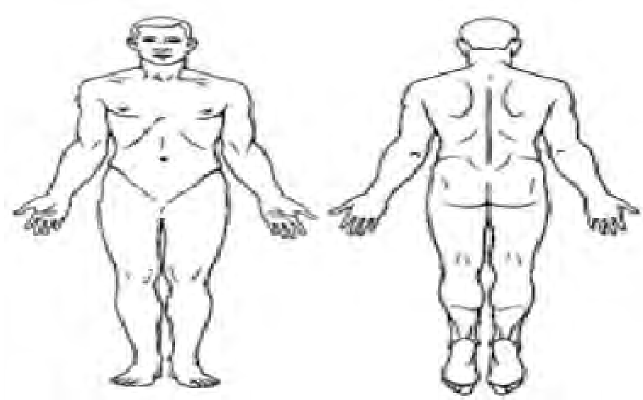
Attachments (as applicable)

Comments

	Print Name	**Signature**	**Date**
Supervisor			
Health and Safety Rep			
Department Manager			

Table 3: **Detailed Incident Report Template**

DETAILED INCIDENT REPORT			
DETAILED INCIDENT REPORT TO BE COMPLETED WITHIN 72 HOURS			
Incident Location:			
Incident Date:			
Incident Type:			
Actual Consequence:			
Potential Consequence:			
Parties Involved:			
Supervisor Name(s):			
External Reportable:		Agencies Notified:	
Description of Events			
Injury/Illness Details			
Injury Body Part:			
Nature of Injury:			
Injury Classification:			
Description of Injury/Illness			
Environmental Damage Details			
Contaminant:			
Area Impacted:			
Volume Lost:		Volume Recovered:	
Clean up Method:			
Additional Details:			



DETAILED INCIDENT REPORT

DETAILED INCIDENT REPORT TO BE COMPLETED WITHIN 72 HOURS

Property Damage/Process Loss Details			
Property Type:		Property Reference:	
Make:		Model:	
Hours Lost:		Approximate Cost:	
Additional Details:			

Direct Causes - Acts	**Description**

Direct Causes - Conditions	**Description**

Root Causes - Personal Factors

1. Inadequate Physical/Physiological Capability			
	1.1 Inappropriate Height, Weight, Size, Strength, Etc.		1.7 Hearing Deficiency
	1.2 Restricted Range of Body Movement		1.8 Other Sensory Deficiency (Touch, Taste, Smell, Balance)
	1.3 Limited Ability to Sustain Body Positions		1.9 Respiratory Incapacity
	1.4 Substance Sensitivities or Allergies		1.10 Other Permanent Physical Capabilities
	1.5 Sensitivities to Sensory Extremes (Temp, Sounds, etc.)		1.11 Temporary Disabilities
	1.6 Vision Deficiency		
2. Inadequate Mental/Psychological Capability			
	2.1 Fears and Phobias		2.7 Poor Coordination
	2.2 Emotional Disturbance		2.8 Slow Reaction Time
	2.3 Mental Illness		2.9 Low Mechanical Aptitude
	2.5 Inability to Comprehend		2.10 Low Learning Aptitude
	2.6 Judgment		2.11 Memory Failure
3. Physical or Physiological Stress			
	3.1 Injury or Illness		3.7 Oxygen Deficiency
	3.2 Fatigue Due to Task Load or Duration		3.8 Atmospheric Pressure Variation
	3.3 Fatigue Due to Lack of Rest		3.9 Constrained Movement
	3.4 Fatigue Due to Sensory Overload		3.10 Blood Sugar Insufficiency
	3.5 Exposure to Health Hazards		3.11 Drugs
	3.6 Exposure to Temperature Extremes		

DETAILED INCIDENT REPORT

DETAILED INCIDENT REPORT TO BE COMPLETED WITHIN 72 HOURS

4. Mental or Psychological Stress			
	4.1 Emotional Overload		4.7 Confusing Directions/Demands
	4.2 Fatigue Due to Mental Task Load or Speed		4.8 Conflicting Demands/Directions
	4.3 Extreme Judgment/Decision Demands		4.9 Preoccupation with Problems
	4.4 Routine, Monotony, Demand for Uneventful Vigilance		4.10 Frustration
	4.5 Extreme Concentration/Perception Demands		4.11 Mental Illness
	4.6 “Meaningless” or “Degrading” Activities		
5. Lack of Knowledge			
	5.1 Lack of Experience		5.4 Inadequate Update Training
	5.2 Inadequate Orientation/Induction		5.5 Misunderstood Directions
	5.3 Inadequate Initial Training		5.6 Lack of Situational Awareness
6. Lack of Skill			
	6.1 Inadequate Initial Instruction		6.4 Lack of Coaching
	6.2 Inadequate Practice		6.5 Inadequate Review Instruction
	6.3 Infrequent Performance		
7. Improper Motivation			
	7.1 Improper Performance is Rewarded (tolerated)		7.8 Improper Attempts to Gain Attention
	7.2 Proper Performance is Punished		7.9 Inappropriate Peer Pressure
	7.3 Lack of Incentives		7.10 Improper Supervisory Example
	7.4 Excessive Frustration		7.11 Inadequate Performance Feedback
	7.5 Inappropriate Aggression		7.12 Inadequate Reinforcement of Proper Behavior
	7.6 Improper Attempt to Save Time or Effort		7.13 Improper Production Incentives
	7.7 Improper Attempt to Avoid Discomfort		
8. Abuse or Misuse			
	8.1 Improper Conduct that is Condoned		8.2 Improper Conduct that is not Condoned

#	Description of Root Causes - Personal

Root Causes - Job/System Factors			
9. Inadequate Leadership and/or Supervision			
	9.1 Unclear or Conflicting Reporting Relationships		9.8 Providing Inadequate Reference Documents, Directives and Guidance Publications
	9.2 Unclear or Conflicting Assignment of Responsibility		9.9 Inadequate Identification/Evaluation of Loss Exposures
	9.3 Improper or insufficient Delegation		9.10 Lack of Supervisory/Management Job Knowledge
	9.4 Giving Inadequate Policy, Procedure, Practices or Guidelines		9.11 Inadequate Matching of Individual Qualifications and Job/Task
	9.5 Conflicting Objectives, Goals or Standards		9.12 Inadequate Performance Measurement/Evaluation

DETAILED INCIDENT REPORT

DETAILED INCIDENT REPORT TO BE COMPLETED WITHIN 72 HOURS

	9.6 Inadequate Work Planning or Programming		9.13 Inadequate or Incorrect Performance Feedback
	9.7 Inadequate Instructions, Orientation and/or Training		
10. Inadequate Engineering			
	10.1 Inadequate Assessment of Loss Exposures		10.5 Inadequate Assessment of Operational Readiness
	10.2 Inadequate Consideration of Human Factors/Ergonomics		10.6 Inadequate or Improper Controls
	10.3 Inadequate Standards, Specifications/Design Criteria		10.7 Inadequate Monitoring of Initial Operation
	10.4 Inadequate Monitoring of Construction		10.8 Inadequate Evaluation of Changes
11. Inadequate Purchasing			
	11.1 Inadequate Specifications on Requisitions		11.7 Improper Handling of Materials
	11.2 Inadequate Research on Materials/Equipment		11.8 Improper Storage of Materials
	11.3 Inadequate Specifications to Vendors		11.9 Improper Transporting of Materials
	11.4 Inadequate Mode or Route of Shipment		11.10 Inadequate Identification of Hazardous Items
	11.5 Inadequate Receiving Inspection and Acceptance		11.11 Improper Salvage and/or Waste Disposal
	11.6 Inadequate Communication of Safety/Health Data		11.12 Inadequate Contractor Selection
12. Inadequate Maintenance			
	12.1 Inadequate Preventive Maintenance		12.2 Inadequate Reparative Maintenance
	12.1.1 Assessment of Maintenance Needs		12.2.1 Communication of Needs
	12.1.2 Inadequate Lubrication and Servicing		12.2.2 Scheduling of Work
	12.1.3 Inadequate Adjustment/Assembly		12.2.3 Examination of Unit
	12.1.4 Inadequate Cleaning or Resurfacing		12.2.4 Part Substitution
13. Inadequate Tools and Equipment			
	13.1 Inadequate Assessment of Needs and Risks		13.5 Inadequate Adjustment/Repair/Maintenance
	13.2 Inadequate Human Factors/Ergonomic Considerations		13.6 Inadequate Salvage and Reclamation
	13.3 Inadequate Standards or Specifications		13.7 Inadequate Removal and Replacement of Unsuitable Items
	13.4 Inadequate Availability		
14. Inadequate Work Standards			
	14.1 Inadequate Development of Work Standards		14.2.3 Translation of Standards to Appropriate Languages
	14.1.1 Inventory and Evaluation of Exposures and Needs		14.2.4 Training
	14.1.2 Coordination with Process Design		14.2.5 Reinforcing with Signs, Color Codes and Job Aids
	14.1.3 Employee Involvement		14.3 Inadequate Maintenance of Standards
	14.1.4 Procedures/Practices/Rules		14.3.1 Tracking of Work Flow
	14.2 Inadequate Communication of Work Standards		14.3.2 Updating
	14.2.1 Publication of Work Standards		14.3.3 Monitoring use of Procedures/Practices/Rules
	14.2.2 Distribution of Work Standards		14.4 Inadequate Monitoring of Compliance
15. Excessive Wear and Tear			
	15.1 Inadequate Planning of Use		15.5 Inadequate Maintenance
	15.2 Improper Extension of Service Life		15.6 Use by Unqualified or Untrained People

DETAILED INCIDENT REPORT

DETAILED INCIDENT REPORT TO BE COMPLETED WITHIN 72 HOURS

	15.3 Inadequate Inspection and/or Monitoring		15.7 Use for Wrong Purpose
	15.4 Improper Loading or Rate of Use		
16. Inadequate Communications			
	16.1 Inadequate Horizontal Communication between Peers		16.8 Incorrect Instructions
	16.2 Inadequate Vertical Communication between Supervisor and Person		16.9 Inadequate Communication due to Job Turnover
	16.3 Inadequate Communication between different Organizations		16.10 Inadequate Communication of Health and Safety Data, Regulations, or Guidelines
	16.4 Inadequate Communication between Work Groups		16.11 Standard Terminology not used
	16.5 Inadequate Communication between Shifts		16.12 Verification/Repeat Feedback Techniques not used
	16.6 Inadequate Communication Methods		16.13 Messages too long
	16.7 No Communication Method available		16.14 Speech Interference

#	Description of Root Causes - Job/System

Corrective Actions	Person Responsible	Due Date	Completion Date

Preventative Actions	Person Responsible	Due Date	Completion Date

Attachments (as applicable)
Comments

2.3 REPORTING

Timely reporting of incidents at the EGM is a critical component for maintaining a strong health and safety culture. The experience of regulatory agencies and other stakeholders can be invaluable in an emergency situation, and can provide additional resources for response, assessment and institution of administrative and engineering controls.

Reporting of any serious accident or a serious injury at the EGM to the safety officer is the responsibility of the Health, Safety and Security Manager or their designate.

Reporting of any spill at the EGM pursuant to the *Yukon Spills Regulations* is the responsibility of the Environmental Manager or their designate. The reporting of spills will be made to the Yukon Spill Report Line and the Yukon Water Board. If a spill at the EGM meets the criteria of a serious accident or results in a serious injury, the Health, Safety and Security Manager will fulfil their obligation with respect to reporting to the safety officer.

In the event that a serious accident results in the spillage or release of cyanide, the Chief Operating Officer or their designate will notify the Director of Energy, Mines and Resources and the Inspector pursuant to the Quartz Mining License held for the EGM. The Environmental Manager will fulfil their obligation with respect to reporting to the Yukon Spill Report Line and the Yukon Water Board and the Health, Safety and Security Manager will fulfil their obligation to report the serious accident to the safety officer.

In the event of a release of cyanide or exposure incident, either at the EGM or at any point of the transportation route within Yukon, the Chief Operating Officer or their designate will also undertake the following:

- notify management and outside response providers and medical facilities of the cyanide emergency;
- notify potentially affected communities of the cyanide related incident and any necessary response measures;
- communicate publicly any hospitalization or fatality related to cyanide exposure;
- communicate publicly the nature of release on or off the mine site requiring response, remediation, or reporting under applicable regulations; and
- communicate publicly the nature of release that exceeds applicable cyanide limits or that causes applicable limits to be exceeded.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review
Yukon Occupational Health and Safety Act	Health, Safety and Security	Annual

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 INTRODUCTION

The *Environmental Monitoring Surveillance and Adaptive Management Plan* (EMSAMP) provides detailed information on routine environmental monitoring at the Project site, and SGC-CMP-SOP-020 “Cyanide Emergency Response Procedures” describes actions to be taken in the event of a cyanide release.

This document; Environmental (Soil/Water) Water Quality Monitoring procedure, will follow the EMSAMP Quality Assurance/Quality Control (QA/QC) procedures, including sample collection and labeling, sample preservation, chain-of-custody, and field reporting.

This procedure is intended to apply to monitoring of area where the presence of cyanide may be encountered (e.g., leak detection and recovery monitoring ports) or if cyanide is detected during routine sampling pursuant to the EMSAMP or is known to be present after a release. Additional field sampling protocols, safety precautions and reporting may be required under these circumstances, as described herein.

1.2 PURPOSE

The purpose of this procedures is to provide easy to follow steps required when monitoring soil and water suspected to have been exposed to cyanide through a spill, leak or discharge. As the EMSAMP already provides an outline of routine monitoring, this SOP focuses on additional precautions required to ensure the health and safety of personnel undertaking monitoring activities that may involve contact with cyanide.

1.3 SCOPE

This procedure applies to all employees, visitors and independent contractors working at the Eagle Gold Mine (EGM) who may be performing environmental monitoring for cyanides.

1.4 RESPONSIBLITIES

1.4.1 Mine General Manager or their designate:

- Overall management of EGM sites and workforce; and
- Will be in charge of all communication with media and outside sources.

1.4.2 Environmental Manager or their designate:

- Ensuring this procedure is communicated to their employees;
- Ensuring their employees have received the appropriate training;
- Ensuring this procedure is implemented; and
- Ensure pertinent information is shared with Process Plant Manager.

1.4.3 Process Plant Manager or their designate

- Ensuring process performance meets design expectations; and
- Adjusting process design, operation, maintenance or surveillance if required.

1.4.4 Supervisors or their designates:

- Implementing these procedures;
- Ensuring these procedures are followed; and
- Ensuring PPE required for tasks under their supervision is available and in good working order.

1.4.5 Process General Foreman

- Monitoring the implementation of this procedure and ensuring that it is maintained;
  - Ensure all safety gear is available and properly worn;
  - Sampling of the leak detection and collection system monitoring ports and the HLF monitoring vault sites, sampling preservation and storage, method of analysis, parameters to measure, use of certified reference materials, and required action on detection of outliers or on non-compliance;
- Ensure all Chain of Custody forms are filled out appropriately and as required communicate with the external lab;
- Prepare spill report documentation and maintain a detailed record of all work completed during monitoring events; and
- Ensuring all information acquired in the field and results of investigations are communicated to their managers.

1.4.6 Environmental Coordinators & Technicians:

- Monitoring the implementation of this procedure and ensuring that it is maintained;
  - Ensure all safety gear is available and properly worn;
  - Specification of sampling sites, frequency of sampling, sampling preservation and storage, method of analysis, parameters to measure, use of certified reference materials, and required action on detection of outliers or on non-compliance;

   - Have a firm understanding of baseline information and be able to make decisions in the field;

- Ensure all Chain of Custody forms are filled out appropriately and as required communicate with the external lab;
- Prepare spill report documentation and maintain a detailed record of all work completed during monitoring events; and
- Ensuring all information acquired in the field and results of investigations are communicated to their managers.

1.5 DEFINITIONS

MSDS: Material Safety Data Sheet

QA/QC: Quality Assurance/Quality Control.

TDG: Transportation of Dangerous Goods

WHIMIS: Workplace Hazardous Materials Information System.

2 OPERATING PROCEDURE

2.1 AWARENESS AND TRAINING

Sodium Cyanide in both solid and liquid forms is highly toxic. Contact with acids or water can produce highly toxic Hydrogen Cyanide (HCN) gas.

Environment team personnel are involved in routine environmental monitoring, and may be involved in environmental monitoring when cyanide contamination is suspected. The Process General Foreman or designate is involved in routine monitoring of locations within cyanide facilities which should always be suspected of contain cyanide. As such, Environmental team personnel and the Process General Foreman will be trained to identify potential symptoms of sodium cyanide poisoning. In addition to safety awareness training, Environment team personnel and the Process General Foreman will have mandatory spill response training including the following topics:

- Responsibilities of personnel
- Causes of spills and preventative measures
- Control, containment and cleanup methods for various spill locations
- Emergency contact information and location
- Storage and disposal of materials used on site
- Reporting requirement and procedure
- Overview of Spill Response Plan
- PPE requirements for handling potential spill materials

In the event of a release involving cyanide, personnel should remain at least 100 meters away from the product. The EGM Emergency Response Team (Mine Rescue) members will have Hazmat (hazardous materials) training and be responsible for containing and removing hazardous substances in the event of a release.

Cyanco (EGM's supplier of cyanide) Dispatch and their partners are technical specialists trained to provide technical advice and/or on-scene technical support, if required, in the event of a product release.

REQUEST SUPPORT FROM

CYANCO EMERGENCY RESPONSE ASSISTANCE PLAN ACTIVATION PHONELINE

1-800-567-7455

2.2 EQUIPMENT AND SUPPLIES

Water and soil sampling equipment is detailed in the EMSAMP, including the preservatives supplied by the lab for sampling cyanides in water.

Sampling of both soil and water suspected to contain contaminants can expose workers to potentially harmful toxins. Samples of aqueous cyanide species are potentially very reactive and toxic, so safety precautions such as gloves and protective clothing must be rigorously observed.

Environmental personnel sampling soil or water suspected to contain cyanide should consult SGC-CMP_SOP-008 PPE for Cyanide Facility Operations and work with the Hazmat trained members of EGM Emergency Response Team to select appropriate PPE prior to sampling.

The Process General Foreman will be required to undertake their position specific sampling with PPE appropriate for sampling locations in which it is assumed that cyanide is present.

2.3 FIELD SAMPLING PROTOCOLS

Field sampling protocols for both routine sampling and for sampling subsequent to a cyanide release are described below. It is important to follow proper sampling and sample handling procedures, prior to delivery to the laboratory. For additional information or details, refer to the EMSAMP or discuss with the laboratory.

2.3.1 Routine Sampling

As detailed in the EMSAMP, water in the receiving environment is sampled for total and WAD cyanide, as follows:

- water samples are collected following the methods outlined in the 2013 British Columbia Field Sampling Manual, Ambient Freshwater and Effluent Sampling, Part E – Water and Wastewater Sampling.
- Samples are collected in containers provided laboratory.
- Sample collection should be undertaken in the following sequence:
  - Put on protective disposable gloves.
  - Rinse container with sample water three times.
  - Complete field treatment protocols described in Table 1, and tightly cap the sample.
  - Store at 4°C.
- In addition to proper sample collection, the EMSAMP details QA/QC procedures for:
  - Duplicate sampling;
  - Labeling;
  - Chain-of custody; and
  - Field reporting - detailed field notes are mandatory for all field staff and should consist of date/time, site location; and weather, including any significant changes over 24 hours.

Table 1: Cyanide Sample Treatment Protocols

Parameter	Sample Container	Filter	Preservatives	Test Parameters	Hold Time
Water (Total CN, WAD CN)	Opaque (black) 60 mL HDPE bottle	YES	sodium hydroxide (NaOH), keep below 10°C	Total Cyanide, WAD Cyanide	14 days

Sampling soil for cyanide is not part of the routine environmental monitoring, and would only occur if cyanide contamination were suspected (Section 2.3.2).

2.3.2 Suspected Cyanide Contamination

ATTENTION:

IF CYANIDE CONTAMINATION IS SUSPECTED, WORK WITH THE HAZMAT TRAINED MEMBERS OF THE EGM EMERGENCY RESPONSE TEAM.

Sampling for cyanides when cyanide contamination is suspected will follow the same procedures as routine sampling (Section 2.3-1). As detailed in the EMSAMP, if adaptive management threshold (Table 2) for Total and WAD CN are reached at specific monitoring locations in the receiving environment, personnel will sample for cyanate and thiocyanate. Table 3 describes treatment protocols for cyanate and thiocyanate.

Table 2: Effluent Quality Standards and Adaptive Management Thresholds

Effluent Quality Standards		
Parameter	**Maximum Concentration in a Grab Sample**	**Adaptive Management Concentration in a Grab Sample**
Total Cyanide	1.0 mg/L	0.75 mg/L
WAD Cyanide	0.03 mg/L	0.0225 mg/L
Adaptive Management Thresholds for the Protection of the Receiving Environment in Haggart Creek		
Parameter	Adaptive Management Threshold	Site Specific Water Quality Objective
WAD Cyanide	0.0038 mg/L	0.005 mg/L

Table 3: Cyanate and thiocyanate Sample Treatment Protocols

Parameter	Sample Container	Filter	Preservatives	Test Parameters	Hold Time
Water (Cyanate*)	Opaque (black) 2 x 145 ml HDPE	YES	sodium hydroxide (NaOH), keep below 10°C	Tick the cyanate checkbox on the bottle label	14 days
Soil	120 ml glass jar/teflon lined cap	n/a	Chill below 10°C	Cyanide	14 days
Soil	120 ml glass jar/teflon lined cap	n/a	Chill below 10°C	Cyanide	14 days

NOTES:
n/a = not applicable.

If soil is suspected to be contaminated with cyanide, sampling will follow *PROTOCOL NO. 3: Soil Sampling Procedures at Contaminated Sites*, and use treatment protocols indicated in Table 3.

In the event of a spill, work with HAZMAT trained members of the EGM Emergency Response Team. Environmental personnel should be prepared to provide support on sampling protocols, and securing proper sampling equipment from the lab, preparing chain of custody forms and other paper work and reporting; however, the HAZMAT trained members of the EGM Emergency Response Team are responsible for containing and removing hazardous substances.

> STOP WARNING
>
> THE HAZMAT trained members of the EGM Emergency Response Team are responsible for containing and removing hazardous substances.

2.4 REPORTING AND INVESTIGATION

2.4.1 Spill Reporting

If cyanide is detected in the environment, follow the Spill Response Plan. The release into the environment of a hazardous material above the reportable quantities or any release into a watercourse is a reportable spill under the *Yukon Spills Regulations* and personnel are required immediately notify the 24-hour Yukon Spill Report line at:

867-667-7244

2.4.2 Incident and Investigation Report

The detection of cyanide in the environment is a safety hazard and signals a potential failure in the mine process. If cyanide is detected in the receiving environment, it is important the proper reporting and investigations is undertaken.

If cyanide is detected in the environment, Environment personnel will notify:

- Health, Safety, and Security Manager or their designate;
- Process Plant Manager or their designate; and
- Mine General Manager or their designate.

These managers will work together to follow SGC-CMP-SOP-024 Incident Investigation and Reporting procedure, to ensure an effective investigation be carried out to identification the causes, events, equipment, materials, people and environmental factors that contributed to the release of cyanide into the environment.

The detection of cyanide in the leak detection and collection system monitoring ports or the monitoring vault is not necessarily a signal of a potential failure in the mine process. In the event that the Process General

Foreman identifies cyanide during their routine monitoring, they should consult the Eagle Gold HLF Operations, Maintenance and Surveillance Manual and discuss their findings with the Process Plant Manager and the Environmental Manager.

2.4.3 Adaptive Management

Adaptive management measures that will be employed in the event that thresholds in Table 2 are reached in the receiving environment include:

- Verify on site analysis results with accredited laboratory results.
- Re-sample and analyze after verification water treatment system functioning properly.
- Consider need for temporary re-routing of contact water to suspend effluent discharge until licensed effluent concentrations are achieved prior to discharge. Examples of operational/ routing changes include:
    - Recirculation of excess process water within the HLF until repairs and adjustments are to achieve licensed effluent concentrations
- Consider capital improvements to augment or replace existing treatment systems.

2.4.4 External Reporting

In the event of a release of cyanide to the receiving environment, either at the EGM or at any point of the transportation route within Yukon, the Chief Operating Officer or their designate will also undertake the following:

- notify management and outside response providers and medical facilities of the cyanide emergency;
- notify potentially affected communities of the cyanide related incident and any necessary response measures;
- communicate publicly any hospitalization or fatality related to cyanide exposure;
- communicate publicly the nature of release on or off the mine site requiring response, remediation, or reporting under applicable regulations; and
- communicate publicly the nature of release that exceeds applicable cyanide limits or that causes applicable limits to be exceeded.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review
Environmental Monitoring, Surveillance and Adaptive Management Plan	Environment Office	
Spill Response Plan	Environment Office	Annual
Environment Yukon. 2018. PROTOCOL NO. 3: Soil Sampling Procedures at Contaminated Sites. Available at: http://www.env.gov.yk.ca/air-water-waste/documents/Protocol3.pdf Prepared February 2018.		
SGC-CMP-SOP-024 Incident Investigation and Reporting		
SGC-CMP-SOP-007 “Cyanide Facility Inspections”.	Environment Office	Monthly
SGC-CMP-SOP-014 “Monitoring and Maintenance of Solution Pond Avian Protection System”	Environment Office	Monthly
ICMC (International Cyanide Management Code). 2018. Sample & Analysis. Available at: https://www.cyanidecode.org/cyanide-facts/sample-analysis		
Eagle Gold HLF Operations, Maintenance and Surveillance Manual	Process Plant	Monthly

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 PURPOSE

The purpose of this document is to establish a uniform process for responding to a medical emergency at the Eagle Gold Mine (EGM). This procedure is only intended to provide general guidance for response actions. The experience and guidance of the Health, Safety and Security Manager and their department staff shall override this procedure as necessary.

1.2 SCOPE

This procedure applies to all employees, supervisors, and managers of the EGM who may be involved in the response to a medical emergency.

1.3 RESPONSIBILITY

1.3.1 Mine General Manager or designate:

- Conduct overall management of the EGM site and workforce
- Approval and sign-off of SOP.

1.3.2 Department Managers or their designates:

- Ensure this procedure is communicated to their employees;
- Ensure their employees have received the appropriate training; and
- Ensure this procedure is implemented.

1.3.3 Health, Safety and Security Manager or designate:

- Monitor the implementation of this procedure; and
- Ensure this procedure is maintained.

1.3.4 Health, Safety and Security Coordinator

- Monitor the implementation of this procedure;

- Ensure this procedure is maintained; and
- Coordinate the transportation of any person involved in a medical emergency.

1.3.5 Paramedics

- Provide medical treatment to any person involved in a medical emergency;
- Determine the severity of any injury or exposure and determine if medical evacuation is required;
- Brief the Health, Safety and Security Coordinator; and,
- Travel to any identified health care facility with the casualty.

1.3.6 Supervisors or their designates:

- Implement these procedures; and
- Ensure these procedures are followed.

1.3.7 All Employees

- Understand and practice this procedure as required; and
- Ask their supervisor for clarification if they are unsure of any aspect of this procedure.

1.4 DEFINITIONS

All Clear: indicates an incident is over and that work can resume.

Emergency Responder: individual, generally a First Aid Attendant, responsible for monitoring Channel 1 for a Code 1 emergency broadcast

Emergency Response Coordinator: individual in charge of overall response to the emergency and the Emergency Response Team.

Emergency Response Team: group of trained individuals who prepare for and respond to any incident.

First Aid Attendants: individuals certified with Level 3 Occupational Health and Safety

Incident Commander: the individual responsible for all incident activities, including the development of strategies and tactics and the ordering and the release of resources. The Incident Commander has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site.

Incident Control Center: the physical location at which the coordination of information and resources to support an emergency response normally takes place.

Serious injury: means:

a) an injury that results in death,

b) fracture of a major bone, including the skull, the spine, the pelvis, or the thighbone,

c) amputation other than of a finger or toe,

d) loss of sight of an eye,

e) internal bleeding,

f) third degree burns,

g) dysfunction that results from concussion, electrical contact, lack of oxygen, or poisoning, or

h) an injury that results in paralysis (permanent loss of function);

YWCHSB: Yukon Workers' Compensation Health and Safety Board

YEMS: Yukon Emergency Medical Services.

2 OPERATING PROCEDURE

The EGM includes first aid facilities that are appropriate for response to the majority of health-related matters on an active mine site. This includes qualified paramedics available on the EGM site 24 hours a day, seven days a week. Additionally, the Health, Safety and Security Team, other departments, and members of the site Emergency Response Team include personnel that are trained in first aid to various levels (Occupational First Aid Levels 1 to 3) as required for their roles.

If any person at the EGM receives an injury, or observes a fellow worker or contactor in distress, their first responses must be to contact Health, Safety and Security immediately.

An injury or exposure to a hazardous substance is likely to result in observable signs that clearly represent a serious injury, in which case the Code 1 protocol, as described below, should be followed.

However, due to the nature of work on the EGM site, there is a possibility that an injury or work-related exposure may not appear as an incident that requires immediate and urgent medical intervention - if you are not qualified to make an informed determination of severity, it must still be reported immediately using the non-serious injury protocol, described below.

The administrations of timely first aid and advanced medical intervention is critical to ensure the health and safety of all persons on the EGM site.

2.1 CLASSIFCIATION OF MEDICAL EMERGENCIES

The classifications for medical emergencies provided below are to be considered general guidance only. If you are not sure of the serverity of an injury or exposure it must be assumed that it is a serious injury and the Code 1 protocol should be followed.

2.1.1 Medical Emergency

A medical emergency is generally considered any acute injury, illness or exposure that poses an immediate risk to a person's life or long-term health.

Figuring out if the symptoms that you or a colleague are experiencing fit the broad definition of a medical emergency may be difficult during a stressful or unfamiliar situation. **When in doubt treat it as a medical emergency**.

There are some general symptoms or complaints that may not be considered a medical emergency but they either are, or could be. The following should always be considered when making a determination of whether a medical emergency and the Code 1 protocol should be followed.

If any of the following is experienced or observed, a medical emergency should be suspected

- Sudden onset of weakness, dizziness or numbness
- Loss of change of vision
- Change in mental status (confusion, unusual behavior, trouble arousing)
- Trouble speaking

- Severe headache
- Loss of consciousness
- Seizures
- Breathing problems (difficulty breathing, shortness of breath)
- Chest pain
- Choking
- Coughing up or vomiting blood
- Severe or persistent vomiting
- Severe bleeding
- Head or spine injury
- Severe abdominal pain or pressure
- Sudden, sever pain anywhere in the body

2.2 INITIAL RESPONSE

If a serious injury, a suspected serious injury, or a health and safety situation in which the severity is unclear, is experienced the first person on the scene must immediately assess the situation to determine if there is an ongoing or potential danger to themselves or others. The first person on the scene should take remedial action to make the scene safe (e.g., use of fire suppression equipment, switching off equipment, removing possible emissions source) as they are able to do without risking further injury. Once the scene is safe, the first person on the scene will follow the Incident Response flow sheet provided as Figure 1 below.

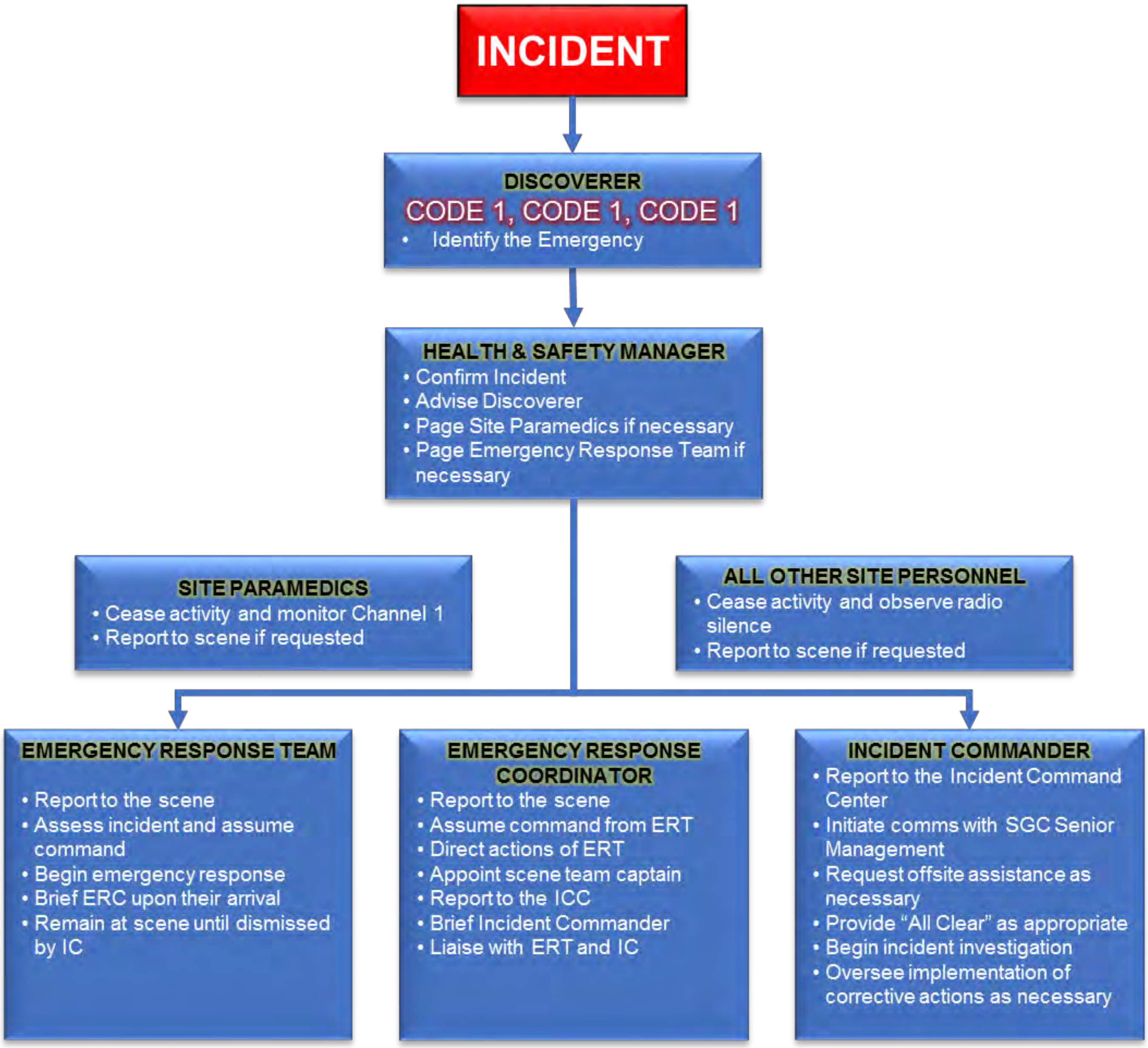


Figure 1: Incident Response Flowsheet

2.3 SEVERITY ASSESSMENT

The site paramedics will evaluate the patient's condition and provide first aid as necessary. Once the patient is stabilized, the paramedic will classify the severity of the injury or exposure (serious or non-serious) and determine if medical evacuation (MEDEVAC) is required.

A basic flowsheet for this process is provided in Figure 2.

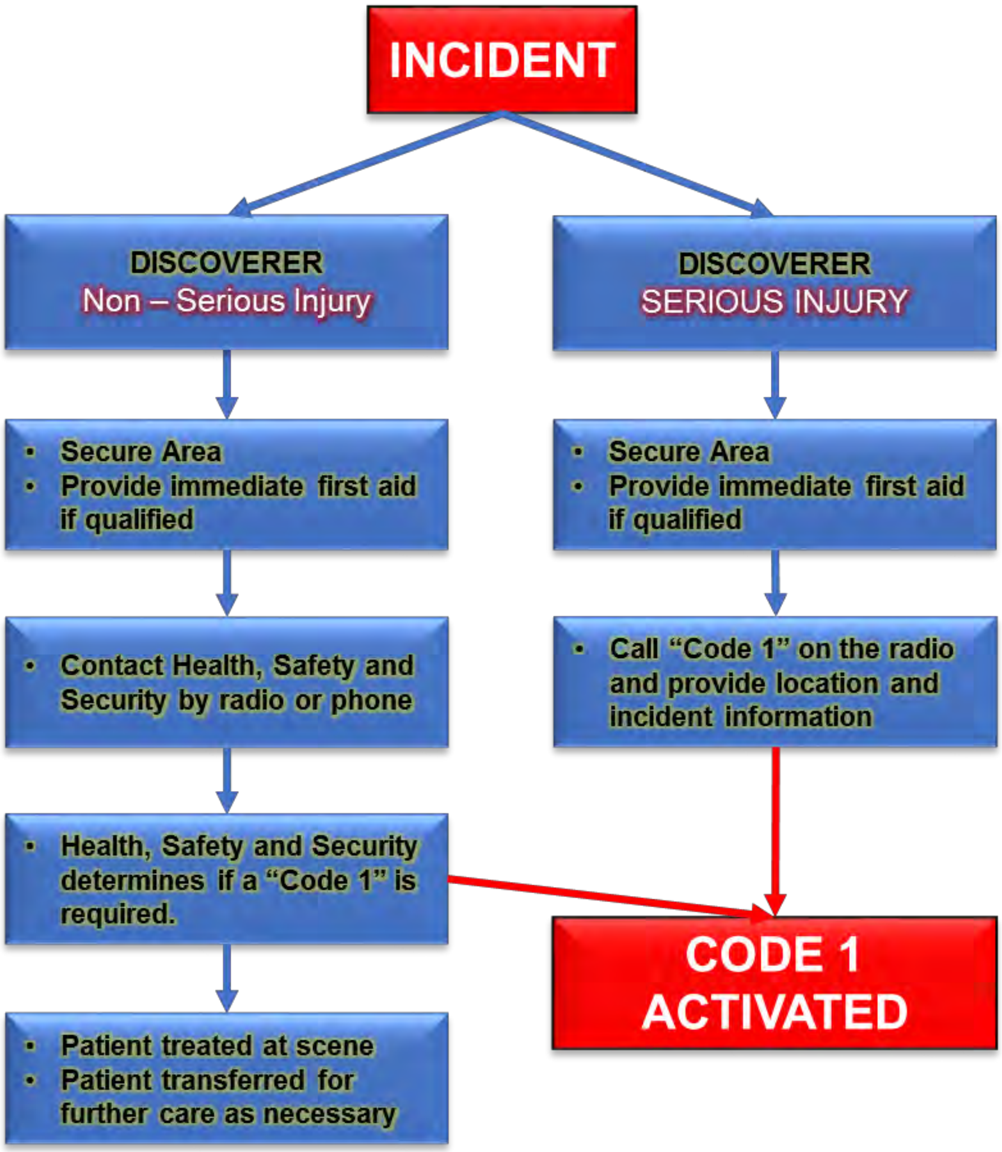


Figure 2: Incident Flowsheet

2.3.1 Serious Injury

If the paramedic has determined that MEDEVAC is required (or advisable) due to a serious injury the Health, Safety and Security Coordinator will be briefed and is then responsible for contacting the Yukon Emergency Medical Services (YEMS) dispatch (867-667-333) to coordinate transport and receipt of the patient. YEMS dispatch will determine in consultation with the Health, Safety and Security Coordinator the appropriate transfer method.

Based on consultation with the YEMS the following additional actions may take place.

- Non-critical stabilized patients that require further medical treatment and/or assessment and do not require medical attention during transfer will be taken off site by designated individual at the first available time.

- Non-critical stabilized patients that require further treatment and/or assessment during transfer must be taken off site via the Mobile Medical Treatment Unit.

The Health, Safety and Security Manager, in coordination with the Health, Safety and Security Coordinator and site paramedics will be responsible for providing an “All Clear” for work to resume as necessary and in accordance with SGC-CMP-SOP-024 “Incident Investigation and Reporting”.

2.3.2 Non-Serious Injury

If the paramedic has determined that the incident involves a non-serious injury, first aid will be provided at the scene of the incident. Transport to the site first aid room may be undertaken and if during further evaluation it is determined that the patient requires transport for medical intervention, or the severity of the injury is advanced to a serious injury classification then the process in section 2.3.1 or the transportation process in section 2.4 will be followed.

2.4 CASUALTY TRANSPORTATION PROCESS

2.4.1 Non-Urgent (Ground Transportation)

Non-critical, stable patients that require further medical assessment and/or medical treatment but **do not** require medical attention during transfer will be taken off site by a member of the Health, Safety and Security team at the first available time (if the mine access roads are open to traffic).

The Health, Safety and Security Coordinator will liaise with either YEMS to determine a receiving medical health care facility, or directly with the Mayo Health Clinic. While en route, communication shall be provided between vehicle and the site.

2.4.2 Urgent (Ground Transportation)

The Health, Safety and Security Coordinator will liaise with YEMS to determine a receiving medical health care facility for non-critical, stable patients that require further medical assessment and/or medical treatment and require medical attention during transfer. In consultation with YEMS, the patient:

- will be transferred to the receiving health care facility by the on-site Mobile Medical Treatment Unit with the paramedic or an OFA level 3 providing care; or
- will be transferred to the receiving health care facility by an ambulance. The ambulance would be dispatched either from Mayo or Whitehorse depending on the nature and urgency of the patient’s condition and the level of care required; or
- will be transferred to the receiving health care facility initially by the on-site Mobile Medical Treatment Unit. The ambulance may be dispatched from Mayo and would meet the Mobile Medical Treatment Unit en route and transfer the patient, depending on the nature and urgency of the patient’s condition.

2.4.3 Immediate (Air)

Once it has been determined by YEMS and the Health, Safety and Security Coordinator that a medical evacuation by air is required, YEMS will coordinate the evacuation ensuring that the receiving health care facility is prepared to accept the patient, and appropriate medical team is dispatched. If a helicopter is not able to land at site for any reason and the patient is being MEDEVACed to a location other than Mayo, the alternative would be to transport the patient by Mobile Medical Treatment Unit or ambulance to Mayo where a helicopter or fixed wing aircraft could transport them to the receiving health care facility.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

1 PURPOSE, SCOPE & RESPONSIBILITY

1.1 PURPOSE

To ensure a safe evacuation and accounting of all personnel at site during a fire at the Camp accommodations at the Eagle Gold Mine (EGM).

1.2 SCOPE

This procedure applies to all employees, supervisors, and managers of the EGM.

1.3 RESPONSIBILITY

1.3.1 Mine General Manager or designate:

- Conduct overall management of the EGM site and workforce;
- Reporting to the Incident Command Center or ICC and communicating with StrataGold Corporation (SGC) Senior Management concerning the fire emergency;
- Taking a radio and camp master keys to the ICC;
- Communicating senior management decisions to the ERTC;
- Consulting with the ERTC and other ERT members before declaring the “All-Clear” and authorizing re-entry to the camp complex or certain portions of the camp complex; and
- Contacting off-site SGC personnel and regulatory agencies (as required).

1.3.2 Department Managers or their designates:

- Ensure this procedure is communicated to their employees;
- Ensure their employees have received the appropriate training; and
- Ensure this procedure is implemented.

1.3.3 Health, Safety and Security Manager or designate:

- Monitoring the implementation of this procedure; and

- Reporting to the ICC to support the Incident Commander and manage communication with the ERTC.

1.3.4 Health, Safety and Security Coordinator

- Monitor the implementation of this procedure;
- Ensure this procedure is maintained;
- Obtain all First Aid and Emergency details from any person announcing the emergency;
- Sending the site mustered personnel to the Maintenance Shop Building as may be necessary due to weather conditions; and
- Gathering emergency equipment/supplies if conditions permit (enlist assistance from others leaving the building if necessary) and load equipment/supplies into the Mobile Emergency Treatment Centre and report to the muster station for roll call.

1.3.5 Paramedics

- Respond accordingly to any and all First Aid or Emergency situations
- Being available at the muster station to treat any medical emergencies.
- Brief the Health, Safety and Security Coordinator; and,
- Travel to any identified health care facility with any injured personnel as necessary.

1.3.6 Supervisors or their designates:

- Ensure that all equipment operators under their supervision pull their equipment over to the side of the road and stand down in the event that is procedure is enacted. Equipment operators must be available in their equipment in case the equipment is required to assist the ERT.
- Ensuring that direct reports and any other personnel in their immediate area report to the Muster Area for roll call;
- Report to the muster area via the closest emergency exit with radio and camp accommodations list;
- Complete a roll call at the muster area of their direct reports and notifying the Health, Safety and Security Manager of persons unaccounted for; and
- Ensuring their direct reports remain at the muster area unless the Health, Safety and Security Manager has requested their release for other duties.

1.3.7 All Employees

- Reporting to the muster area via the closest emergency exit;
- Ask their supervisor for clarification if they are unsure of any aspect of this procedure.

1.3.8 Emergency Response Team Captain (ERTC)

- Reporting to the turn out sea can to equip themselves and the ERT.
- Coordinating the fire emergency in conjunction with the Health, Safety and Security Manager and Mine General Manager in a safe manner and in accordance with the ERT Safe Work Guidelines.

1.3.9 Emergency Response Team (ERT) Members

- Reporting to the turn out sea can to equip themselves.
- Conducting firefighting, building sweeps, and administering first aid as directed by the ERTC

2 OPERATING PROCEDURE

Fires can occur in any location, but a fire with serious consequences would be one involving the camp, fuel farm and chemical storage areas or tanks.

Evacuation procedures, emergency exit routes, and muster points for the relevant building, are posted throughout the building(s). This includes each individual room in the camp. Personnel should familiarize themselves with the evacuation route for any area which they may be involved with during their stay at the EGM.

In the event of fire in camp, ensuring safe and expedient evacuation of all individuals is critical. Individuals can be spread throughout the building making it challenging to account for everyone. Thus, accounting for all personnel needs to be organized quickly so that any individual who may be at risk can be identified and rescue efforts put forth.

In event that anyone notices a fire in the camp area, they must immediately operate one of the fire pull stations located around the camp or alert others in the area to the situation and direct them to raise the alarm.

The camp is equipped with a fire suppression system and strategically placed all-purpose fire extinguishers. Individuals on scene should attempt to extinguish the fire provided there is no risk to themselves or others. In the event that there is a threat to your own or another person's safety, proceed to the designated Muster point immediately.

A "Code 1" call over this communication system will be initiated by the Health, Safety and Security Team as they are familiar with the camp's alarm system notifications.

2.1 ALL NON-EMERGENCY RESPONSE TEAM PERSONNEL

Personnel should at all times keep outerwear suitable for the current weather conditions readily available in their rooms in the event that an evacuation is required. The Health, Safety and Security Team has some thermal protection in the turn out seacans but this should not be relied up due to the potential duration of a camp evacuation and the number of people at the EGM site.

Upon hearing a "Code 1" call over the site communication system or the camp fire alarm, all individuals will immediately evacuate the main camp by the closest available exit, shouting "fire" and knocking on doors as they exit (do not wait for a response to the knocking). Individuals will not be permitted to return to camp until an "All Clear" has been issued.

Personnel should locate their immediate supervisors when they arrive at the muster stations so that a roll call can be completed.

2.2 MINE GENERAL MANAGER OR DESIGNATE

Upon hearing a "Code 1" call over the site communication system indicating that there is a fire in camp, the Mine General Manager or designate will report to the Incident Command Centre to assume the role of Incident Commander. The Incident Commander is then responsible for the coordination of communication with internal and external parties.

If the fire is uncontrollable, as determined by the ERTC, and further assistance may be required, the Incident Commander may request support from the Mayo Fire Department or other agencies; however, it must be recognized that support would be at least 60-90 minutes. In this circumstance, the priority will be to ensure that the fire does not spread further.

The Incident Commander will initiate planning for site evacuation.

2.3 HEALTH, SAFETY AND SECURITY MANAGER

Upon hearing a “Code 1” call over the site communication system indicating that there is a fire in camp, the Health, Safety and Security Manager or designate will report to the Incident Command Centre to receive status updates from the ERTC. The Health, Safety and Security Manager

2.4 HEALTH, SAFETY AND SECURITY COORDINATOR

As the main first aid room is located in the camp facility, a secondary location for first aid will be the Mobile Medical Treatment Unit (MMTU). Upon hearing a “Code 1” call over the site communication system indicating that there is a fire in camp, the Health, Safety and Security Coordinator will retrieve the MMTU and drive it to the camp muster station, or any alternate muster station that may have the greatest number of personnel.

The Health, Safety and Security Coordinator will also be responsible for arranging transport of personnel gathered at the muster station to the shop building if weather conditions are deemed to be too harsh for an extended stay in the elements.

2.5 EMERGENCY RESPONSE TEAM CAPTAIN

Upon hearing a “Code 1” call over the site communication system indicating that there is a fire in camp, ERT Captain will report to the turn out sea can to retrieve their fire response Personal Protective Equipment.

If conditions permit, the ERTC have the first two ERT members who arrive retrieve the site water truck and bring it to the fire location.

The ERTC will continue to ensure that the ERT members are properly equipped in their Personal Protective Equipment and that they are preparing the fire-fighting equipment.

The ERTC will then assign ERT members to either camp room sweep, fire fighting or communication liaison with the ICC.

2.6 EMERGENCY RESPONSE TEAM MEMBERS

Upon hearing a “Code 1” call over the site communication system indicating that there is a fire in camp, ERT members will report to the turn out sea can to retrieve their fire response Personal Protective Equipment. Once equipped, the ERT members will attend the scene of the fire.

If safe to do so, the ERT team will conduct a room sweep as directed by the ERTC to ensure complete evacuation. Any person found within the camp will be escorted by one of the ERT team to the nearest muster station. The ERT member providing the escort will provide first aid to that person at the muster station as necessary or turn their control over to the paramedics so that they can return to the scene of the fire.

ERT members not assigned to the sweep will commence fire fighting measures as directed by the ERTC with the exception of the communication liaison.

The communication liaison is responsible for providing updates on firefighting efforts and the roll call status to the ICC and to the ERTC. This communication will be via the camp communication system (radio or phone) or verbally in the event that site communications have been disrupted.

2.7 PARAMEDICS

The paramedic will prepare for a possible medical emergency, including notifying the appropriate health care facility and preparing for a possible medical evacuation.

3 REFERENCES & RELATED DOCUMENTS

Document	Primary File Location	Frequency of Review

REVISION CONTROL TABLE				
Version No.	**Date**	**Pages(s)**	**Section(s)**	**Purpose of the Modification**

APPENDIX B

ADR Plant Operations Plan

EAGLE GOLD PROJECT

ADR PLANT OPERATIONS PLAN

Version 2019-01

MARCH 2019

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1 INTRODUCTION

This Operations Plan for the Eagle Gold Project (the Project) Adsorption, Desorption and Recovery (ADR) Plant was prepared by StrataGold Corporation (SGC) to provide guidance to ADR Plant Personnel in the safe operation of the ADR Plant and to support the SGC Cyanide Management Plan. This Plan has been developed to:

- minimize the risk of cyanide exposure to workers and the potential for hydrogen cyanide (HCN) gas generation;
- describe ADR Plant Operation and pH adjustment through the addition of hydrated lime and caustic; and
- ensure that ADR Plant equipment and devices function as necessary for safe cyanide management.

The ADR Plant Operations Plan is designed to be compliant with the International Cyanide Management Code and will be updated to account for any facility design or operational changes that may occur during the life of mine (LOM).

This Plan describes:

- the ADR Plant layout and location of the safety devices;
- primary and secondary cyanide containment;
- Principles of Operation;
- ADR Plant Operation circuits and pH control; and,
- Cyanide destruction.

CAUTION

This Plan is not to be considered a completed description of all duties required of ADR Plant personnel.

WARNING

No employee, contractor or visitor to the Project will be permitted entry to the ADR Plant without approval by the Process Manager, or designate.

Approval for entry may only be granted in writing and after confirmation by the Process Manager, or designate, that such employee, contractor or visitor has been sufficiently briefed on all hazards, equipment, and safety protocols that they may encounter.

2 ADR PLANT SAFETY FEATURE LAYOUT

The ADR Plant systems have been built to adsorb gold from cyanide solutions collected from the Heap Leach Facility (HLF) and include:

- Two carbon-in-column (CIC) trains operating in parallel with five cascade type carbon adsorption columns;
- Carbon transfer system including transfer pumps, valves and associated piping;
- Barren solution sump and pumps to recirculate barren solution to the HLF;
- a barren leach solution heating circuit to provide supplemental heat to the barren solution during the winter months;
- Acid wash tank, elution/desorption column, heat exchangers; and,
- Carbon regeneration circuit.

2.1 ADR Plant Safety Devices

The ADR plant is designed with the following safety devices, the location of the devices is shown in the ADR Plant layout in Figure 2.1-1.

The safety devices include:

- CN mixing area ventilation;
- Fixed HCN Monitors;
- Fire Hose Cabinets / Fire Extinguishers; and
- Showers / Eyewash;

Additionally, the ADR Plant will be equipped with spill and emergency response equipment, including medical oxygen and cyanide antidote. Neutralization and cyanide destruction are discussed in Sections 4 and 5 of this Plan

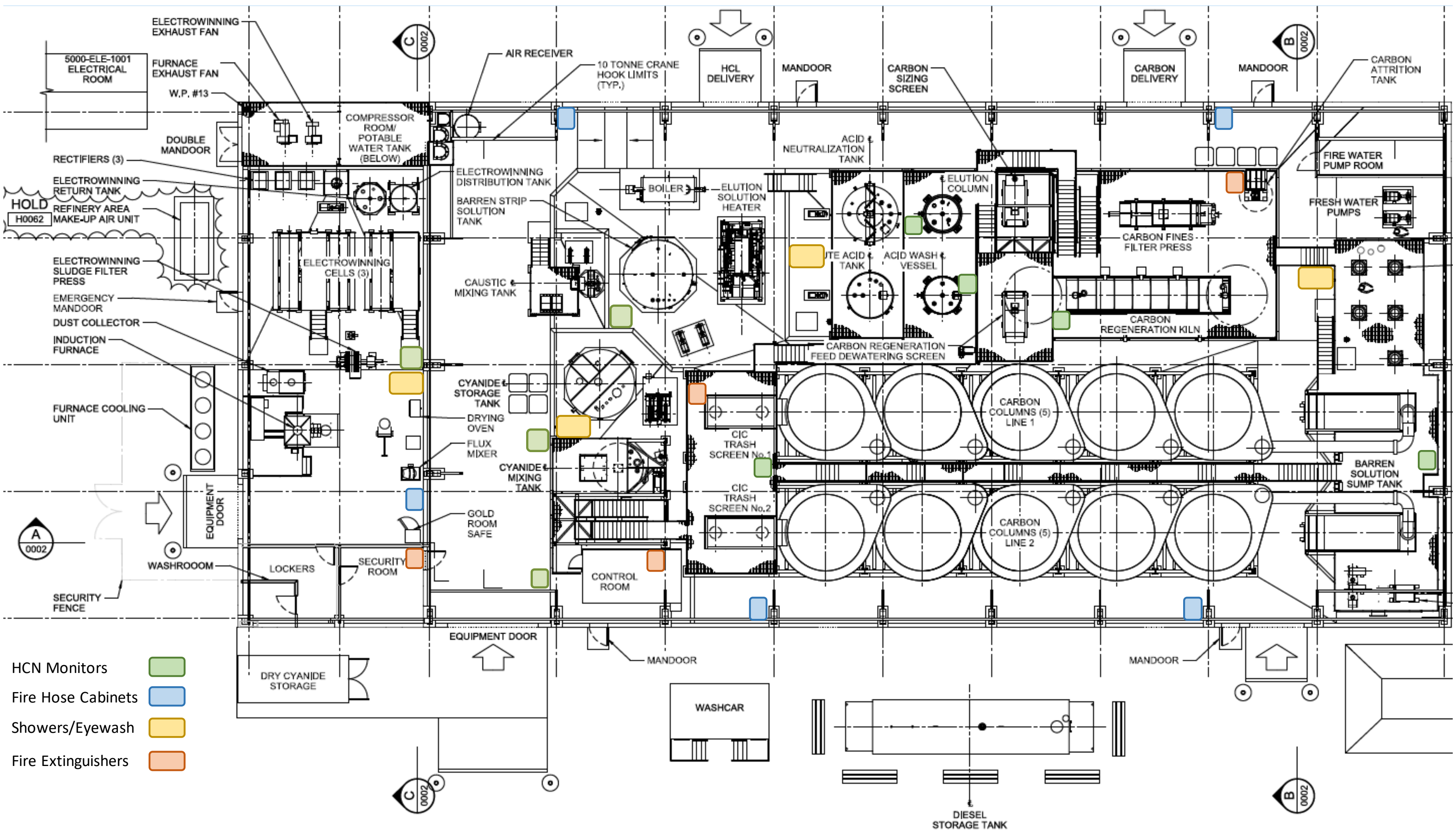

Figure 2.1-1: ADR Plant Layout

2.1.1 HCN Monitors

Fixed HCN Monitors will be installed in:

- cyanide receipt and storage areas,
- the mixing area,
- the barren solution tank sump,
- the acid wash vessel,
- carbon strip/wash area,
- carbon regeneration area,
- carbon screens, and
- the electrowinning area.

These locations were chosen due to the presence of WAD (weak acid dissociable) cyanide in the systems and potential risk of HCN gas generation. Additionally, the mixing deck will be fitted with an audible and visual HCN alarm, a stationary HCN monitor set to alarm at 4.7 ppm, and a video monitoring system, all of which can be accessed/observed from the ADR plant operations control station.

The HCN monitors have a detection range: 0-10 ppm.

- HCN High Alarm is triggered at 4.7 ppm; and
- HCN High-High Alarm is triggered at 6.7 ppm

The alarms are installed with 2 hardwired local beacons:

- Amber indicates an HCN concentration of 4.7ppm or greater has been detected; and
- Red indicates and instrument fault

Measurements are displayed, trended and alarmed on the control system. HCN monitors closely monitor the areas where WAD cyanide is present in the process for accidental release of HCN gas.

HCN gas detectors must be calibrated and certified as per the product requirement, and must be maintained according to the supplier specifications.

The number and location of HCN monitors will be reviewed annually following the risk assessment procedure described in SGC-CMP-SOP-016 Assessment and Mitigation of Cyanide Exposure to ensure adequate and effective monitoring coverage

2.1.2 Fire Hose Cabinets & Fire Extinguishers

The ADR Plant has a firewater ring main around the perimeter of the ADR plant. This ring main will supply water to the fire hose cabinets. General purpose dry chemical fire extinguishers will be provided at locations in the ADR Plant as shown on Figure 2.1-1.

In the case of a fire containing cyanide, the use of water, carbon dioxide, or foam is strictly prohibited as detailed in SGC-CMP-SOP-009 Fire Prevention Protection Program. Fires involving cyanide salts or solutions are not combustible, but may generate highly toxic, flammable, corrosive and explosive hydrogen cyanide gas if in contact with water, carbon dioxide fire extinguishers, or some foam fire extinguishers if these contain acidic agents. A dry chemical extinguisher sprays a very fine powder of sodium bicarbonate ($NaHCO_3$, baking soda), potassium bicarbonate ($KHCO_3$, nearly identical to baking soda), or monoammonium phosphate ($(NH_4)H_2PO_4$). These solids coat and smother the fire. Personnel will be trained in emergency response procedures in the event of a fire involving cyanide and the use of dry chemical fire extinguishers, which will be the primary fire suppression tool for fighting fire that may possibly contain cyanide.

In the event of a large fire in the ADR Plant, the decision to use fire hose water will rest with appropriately trained emergency response personnel equipped to take special protective precautions, such as wearing full body protective clothing (PVC [Polyvinyl Chloride] jackets and pants, PVC gloves and chemical resistant boots), using self-contained breathing apparatus with a full-face piece operated in pressure-demand or positive pressure mode. Soda ash, or other suitable alkaline material, to control the pH of the water/cyanide mixture created may also be used.

The Health and Safety Manager or their designate will be responsible for regular inspection and ensuring maintenance of firefighting equipment throughout the ADR Plant.

2.1.3 Showers / Eyewash

Combined shower/eyewash stations installed throughout the ADR Plant as shown on Figure 2.1-1 have instant electric water heaters and are fed potable water without needing a hot water tank. A typical shower/eyewash in Figure 2.1-2. Eyewash/shower stations have been located to be available for immediate use (i.e., located within 10 seconds (approximately 15 m) and on the same level as work activities involving cyanide handling. The pathway to the stations should always be kept clear of obstructions and slip/trip hazards. Personnel performing tasks involving cyanide will ensure emergency showers are working prior to performing work as outlined in SGC-CMP-SOP-018. Eyewash/shower stations will be inspected regularly by the Health & Safety Manager or their designate.

Figure 2.1-2: Typical Shower/Eyewash Station

2.2 ADR Plant Containment

The ADR Plant contains cyanide and caustic (high pH) and acid (low pH). These reagents must be kept separate, and their respective areas within the ADR Plant have been designed to ensure they remain separate in the event of a process upset. Locations within the ADR Plant where cyanide and caustic will be used include three bermed areas shown in green in Figure 2.2-1: the Cyanide Mixing area, the Carbon in Column (CIC) area, and the Carbon Regeneration area; each with berms that are 0.3 m. The location within the ADR Plant where acid is used, shown in red in Figure 2.2-1, is also bermed with a berm height of 0.6 m..

The areas containing cyanide and caustic with berm heights of 0.3 m are additionally designed with an overflow weir, such that in the event of a major spill or tank rupture, the areas can share a common sump in the CIC area without over topping the acid area berm of 0.6 m.

Each bermed area is graded toward its own dedicated concrete sump, designed to contain spills and to allow for the immediate return of spilled solution to appropriate locations in the process. This is to ensure that no residual spill material will be generated in normal operations that will require management and disposal as waste.

Beyond concrete containment with the building, The ADR Plant itself rests on pad also designed for cyanide containment. The pad underneath the building is lined and graded such that overflow would be directed into a lined trench that flows back into the Heap Leach Facility (Figure 2.2-2).

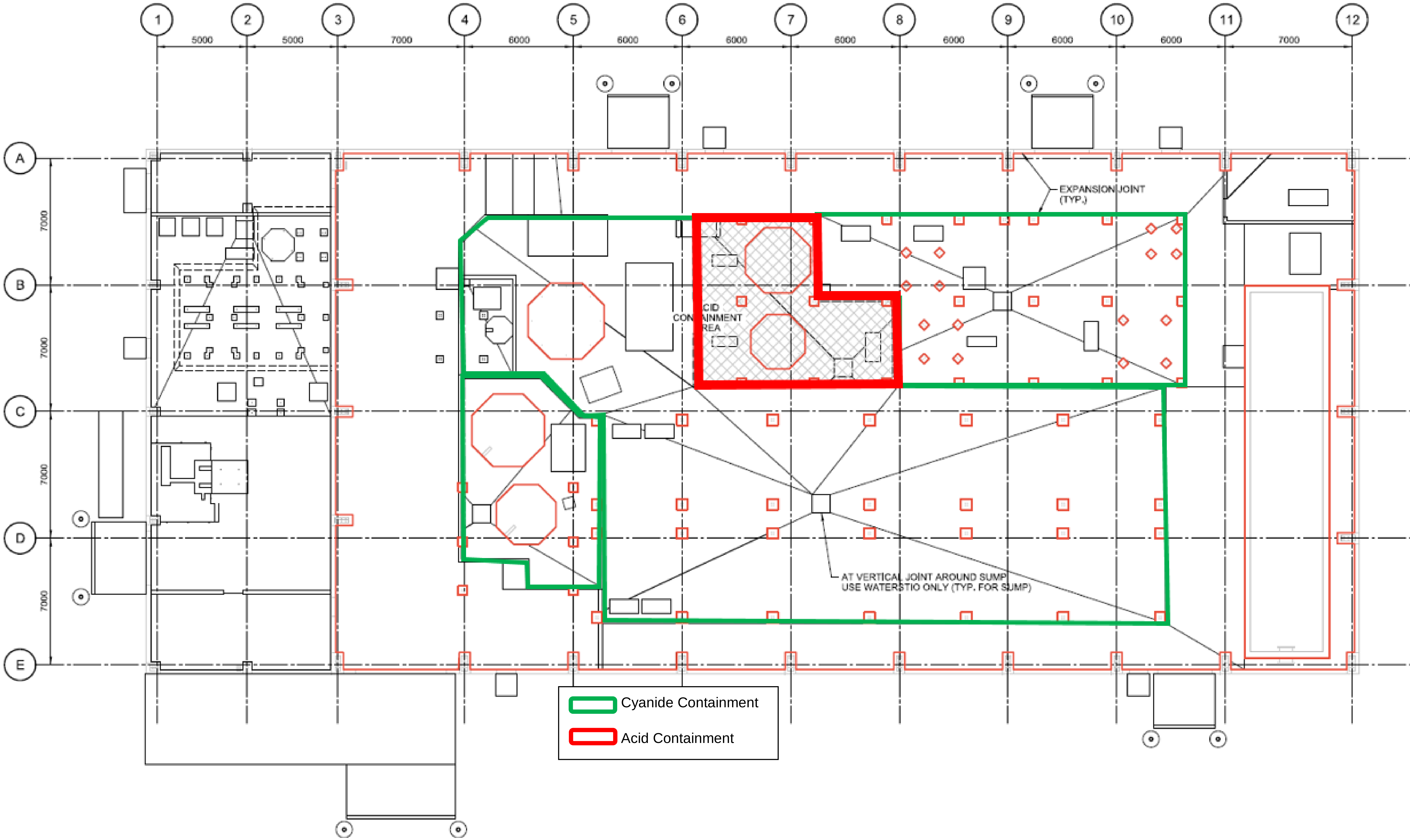

Figure 2.2-1: Cyanide Containment

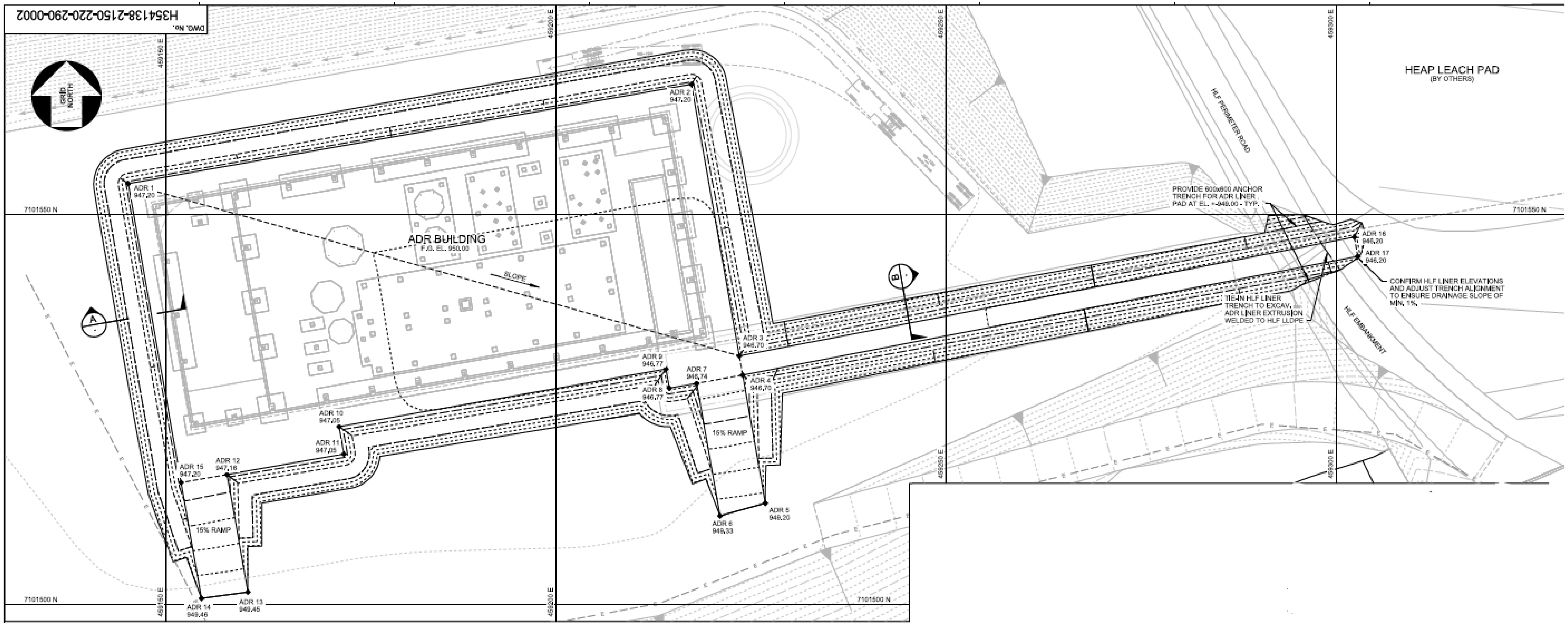

Figure 2.2-2: ADR Plant Secondary Containment

3 PRINCIPLES OF OPERATION

3.1 Leaching

Gold is one of the most durable and corrosion-resistant metals, and it is extremely difficult to dissolve. It can be dissolved by only a few solutions including sodium cyanide (NaCN), potassium cyanide (KCN), aqua regia (a powerful mixture of 25 percent nitric acid [HNO3] and 75 percent hydrochloric acid [HCl]), and a small number of other special reagents. Sodium cyanide is the most common reagent choice, primarily due to cost effectiveness, and it is the reagent selected for this project.

Leaching involves the use of a dilute cyanide solution to dissolve solid particles of gold (Au) from crushed ore. The chemical reaction for the dissolution of gold, the "Elsner Equation", follows:

$$4\ Au(s) + 8\ NaCN(aq) + O_2(g) + 2H_2O(l) \rightarrow 4\ Na[Au(CN)_2](aq) + 4\ NaOH(aq)$$

The result is a “pregnant” solution containing gold cyanide species, chiefly $Au(CN)_2^-$. The rate of gold dissolution is directly proportional to the concentration of cyanide in solution, up to a maximum rate. Beyond this maximum, increases in cyanide concentration can start to inhibit the dissolution rate.

The dissolution of gold by cyanide solutions must be performed in an alkaline media. The sodium cyanide decomposes, generating deadly hydrogen cyanide gas, when the pH of the solution is too low. To maintain the protective alkalinity of the leach solution, thereby minimizing hydrogen cyanide gas generation, lime [Ca(OH)2] or caustic (NaOH) are usually added to solutions containing cyanide.

3.2 The pH Scale

The pH of a solution expresses its relative acidity or alkalinity on a scale of 0 to 14 (Figure 3.2-1). The pH expresses the concentration of the hydrogen ion (H+). Pure distilled water has a pH value of 7 and is regarded as neutral (neither acidic nor alkaline). The pH values decreasing from 7 to 0 indicate increasing acidity, and pH values increasing from 7 to 14 indicate increasing alkalinity.

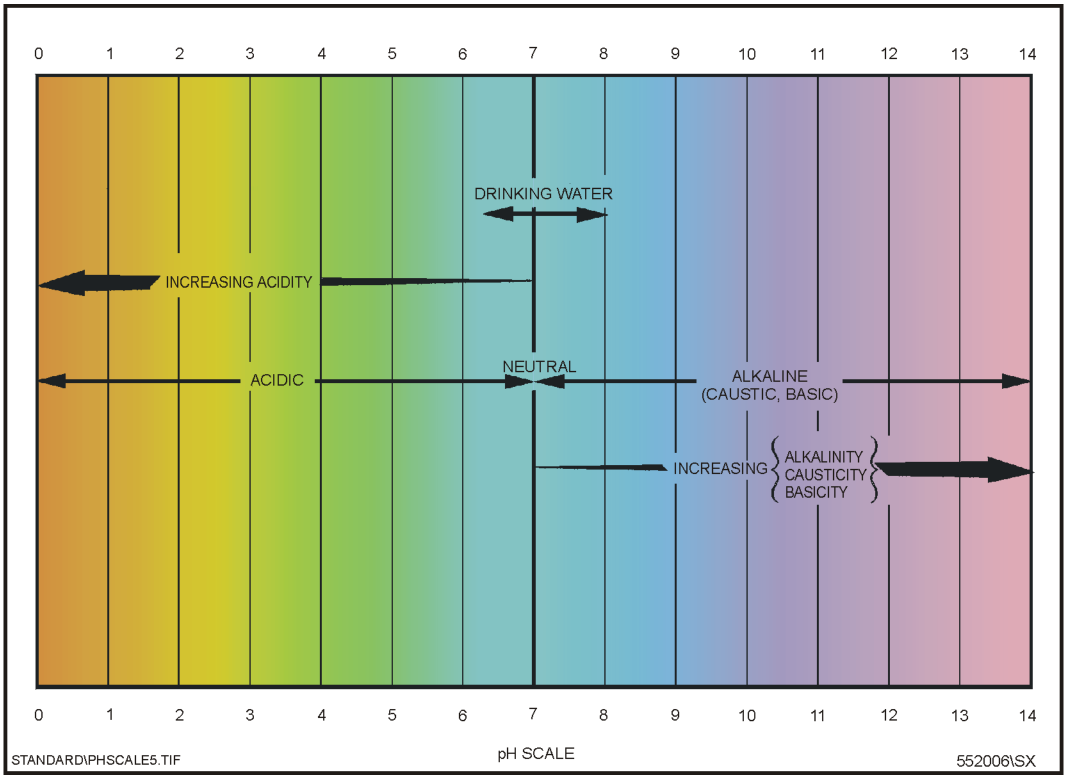

Figure 3.2-1: The pH Scale

3.3 Activated Carbon

Activated carbon is a family of carbonaceous (carbon-containing) substances manufactured by processes that develop adsorptive properties (the ability to adsorb). The adsorptive properties of carbon are functions of both the chemical condition of the carbon surface and the area of the surface. Very irregular shapes provide a large surface area for a given weight of carbon. It has been found that one of the best carbons for adsorption of gold is coconut-shell charcoal. Figure 3.3-1 shows coconut-shell activated carbon magnified many times through an electron microscope. The picture shows that the surface area is very large relative to its size.

Coconut-shell charcoal is made by carefully heating coconut shells in the absence of air until all of their components except a carbon skeleton are driven off. The activity of the carbon (the effectiveness for adsorption of the surface) is produced by careful manufacturing conditions. The amount of surface per gram of carbon is produced by the complex cell structure provided by the coconut. Typically, a gram of activated carbon has a total surface area of 1,050 m^2 to 1,150 m^2. Coconut-shell charcoal is very strong. Durability is important because the carbon must not break up through attrition; otherwise some of the carbon, now in small pieces, would escape through the screens and be lost to the process. This lost carbon would carry gold with it.

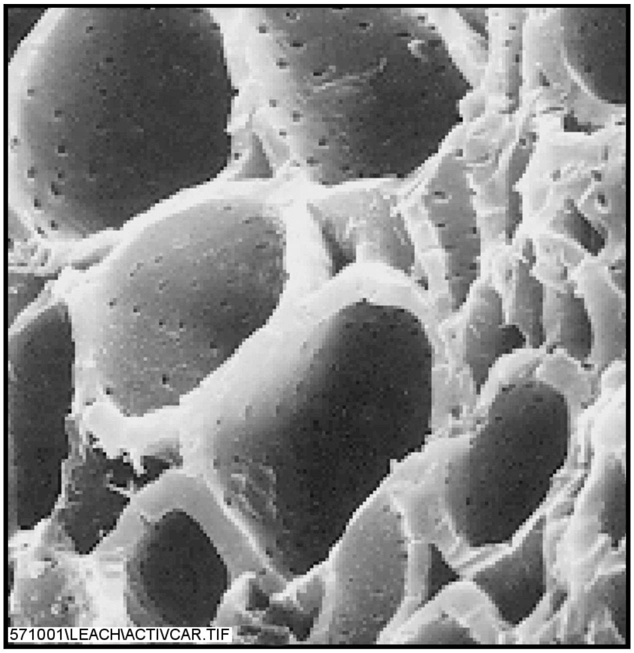

Figure 3.3-1: Structure of Activated Carbon

3.4 Adsorption and Desorption

Adsorption is a process in which molecules from within a fluid are concentrated on the surface of a solid by chemical forces, physical forces, or both. Desorption is the opposite process, during which the molecules are released from the surface.

In the Carbon Adsorption process, soluble gold cyanide species, chiefly $Au(CN)_2^-$ are adsorbed onto the activated carbon internal and external surfaces. In the carbon-in-column trains, most of the gold-cyanide complex ions become physically attached to the surfaces of the carbon particles in a process called adsorption. The CIC circuit is designed with sufficient tank volume to ensure an adequate amount of residence time is provided to complete the adsorption of the gold onto the carbon. The gold- cyanide complex is adsorbed (attached) onto the surface of the activated carbon. If the pH is too high or the amount of excess cyanide in the slurry is too high, the adsorption of the gold-cyanide complex can be hindered.

Cyanide forms complex ions with other metals in addition to gold, and some of these complex ions are also adsorbed onto the carbon. The order of preference of adsorption of the most commonly encountered complex ions is shown in Table 3.4-1.

Table 3.4-1: Metal Cyanide Complex Adsorption on Activated Carbon

	Element	Cyanide Complex
Most strongly adsorbed	Gold	$Au(CN)_2^-$
↕	Mercury	$Hg(CN)_2$
	Silver	$Ag(CN)_2^-$
	Copper	$Cu(CN)_3^{-2}$
	Zinc	$Zn(CN)_4^{-2}$
	Nickel	$Ni(CN)_4^{-2}$
Least strongly adsorbed	Iron	$Fe(CN)_6^{-4}$

Table 3.4-1 shows that gold and silver are adsorbed in preference to the other metals. This feature makes the separation and purification of precious metals far easier than it otherwise would be.

The degree of adsorption of the gold-cyanide complex depends upon several factors. The process takes advantage of these factors — first to adsorb the gold and then to desorb the gold. Table 3.4-2 illustrates how use is made of the properties of carbon and the gold-cyanide complex in the CIC process. Chemical conditions throughout the process are changed to adsorb and desorb gold.

Table 3.4-2: Factors Affecting Carbon Adsorption and Desorption

Property	Use Made of the Property in Carbon Loading (Adsorption) and Stripping (Desorption)
High pH (above 11) hinders adsorption, but helps desorption	Adsorption (loading) is done at a high enough pH to provide safe operation with cyanide (10.5), but no higher. A higher pH wastes reagent and increases scaling, which hinders absorption. In the subsequent desorption process, the pH is very high (above 12).
High calcium ion (Ca++) concentration helps adsorption, but hinders desorption.	The pH in carbon loading is raised with lime added to crushed ore prior to leaching, which contains calcium ions and helps to adsorb the gold.
High sodium ion (Na+) concentration hinders adsorption, but helps desorption.	In the stripping process, the calcium ion is completely removed and the pH is raised with caustic, which contains the sodium ion that helps desorption.
High residual cyanide ion (CN-) concentration hinders adsorption.	During loading, the cyanide concentration in solution is low. In the stripping process, the cyanide concentration may or may not be high (depending on the process).
Very high temperature helps desorption.	The adsorption process takes place at the ambient temperature of the solution, but the desorption process is at an elevated temperature (about 290°F) or greater. The Pressurized ZADRA Strip process allows higher temperatures to be reached, by operating at higher pressure to ensure solution does not flash to steam.

Table 3.4-3 summarizes the conditions used in carbon adsorption and desorption.

Table 3.4-3: Adsorption/Desorption Conditions

Loading (Adsorption)	Stripping (Desorption)
Low cyanide concentration	Not cyanide dependent
pH 10.5 to pH 11	pH above 12
Calcium ion present from lime (low sodium)	Sodium ion present from caustic (no calcium)
Ambient temperature	Temperature at or above 290°F

3.5 Carbon Handling

3.5.1 Carbon Regeneration

The system allows carbon to be repeatedly loaded, stripped, and re-loaded. However, as carbon is utilized in the adsorption and recovery circuits, calcium scale and various organic compounds, including oil, can foul carbon used in the carbon adsorption circuit.

An acid wash circuit prior to stripping (desorption) is used to remove the calcium carbonate and other acid soluble impurities, but organics that are not acid soluble will also adsorb into the carbon particle pores. Organics slow the gold and silver adsorption rate by contaminating the pore structure of the carbon (adsorption sites) available for gold adsorption, decreasing the metal loading capacity of the carbon. Organics can be removed from the carbon by volatilizing at high temperatures. The process of removing the organics and restoring the active sites on the carbon is *carbon regeneration*.

3.5.2 Attrition

Periodically, fresh carbon is also added to the circuit to make up for losses, but is attritted before it is introduced to the circuit. *Attrition* is the high-energy agitation of a suspension of carbon. The carbon particles collide with each other. Any loose or weak spurs (rough edges) of carbon, or broken pieces of carbon, are separated at this stage. The carbon handling systems elsewhere in the process are much gentler than in this equipment. This process ensures that readily produced fine particles are generated here rather than in a stage of the process, such as the carbon-in-leach circuit, where they may be lost, carrying gold with them.

3.5.3 Carbon Transfers

Carbon transfers move carbon from tank to tank through each stage of processing. Carbon transfer pumps throughout the ADR Plant are used to make carbon transfers. Carbon transfers are completed using carbon push water to prevent carbon from plugging lines.

4 ADR PLANT OPERATIONS AND PH CONTROL

The overall objectives of the leach and carbon handling circuit are to adsorb the gold from pregnant solution onto activated carbon; acid wash the loaded carbon to remove acid soluble impurities; strip the adsorbed gold from the activated carbon, and regenerate the stripped carbon in order to remove any contained organic material before its reuse.

These objectives must be accomplished with minimal downtime and with the lowest possible cost. They also must be achieved while maintaining the health and safety of plant personnel, protecting the environment, and preventing damage to plant equipment.

The ADR plant processing steps include:

- Cyanide Mixing
- Heap Leaching & Lime Addition
- Carbon Adsorption
- Carbon Acid Wash & Neutralization
- Carbon Stripping; and
- Carbon Regeneration

Processing steps involve the use of caustic, sodium cyanide, acid reagents and solutions. If cyanide comes in contact with acid, HCN gas may be produced. A key component for effective operation of the ADR Plant involves controlling pH throughout the process.

To operate the ADR Plant, personnel must be familiar with the Process & Instrumentation Drawings (P&IDs) and the process mass balance, as well as the individual equipment manuals. Operators must be well trained in safety procedures when working with chemical reagents and must wear suitable personal protection equipment (PPE). PPE requirements for the ADR Plant operators working directly with cyanide are selected based on the task being performed in accordance with SGC-CMP-SOP-008.

4.1 Cyanide Mixing

Cyanide mixing involves the mixing of dry cyanide briquettes with water to produce process solution, which is then delivered to the Barren Solution Sump Tank and pumped to the heap leach facility.

The gold recovery process requires 14.4 t cyanide/day that will be provided by mixing two 1 t bags of solid cyanide with water in the cyanide mixing tank, to a 20% strength several times a day. 20% strength has a specific gravity of 1.11, such that 2 t of NaCN is mixed with 8 t of water to get 9.0 m^3 of solution. The mixing procedure is partially automated and requires an operator. The trigger for initiating a new bath is:

- The cyanide mixing tank is empty
- Sufficient space in the cyanide storage tank to accept a 9 m^3 batch
- Sufficient Intermediate Bulk Containers (IBCs) of cyanide are in the ADR Plant cyanide IBC storage area.

Cyanide mixing will be conducted according to SGC-CMP-SOP-005 Cyanide Mixing Process, an involves the following steps:

1. Control system
   - Turn on CN mix tank and storage tank vent fan
   - Add water until tank level is at 8 m^3
   - Turn on agitator
2. Operator
   - Operator is wearing full CN handling PPE in accordance with SGC-CMP-SOP-008
   - Pry lid off 2 IBCs
   - Activate remote control crane to pick up CN bag out of IBC and place into bag splitter located above the CN mix tank
3. Control system
   - Agitate for 60 minutes
   - Turn off agitator
   - Transfer to CN storage tank
4. Operator
   - Activate triple rinse bag system and dispose of bag once rinsing complete
   - Fork lift operator unloads CN IBCs (Figure 4.1-1) from CN container and transports them into the ADR plant, stacked one high in preparation for next mix.

Mixed process solution is then transferred through a series of pumps and pipes to the Cyanide Storage Tank, and then on to the Barren Solution Sump Tank through a series of pumps, pipes and drip emitters which deliver the process solution to the heap leach pad.

Additionally, process solution from the cyanide storage tank provides cyanide solution to the carbon columns, if required, and to barren strip solution tank used during the carbon stripping process (see Figure 4.1-2).

pH of the barren solution and pregnant solution are monitored continuously via electronic pH meters and confirmed daily by analysis of grab samples and daily composite samples.

Figure 4.1-1: Cyanide Container

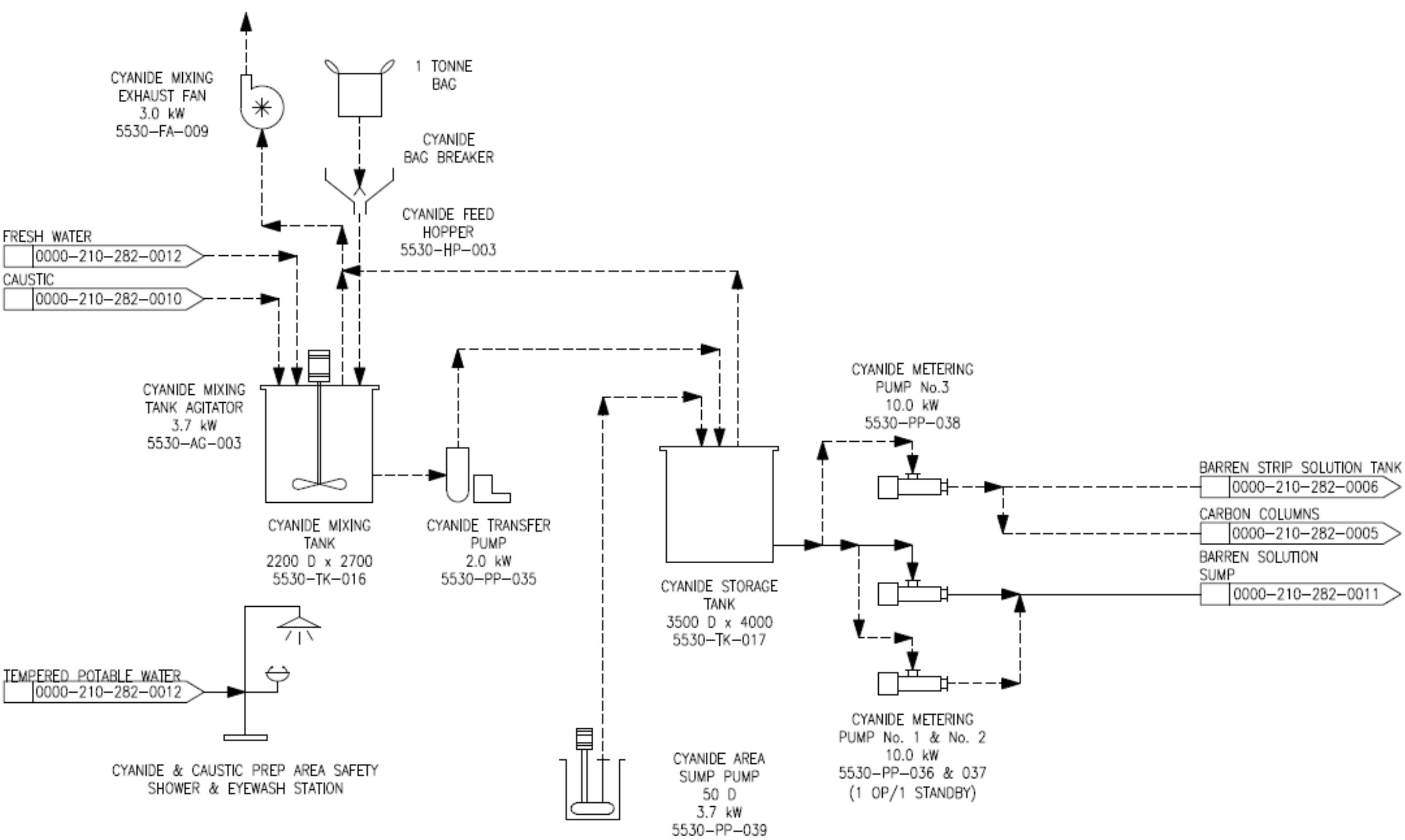

Figure 4.1-2: Cyanide System

4.2 Heap Leaching & Lime Addition

Stacked ore is irrigated with a barren cyanide-caustic solution fed from the ADR Plant through pipelines and drip emitters. The barren solution percolates through the ore, dissolves gold producing a gold-bearing “pregnant” solution, which is then captured and directed back to the ADR Plant carbon adsorption circuit. Prior to the leaching, hydrated lime is added to crushed ore prior to being placed on the heap leach pad. This is the primary mechanism to control the pH of the pregnant and barren solution in the ADR Plant.

Ore throughput is continuously monitored automatically via a weigh scale that reports to the control room. The target hydrated lime to ore ratio is reviewed daily by pH measurement. Hydrated lime is metered from a storage silo onto the ore conveyor, and mixed with crushed ore at the grasshopper transfer points prior to the ore being placed on the heap. The target hydrated lime to gold ore ratio is maintained by continuously measuring the amount of ore crushed and sent to the heap, and adjusting the lime addition via screw feeder. The lime addition screw feeder automatically doses lime onto the crushed ore conveyor. Through a series of grasshopper transfers and stacking, the lime and crushed ore is mixed. The lime level in the lime silo is also continuously monitored and reports to the control room. A properly maintained hydrated lime to gold ore ratio is key to maintaining pH above 10.5 both at the heap and throughout the entire ADR processing facility. The pH of the pregnant and barren solution is monitored continuously via electronic pH meters and confirmed daily by analysis of grab samples and daily composite samples. Based on the pH measurements of barren and pregnant solution, and their trends over time, the hydrated lime to ore ratio can be adjusted as required. Due to the mass of material at the heap, pH is expected to change slowly.

4.3 Carbon Adsorption & Barren Solution

Soluble gold cyanide species, chiefly $Au(CN)_2^-$ are adsorbed onto the activated carbon internal and external surfaces. Pregnant solution from the heap leach pad is continuously directed through beds of carbon in CIC trains in an up-flow manner through 5 stages of activated carbon (Figure 4.3-1). Fresh or regenerated carbon is introduced into the last tank in the series and is periodically moved (or *advanced*) upstream countercurrent to the flow of solution. The dissolved gold in solution adsorbs onto the activated carbon, removing it from the solution. The barren solution discharged from the final carbon column will be pumped to the Barren Solution Sump Tank. Once the carbon is adequately loaded with gold, it is transferred out of the CIC train for further processing and freshly regenerated carbon is transferred into the CIC train.

The Barren Solution Sump Tank receives barren solution from the carbon columns for reuse in leaching. Additionally, cyanide solution, liquid caustic and anti-scalant are added to the barren solution to maintain the required pH and cyanide concentrations for leaching (Figure 4.3-2).

The pH of the pregnant and barren solution is monitored continuously via electronic pH meters and confirmed daily by analysis of grab samples and daily composite samples. Electronic pH meters are accurate and reliable and include redundant pH meters reporting to the control room. Readings are then confirmed by manual routine sampling providing robust pH measurements.

Grab samples of both pregnant and barren solution are critical to monitoring the performance of the ADR Plant. Grab samples are taken every 2 hours for metallurgical purposes to confirm the gold leaching of the heap and the gold recovery of the ADR Plant and pH is measured as part of the metallurgical analysis. Wire samplers on the pregnant and Barren Solution Sump Tanks automatically collect daily composites which are sent for complete chemical analysis, including pH.

The pH of the pregnant and barren solution in the ADR plant is controlled, and changes very slowly, by the hydrated lime addition to the heap. If immediate changes to pH are required, additional pH adjustment can be performed inside the ADR Plant with the addition of caustic to the solution (as described below in Section 4.4).

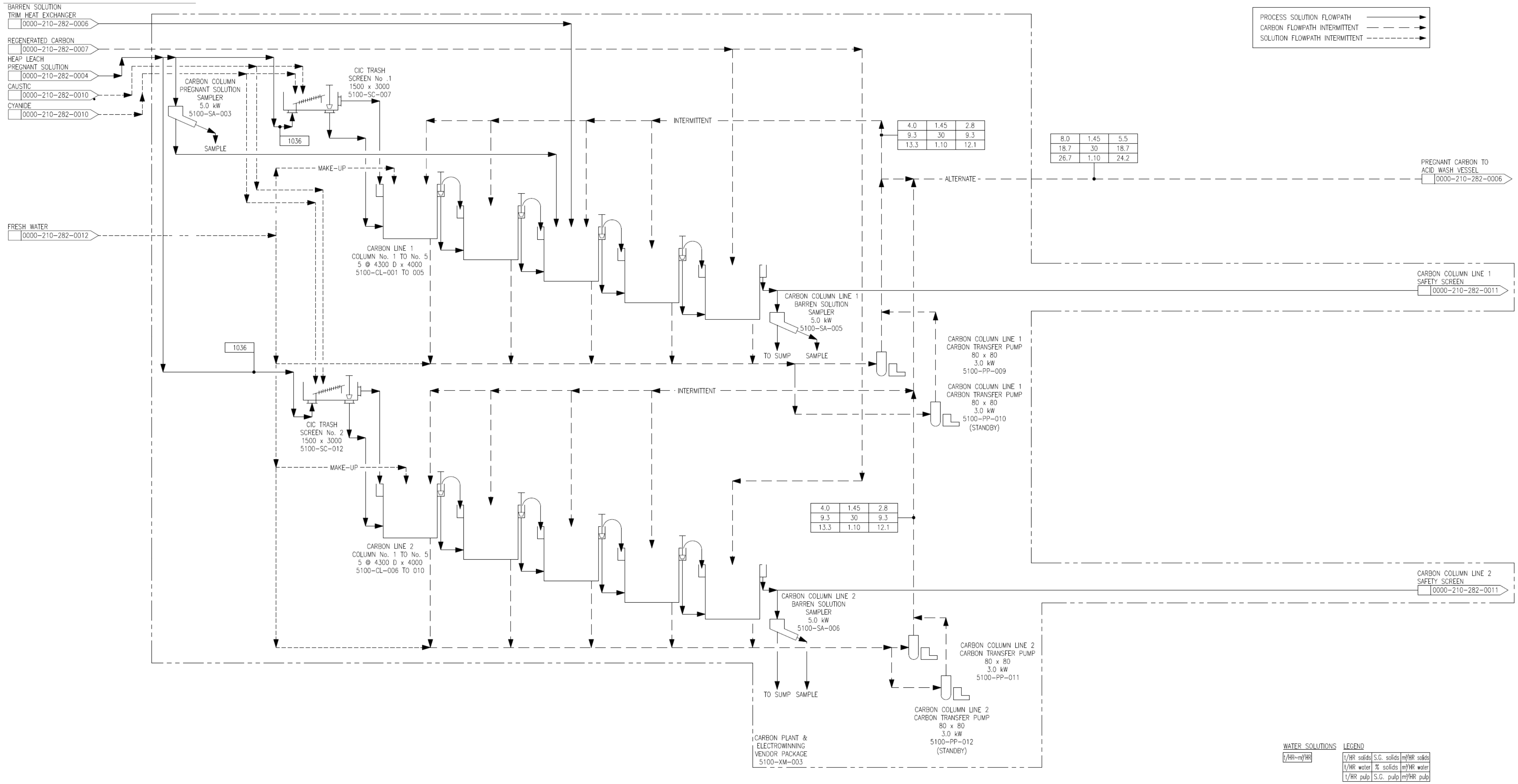

Figure 4.3-1: Carbon Adsorption Process Flowsheet

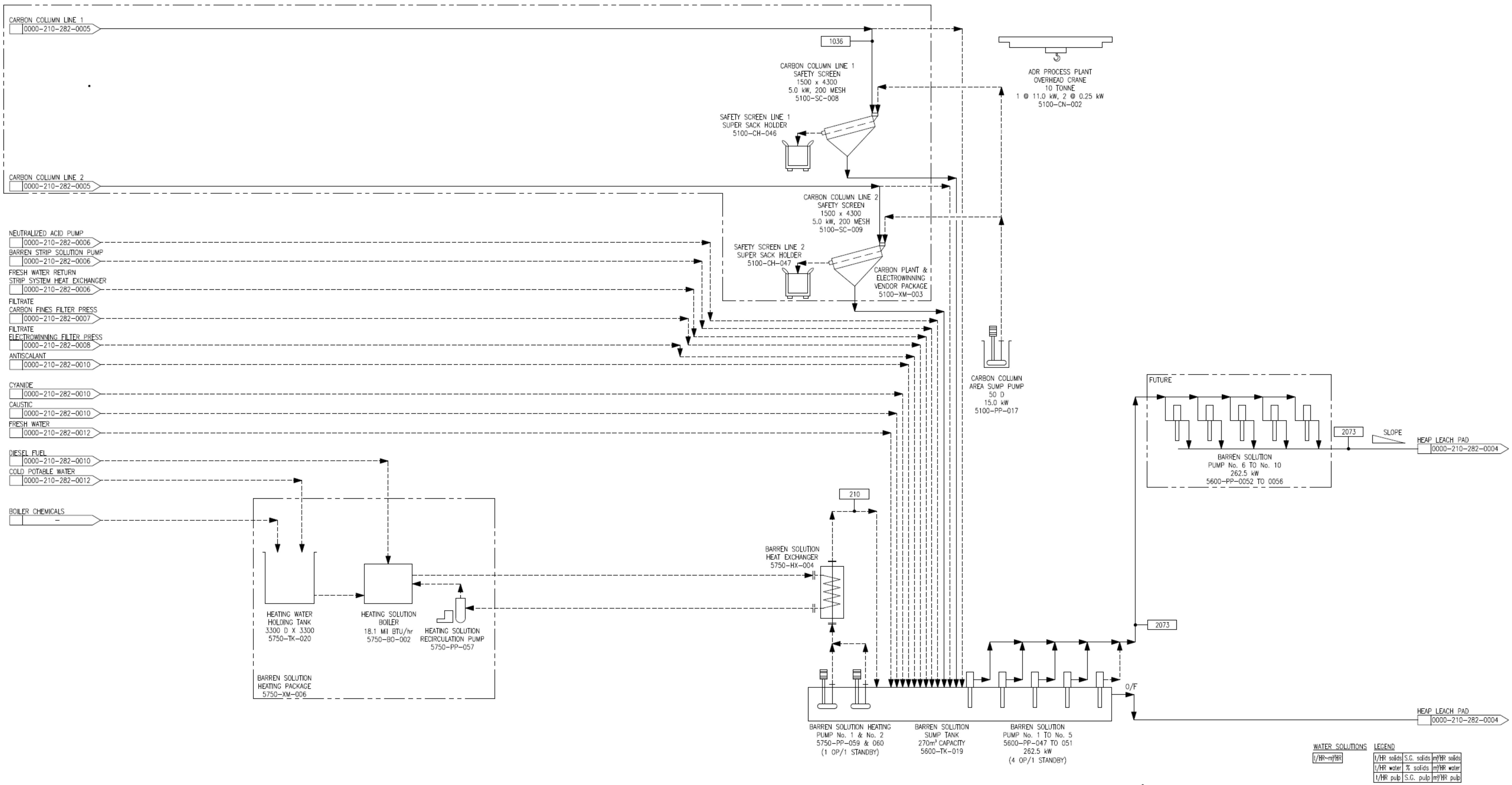

Figure 4.3-2: Barren Solution Process Flowsheet

4.4 Carbon Acid Wash & Neutralization

Carbonate scale, CO_3, builds up on the activated carbon during the adsorption process and interferes with the carbon's adsorption properties. The scale is dissolved using a dilute acid solution.

CAUTION

Certify that the dilute acid tank is mostly full of water before introducing the concentrated acid. Mixing water into acid can cause excessive heat generation.

WARNING

The operator must be well trained in safety and procedures when working with the caustic, sodium cyanide, acid reagents and solutions. Contact the site Safety Manager or your supervisor if you have any questions or concerns regarding the use of these chemicals. The operator must wear adequate personal protection equipment.

WARNING

The acid wash solution will have a pH value around 1 and deadly hydrogen cyanide gas will be produced if sodium cyanide is present in the entrained carbon transfer solution

DANGER

When transferring carbon into the Acid Wash Vessel, solution will flow into the acid area sump. Be sure that the sump is free of solution before and after carbon transfer. Do not transfer carbon into the Acid Wash Vessel if acid is present in the sump. Pump the sump clear of solution after carbon transfer. Mixing process solution with acid can result in the production of deadly hydrogen cyanide gas.

The carbon acid wash process (shown in Figure 4.4-1) involves the following steps:

1. Acid Wash Vessel Preparation
   - The acid wash exhaust fan should be running (this exhaust fan should always be running whenever acidic solutions may be present in any of the vessels).
   - Acid Wash Vessel is prepared with water, and gold laden carbon (referred to as loaded carbon) that is transferred into the Acid Wash Vessel.
   - The carbon transfer solution is allowed to drain from the Acid Wash Vessel.
2. Dilute Acid Preparation
   - A 3-5% dilute hydrochloric acid solution is mixed in the dilute acid tank (Figure 4.4-2). Dilute acid is prepared based on a known acid concentration determined using the operation acid titration procedure (rather than pH measurement).

3. Acid Wash and Recovery

   - The dilute hydrochloric acid solution is then circulated in an up-flow manner through the carbon bed in the Acid Wash Vessel for approximately 1-2 hours.
   - The acid solution contained in the Acid Wash Vessel is then recovered back to the Dilute Acid Tank prior to neutralization.

4. Neutralization

   - Any residual acid in the Acid Wash Vessel must be neutralized prior to removal of the solution and further treatment of the loaded carbon.
   - Neutralization is done by circulating caustic solution through the Acid Wash Vessel and Acid Neutralization Tank.
   - Caustic solution is prepared in the Caustic Mixing Tank and transferred to the Acid Neutralization Tank (Figure 4.4-3).

     NOTE: In addition to acid neutralization, the ADR Plant is built to allow for the addition of caustic solution to the cyanide system, the carbon columns and barren solution system, and the barren strip solution tank to allow operators to increase the pH of process solution throughout the system, if required.
   - Caustic solution is slowly added to the system until the installed pH probe reads above 10. Neutralized acid from the Acid Wash Vessel is then drained to the acid area sump.
   - Solution in the Acid Neutralization Tank is then recirculated using the Neutralized Acid Pump and pH is verified before it is discharged to the Barren Solution Sump Tank.
   - The pH probes are calibrated on a regular schedule in accordance with the probe manual.

5. Carbon Rinse

   - After neutralization, the loaded carbon in the Acid Wash Vessel is rinsed to remove any residual acid. The spray water valve is opened until the Acid Wash Vessel is filled to a level above the carbon bed, which is soaked for 10 minutes before allowing the solution to drain. Rinsing and draining of the tank is repeated, as needed, to ensure carbon is adequately rinsed.
   - Once the carbon has been rinsed, it is transferred to the Strip Vessel further processing.

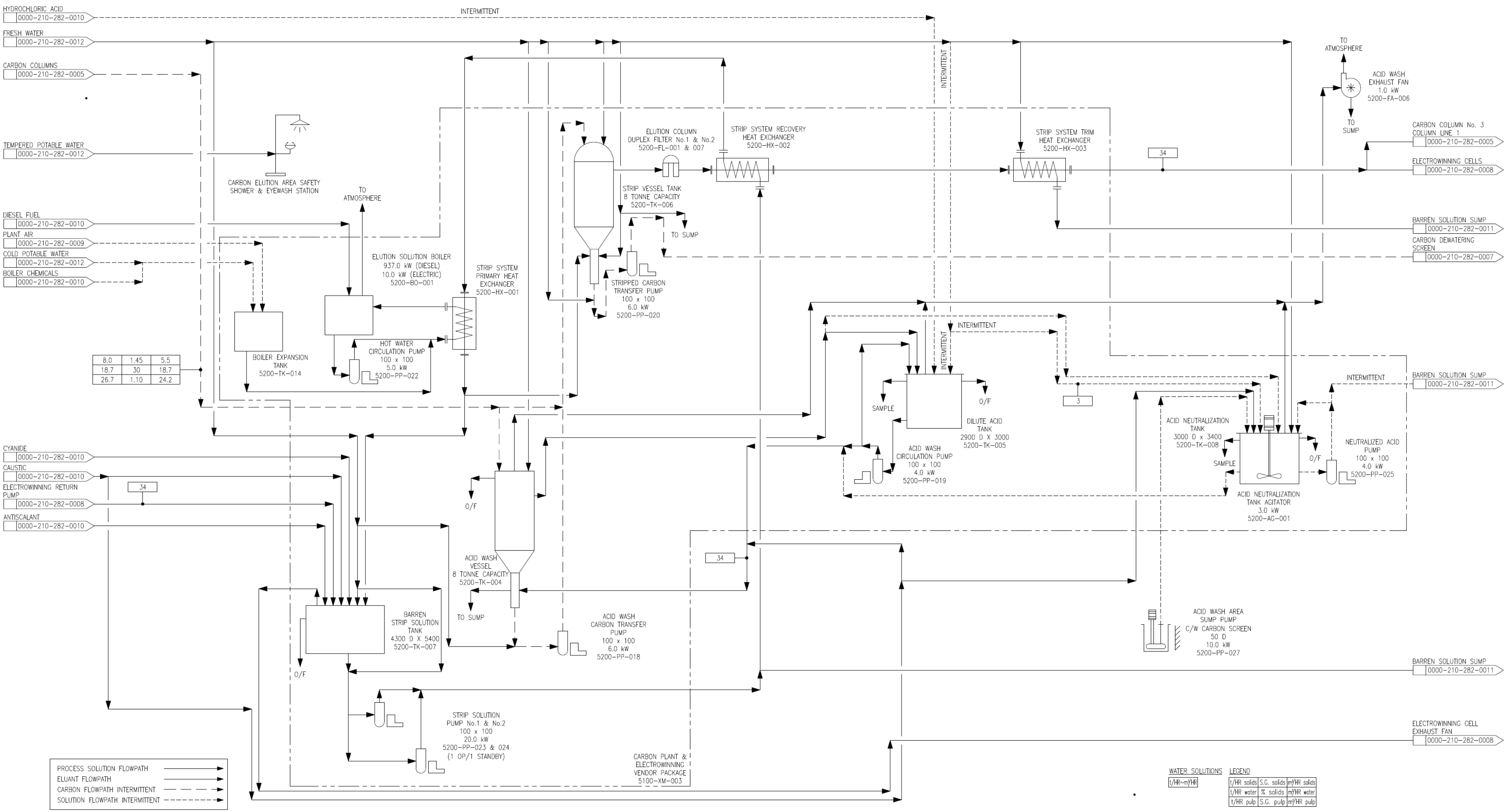

Figure 4.4-1: Acid Wash and Elution Process Flowsheet

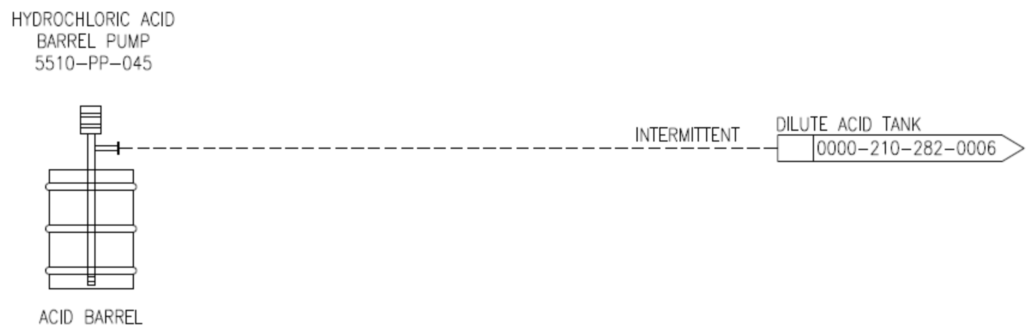

Figure 4.4-2: Acid System

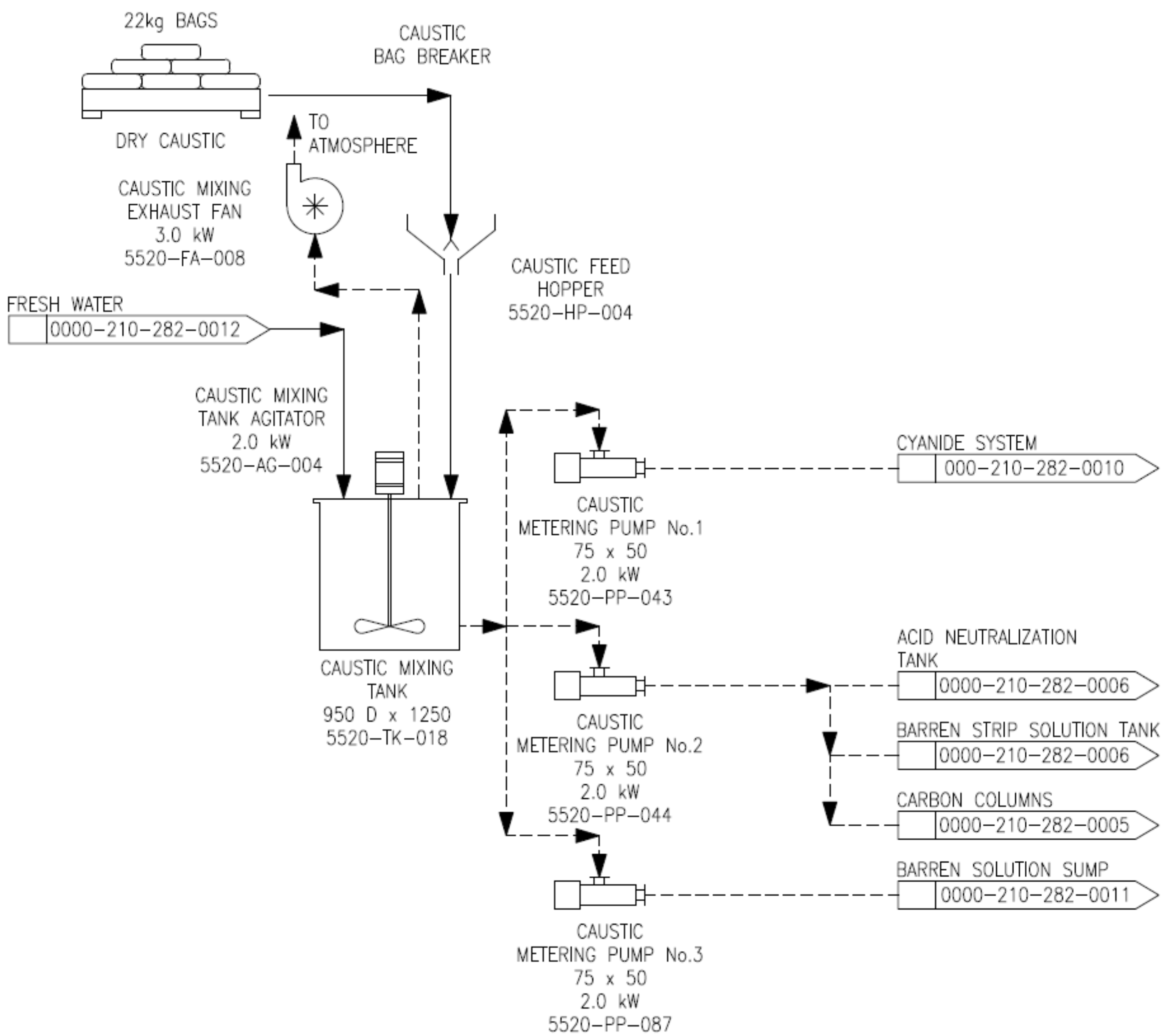

Figure 4.4-2: Caustic (NaOH) System

4.5 Carbon Stripping

After acid washing, the loaded carbon is stripped of the adsorbed metal species using a Pressurized ZADRA Strip scheme. The ZADRA strip process utilizes solution of a minimum 1.0% caustic (NaOH) and 0-0.1% sodium cyanide (NaCN) concentration, heated to 149°C (300°F) and circulated at a minimum pressure of 380kPa (55 psig) to strip the carbon. In this process, the strip solution is chemically prepared in the Barren Strip Solution Tank and heated.

Barren strip solution is pumped in an up-flow manner through the carbon bed in the Strip Vessel, where it strips the carbon of gold. The pregnant strip solution, exiting the top of the Strip Vessel, is routed to the Electrowinning Cells.

WARNING

The operator must be well trained in safety and procedures when working with the caustic and sodium cyanide reagents and solutions. Contact the site Safety Manager or your supervisor if you have any questions or concerns regarding the use of these chemicals. The operator must wear adequate personal protection equipment.

WARNING

The Strip Circuit operates at 414 kPa (60 psig) pressure and at temperatures nearing or above 300°F. If the system pressures are lost at temperatures above the boiling points of the solutions, then the solutions will immediately flash to steam—a serious potential to cause life limiting injury or death.

DANGER

DO NOT allow the pressure to drop below 380 kPa (55 psig) in the strip circuit. Do NOT open any pressure relieving valves or flanges when the system is under pressure or is at elevated temperature.

The carbon stripping process (Figure 4.4-1, above) involves the following steps:

1. Strip Solution Preparation and Preheat
   - Verify that the Electrowinning Cell Exhaust is on.
   - The amount of water and reagent added depends on the solution level and the current reagent concentration of the Barren Strip Solution Tank. The required reagent concentrations (NaOH and NaCN) are determined in advance, by titration.
   - Water is added to the Barren Strip Solution Tank until the level is approximately 50%.
   - Valves are opened to allow barren strip solution to circulate through the heating system and back to the Barren Strip Solution Tank.

- The required volumes, based on mass balance for dosing, of caustic and then cyanide, are slowly added to the solution. Caustic is added before dosing cyanide (NaCN) to ensure solution is at required pH. Additional water is added, if required.
- After dosing the reagent, the barren strip solution is preheated to a temperature of 60 °C (140 °F) by turning on the Elution Solution Boiler, and circulating barren strip solution through the heat exchangers and back to the Barren Strip Solution Tank.
- Barren strip solution during the preheat cycle should not be overheated - it is not under pressure and will flash to steam at a temperature of 100 °C.

2. Strip Circuit Preparation
   - The operator ensures that all carbon transfer solution has been drained from the Strip Vessel and that all inspection ports on the Strip Vessel are properly closed and sealed.
   - the Electrowinning Cell manual is reviewed and, and the operator ensures all electrowinning cell solution valves are configured in accordance with the operating procedures.
3. Carbon Stripping
   - Verify the Electrowinning Exhaust Fan is on.
   - The Strip Circuit works in a closed-loop with the Heater, Heat Exchangers, and the Electrowinning Circuit. The Carbon Strip Vessel and the electrowinning cells are filled with barren strip solution.
   - Barren strip solution discharged from the electrowinning cells then begins filling the Electrowinning Return Tank. Once the Electrowinning Return Tank level reaches 50% full, the Electrowinning Return Pump is turned on and returns barren strip solution to the Barren Strip Solution Tank.
   - The Electrowinning Cell Rectifiers are then turned on.
   - After 1 to 2 hours, the temperature of the pregnant strip solution exiting the Strip Vessel Column should be 132°C (270°F). This is considered the starting temperature of the strip.
   - The temperature of the pregnant strip solution exiting the heat exchanger skid should be close to 85°C (185°F). If the temperature goes above 90°C (194°F), cooling water to the trim heat exchanger will be turned on to lower the temperature to 85°C (185°F).
   - Strip solution is circulated for 5 to 6 hours or until the pregnant gold values in the strip solution are below 5 ppm.
4. Strip Circuit Cooldown
   - Once the carbon stripping has been completed, the strip circuit must be cooled and depressurized before the carbon may be transferred out of the Strip Vessel.
   - Water is pushed into the strip circuit until the temperature on the Heater Skid reads below 100°C (212°F).
   - Once the strip vessel pressure indicator reads below 70 kPa (10 psi), the strip vessel vent is opened to relieve the pressure in the Strip Vessel.

5. Strip Carbon Transfer
    - Once the carbon has been cooled, it is ready for further processing. Typically, the carbon is transferred to the Carbon Regeneration Kiln, but can be bypassed if needed.

The purpose of the stripping (or elution) circuit is to remove the gold from the loaded carbon. The solution derived from this process, called the pregnant solution, is pumped to electrowinning cells in the refinery where the gold is recovered from the solution. Gold is recovered as a soft sludge from the stainless-steel mesh cathodes. The sludge is washed from the cell and then dried to remove moisture. dried sludge is mixed with fluxes and recovered through smelting in the Melt Furnace.

4.6 Carbon Regeneration

As carbon is utilized in the adsorption and recovery circuits, the surface and internal pore structure is contaminated with organic species. The organics interfere with the carbon's gold adsorption rate, and decrease the metal loading capacity of the carbon. In order to maintain an adequate activity, the carbon must be reactivated prior to its reintroduction into the plant. This is done in a horizontal rotary kiln, the Carbon Regeneration Kiln, specifically designed for this purpose. The organics are removed by heating the carbon to 650 to 750 °C in a slightly oxidizing atmosphere and burning them from the carbon. The carbon is regenerated in a steam environment, which aids the regeneration process and decreases the temperature requirement for regeneration.

4.7 Responding to Process Upsets

4.7.1 Alarm Response

Alarm response limits have been programmed for various process parameters. These alarms are intended to alert the operator if established limits are exceeded.

Once an operator has been alerted to an alarm condition, it is the operator's responsibility to:

- Acknowledge the alarm;
- Determine what has caused the alarm;
- Determine the best action to take to eliminate the cause, thereby removing the alarm condition; and
- Execute the action decided upon.

In some cases, it is necessary to obtain assistance and advice from the shift supervisor, maintenance personnel, or both.

Alarms may be caused by one of the following:

- Process upset condition.
- Electrical or mechanical malfunction.
- Personal safety situation.

The operator must be aware that any alarm may be caused by a faulty instrument. If the operator is unable to remedy the alarm condition, the shift supervisor is notified and the instrument is checked for proper operation.

4.7.2 HCN Gas Alarm Response

Under normal operating conditions, the ADR Plant and associated processes are designed and operated such that HCN gas is not produced. The pH throughout the process is monitored closely and frequently, and the capability to make both slow and immediate adjustments to pH are through the addition of hydrated lime or caustic are built into the system.

Should HCN gas be detected by fixed or portable HCN monitors, the emergency response plan will be implemented and the steps in Table 4.7-1 will be taken.

In the case of an ambient monitor, a siren and flashing lights will be activated and HCN levels will be displayed in the process control room. In the case of a personal monitor, the monitor will vibrate and emit a high-pitched alarm.

Most circumstances are likely to require only temporary evacuation from an affected work area. The HCN gas release area and a downwind isolation zone must be established immediately.

Personnel will not be permitted to enter the area in question without the correct personal protective equipment. Investigation and remediation of the HCN gas release within the affected area should only be undertaken by Personnel who are properly trained and equipped with the appropriate PPE including self contained breathing apparatus.

Measures implemented to reduce HCN levels in the ADR Plant will vary depending on the circumstances (e.g. the particular HCN levels, the cause of the increased levels and the plant location), and may include:

- Spill response and remediation (if cause by a reactive spill);
- Reducing or stopping cyanide addition upstream of incident;
- Increasing the pH of process solution upstream of incident through the addition of caustic;
- Shutting down the ADR Plant for further investigation and maintenance (if required); and/or
- Activating the cyanide destruction circuit.

Each of the above measures will take some time to reduce the level of HCN gas. Employees will not be permitted to access the area in question without the correct personal protective equipment or until safe HCN levels are achieved.

Table 4.7-1: Emergency Response in the Event of HCN Gas Detection within the ADR Plant

Incident	Release of HCN Gas within the ADR Plant
Potential Causes	• Accidental release of dry sodium cyanide which is then exposed to acids, acid salts, water, moisture or carbon dioxide • Rupture or failure of tanks, pipelines, fittings or valves containing sodium cyanide solution • Temporary loss of process pH control systems
Preventative Measures	• Preventative maintenance • Event driven maintenance • Hazard identification and response training for relevant ADR Plant Personnel • Installation and regular testing of fixed HCN detectors and portable HCN monitors • High level of construction quality assurance

Incident	**Release of HCN Gas within the ADR Plant**
Detection Method	• Routine facility inspection • Event driven inspection • Activation of fixed HCN detectors or portable HCN monitors

Site Response	• Initiate "Code 1" as per "Initial Response - Code 1 Procedure"
	• Evacuate area
	  • Small spills in reactive conditions - 60 m in all directions, 200 m downwind
	  • Large spills in reactive conditions - 390 m in all directions, 1.3 km downwind
	• Administer first aid as required
	• ERT or other trained and equipped personnel stop release, contain spill, and neutralize if possible
	• Immediate notification of SGC Senior Management so communication protocol can be enacted
	• Construct emergency catchment areas if secondary containment breached

Emergency Level	Tier 1 - 3
Potential Effects	• Fatality
Follow Up	• Incident/accident investigation • Pump spilled solutions back in the cyanidation process • Environmental remediation if PLS is released

4.7.3 Shutdowns

Shutdowns should proceed in a manner that ensures equipment is secure so damage is prevented, and such that start-up can be efficient and timely. Under controlled shutdown conditions, equipment is thoroughly inspected and a list of maintenance and repair items should be prepared. In an emergency shutdown, equipment must be inspected immediately following shutdown to determine the cause of the shutdown and initiate actions to corrected the condition as soon as possible.

4.7.3.1 Controlled Shutdown

Controlled shutdowns are primarily for maintenance and may be a standby shutdown or a complete planned stoppage of operations for an extended period of more than 24 hours. The shutdowns are coordinated among all the operators and maintaining communications with every one involved. The order of individual process or equipment shutdown is in accordance with the associated equipment manuals.

After a controlled shut down, start-up procedures for each circuit are followed. Implementation of preoperational inspections will depend on whether the controlled shutdown was a standby shutdown of a complete planned stoppage for an extended period of time.

4.7.3.2 Emergency Shutdown

An emergency situation can be caused or initiated by a major equipment malfunction, by a personnel safety situation, or by certain interlock conditions designed to prevent equipment damage. All plant personnel can initiate an emergency shutdown if they see or suspect a safety hazard or life-threatening situation.

The following steps are taken in the event of an emergency shutdown.

1. Determine whether any personnel have been injured as a result of the emergency. If actual personal injury is the cause of the shutdown, report the incident using the proper procedure.
2. Shut down equipment as required to isolate the emergency situation.
3. If the shutdown was caused by an equipment fault, visually inspect the equipment that caused the shutdown and ensure that the cause of the emergency has been cleared.
4. If the shutdown was caused by a process upset condition, proceed with tart-up when the upset condition is corrected and authorization is received from supervision.
5. If necessary, completely shut down the remaining equipment.

After the cause of the emergency shutdown has been determined and the condition corrected, the start-up procedures including preoperational inspections should be followed.

WARNING

Ensure that all personnel are accounted for before restarting any equipment.

4.7.3.3 Power Failure

In the event of a power failure, electrically driven process equipment is shut down. Power failures may be short in duration. In many cases, the areas can be started up without delay.

The following steps are taken in the event of a power failure:

1. Ensure that any circuit breakers that may have tripped during the power outage have been reset.
2. Unless the power is immediately restored (i.e., via backup generators or grid restoration), shut off all water and reagent flows. This involves closing isolation valves at their point of use.
3. Attend to any water leaks.
4. Inspect areas and make sure there are no unsafe conditions that have to be addressed before start-up.
5. Prepare a damage report indicating what repairs are required before a start-up can be initiated.

WARNING

Ensure that all personnel are accounted for before restarting any equipment.

After the cause of the power failure has been determined and the condition corrected, the start-up procedures should be followed. Implementation of preoperational inspections will depend on the length of time that the power was not available.

4.8 Documentation & Reporting

Documentation of surveillance and inspection activities, responses to process upsets, and incidences or shutdowns will be completed by the responsible person (inspector) and then provided to the Process Manager and Health and Safety Manager for record keeping, and will include recording of:

- routine visual observations (departures from normal conditions);
- instrumentation monitoring and testing (e.g., the results of pH analysis are entered onto daily operation logs as shown in Appendix A);
- analyses and evaluations; and
- recommendation (required action noting importance and/or urgency).

Documentation will include inspection reports and incident reports which will incorporate inspection logs, photographic and video records, instrumentation readings, instrumentation plots. Additionally, annual inspections and third-party reviews will also be conducted and follow the same protocols for documentation.

Records from all ADR Plant inspections conducted by Process, Health and Safety and Environmental personnel will identify the inspector, indicate the date of inspection, describe any observed deficiencies and the nature of corrective actions, will note the work order number(s) and dates associated with any required corrective or preventive action. All inspection records will be retained for at least 4 years, as required by SGC-CMP-SOP-003 “Records Management.”

5 CYANIDE DESTRUCTION

Under normal operating conditions, the Project has a negative water balance, meaning that water needs to be added to the system in order to for the HLF and ADR Plant to operate. Once leaching begins, water is recycled through the system such that no water is discharged until mine closure. Nonetheless, cyanide destruction capabilities are built into the ADR Plant, as required the water use licence, and available to treat excess cyanide in the very highly unlikely event this need should arise.

During operations, the water balance is actively managed to maximize gold recovery and protect the health and safety of personnel and the environment. Operators are guided by appropriate equipment manuals, as well as the Heap Leach Facility Contingency Water Management Plan (HCWMP) which describes the management and storage of leach solution, both pregnant and barren, and precipitation within the HLF. The HCWMP is intended to inform relevant site personnel of the mitigation measures available to manage the solution inventory within the HLF to minimize the risk of an unplanned release of solution to the environment. Cyanide destruction capabilities should only be used as a very last resort, once all other HLF contingency measures have been exhausted.

The cyanide destruction process for the Project uses hydrogen peroxide. The process has proven to be robust, and is used at mine sites worldwide, including the Brewery Creek Mine in the Yukon which operated from 1997 to 2001. The process is appropriate for remote project locations, and enables a quick start-up for emergency use.

5.1 Cyanide Destruction Chemistry

Hydrogen peroxide (H_2O_2) has a well-established reputation as the process of choice for treating cyanide solutions. The primary benefit of hydrogen peroxide is that it is a "clean" chemical in the sense that the reaction product of the H_2O_2 itself is simply water. In a peroxide treatment system there will be no appreciable increase in the dissolved solids concentration; scaling and undesirable salting conditions are avoided.

The oxidation of cyanide with peroxide produces cyanate and water as shown in the following equation:

$$CN^- + H_2O_2 \rightarrow OCN^- + H_2O$$

The cyanate subsequently hydrolyses slowly to produce ammonium and carbonate ions, depending on the pH:

$$OCN^- + 2H+ + H_2O \rightarrow CO_2 + NH_4^+$$

or:

$$OCN^- + OH^- + H_2O \rightarrow CO_3^{2-} + NH_3$$

Although ammonia (NH_3) is toxic to fish at low levels, it is almost entirely available in the far less toxic cationic form ($NH4^+$) at the natural pH of open waterways.

If excess hydrogen peroxide is present in the treated water, it rapidly decomposes to water and oxygen, presenting no environmental threat:

$$2H_2O_2 \rightarrow 2H_2O + O_2$$

Hydrogen peroxide is capable of oxidizing both "free" cyanide (CN_f) and complexes (titratable cyanide):

$$CN^-, HCN, NaCN, KCN, Ca(CN)_2, Cd(CN)_4^{2-}, Zn(CN)_4^{2-}$$

and "weak acid dissociable" cyanide (CN_{WAD}) complexes, which include the above-mentioned titratable cyanide species as well as the following metal cyanide species:

$$Cu(CN)_2^-, Cu(CN)_3^{2-}, Cu(CN)_4^{3-}, Ag(CN)_2^-, Ni(CN)_4^{2-}$$

In contrast, the following metal cyanide complexes cannot be oxidized by hydrogen peroxide. These compounds, along with CN_{WAD} complexes, are measured as “total” cyanide (CN_{TOT}):

$$Au(CN)_2^-, Fe(CN)_6^{3-}, Fe(CN)_6^{4-}, Co(CN)_6^{4-}$$

However, it is still possible to achieve limits by precipitating the $Fe(CN)_6^{4-}$ with, for example, copper ions:

$$Fe(CN)_6^{4-} - + 2Cu_2^+ \rightarrow Cu_2Fe(CN)_6 \text{ (solid)}$$

This can normally be accomplished by lowering the pH to 8 to 9 in the presence of copper hydroxide. Occasionally, more copper must be added in the form of copper sulfate to achieve the desired CN_{TOT} level.

The cyanide destruction reaction using peroxide is relatively fast. The presence of transition metals, especially copper, helps to accelerate the reaction. However, effluents that contain little or no metals may require a catalyst in order to accommodate a treatment circuit with limited effluent retention capabilities. Copper sulfate pentahydrate additions are ideal for this purpose.

Low effluent temperatures will significantly slow down the reaction time. Therefore, cyanide destruction circuits must be designed with sufficient retention time to allow the reaction to go to completion at the lowest possible effluent temperature experienced at a particular site. If shorter retention times are desired, more copper catalyst can be added to reduce the cyanide destruction reaction time.

Hydrogen peroxide can be shipped safely at high concentrations (up to 70% by weight H_2O_2) and stored for long periods of time without appreciable loss of activity, which makes H_2O_2 an ideal choice for remote locations. H_2O_2 has proven invaluable for emergency cyanide effluent treatment programs, where quick start-up is essential.

5.2 Cyanide Destruction Design Criteria

The concentration of CN_{WAD} in the pregnant solution will fluctuate during operations, as it is dependent on the NaCN dosage rate to the barren solution. Dosage rates are a trade-off between excess NaCN consumption and leach effectiveness, up to a maximum concentration, at which point increases in cyanide concentration can start to inhibit the dissolution rate. For cyanide destruction design purposes, a value of 60 ppm is typically used. The design criteria for the cyanide destruction circuit is presented in Table 5.2-1.

Table 5.2-1: Cyanide Destruction Design Criteria

Description	Unit	Value (Min)	Value (Max)
Leach Solution Flow Rate	m^3/h	660.00	1,036.00
Leach solution retention time	min	14.47	9.22
Leach solution cyanide concentration			
CN_{WAD}	ppm	60.00	60.00
	g/hr	39,600.00	62,160.00
CN_{TOT}	ppm	70.00	70.00
	g/hr	46,200.00	72,520.00
Hydrogen Peroxide consumption rate	g / g WAD CN	3.50	3.50

	kg/h	138.60	217.56
Copper Sulphate consumption rate	g / g WAD CN	0.22	0.22
	kg/h	8.71	13.68
Lime consumption rate	g / g WAD CN	2	2
	kg/h	79.20	124.32
Final effluent solution cyanide concentration			
CN_{WAD}	ppm	0.2	
CN_{TOT}	ppm	2.2	
Final effluent pH	pH	9.6	

5.3 Cyanide Destruction Circuit

The cyanide destruction circuit uses the CIC columns as shown in Figure 5.3-1, if/when required. Cyanide destruction process flowsheets are shown in Figures 5.3-2 and 5.3-3. The process utilizes existing equipment with the addition of the required reagents and agitation maintained on site in the cyanide destruction kit.

The following steps are taken to activate the cyanide destruction circuit:

1. Pregnant solution and barren solution pumps are shutoff.
2. One (1) train of five (5) carbon columns are emptied to the other train of five (5) carbon columns by sequentially pumping solution (including carbon) to its adjacent column. Effectively, this causes each tank in the train to cascade solution to the downstream tank and ultimately to the barren sump. The carbon screen in each tank will keeps carbon in the tank.
3. The Barren Solution Sump Tank is emptied using one barren solution pump
4. Five (5) pressurized air hose agitators will be connected to the bottom to each of the five (5) carbon columns within the chosen train.
5. Pregnant solution and barren solution pumps are turned on at half throughput
6. Each of the five (5) CIC columns is dosed with hydrogen peroxide.
7. Copper sulphate tote is moved up to the CIC platform, and the system is dosed with copper sulphate.
8. Cyanide destroyed pregnant solution is then managed based on the scenario that required the activation of the CN destruction circuit either by pumping to the heap leach facility, the events pond, an emergency downgradient storage pond or released to the environment.

The cyanide destruction circuit has redundancy in the event of a failure of one or more component of the circuit. The cyanide destruction circuit uses existing pregnant solution pump and pipelines to be functional. However, if the barren solution pumps are inoperable, the cyanide destruction circuit can be operated by recirculating treated barren solution to the heap via lined ADR overflow trench (see Figure 2.2-2, above). Additionally, manual agitation and reagent dosing can be used to operate the destruction circuit.

An ADR bypass line has been included in the design of the HLF, which can also enable a reduction flow rates to the cyanide destruction circuit, if needed (e.g., to allow for the arrival of additional cyanide destruction reagents to arrive on site in the event of an extended cyanide destruction period).

Double containment of the berms and the lined ADR Facility, as described above in Section 2.2 would also prevent cyanide from entering the environment in the unlikely event of an extended cyanide destruction period.

5.4 Cyanide Destruction Kit

A neutralization and cyanide destruction kit with the capacity to run the cyanide destruction circuit in the ADR Plant will be stored on site. The cyanide destruction kit components include:

- hydrogen peroxide stored in heated area;
- copper sulphate stored in 1 t Pallets;
- lime from existing lime silo; and
- five pressurized air hose agitators stored in CIC area.

The reagent volumes to be stored on site will be estimated based on the design criteria CN_{WAD} concertation and the maximum water stored within the HLF and ADR Plant system and will be sufficient to treat HLF draindown and allow time for additional reagent delivery if necessary. Required cyanide destruction reagent volumes will continue to increase as operations ramp up, more ore is placed on the heap leach pad, and additional solution is held in the system.

All components, chemical and mechanical, of the cyanide destruction circuit with be regularly maintained and inspected.

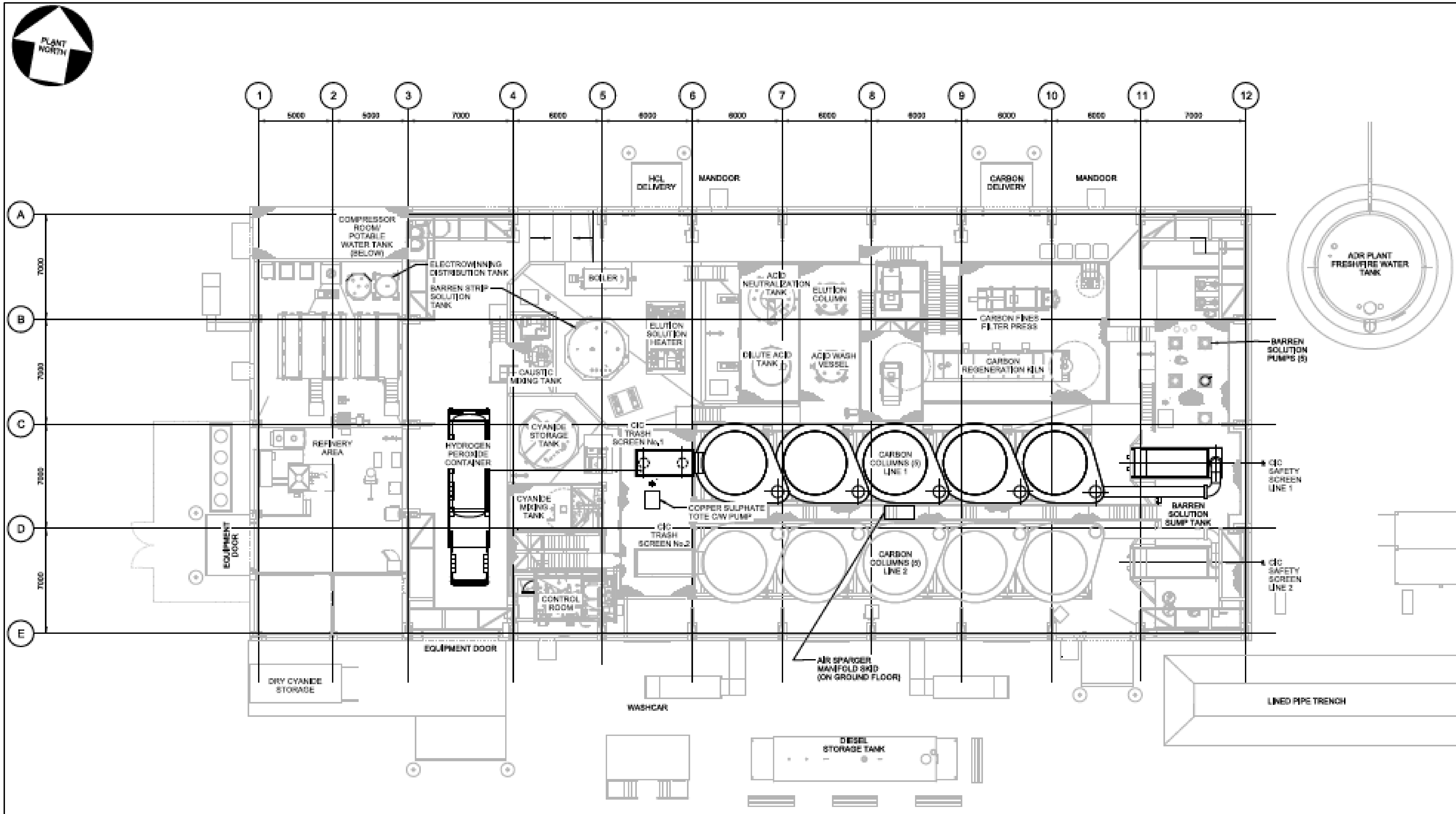

Figure 5.3-1: Cyanide Destruction Circuit – General Arrangement

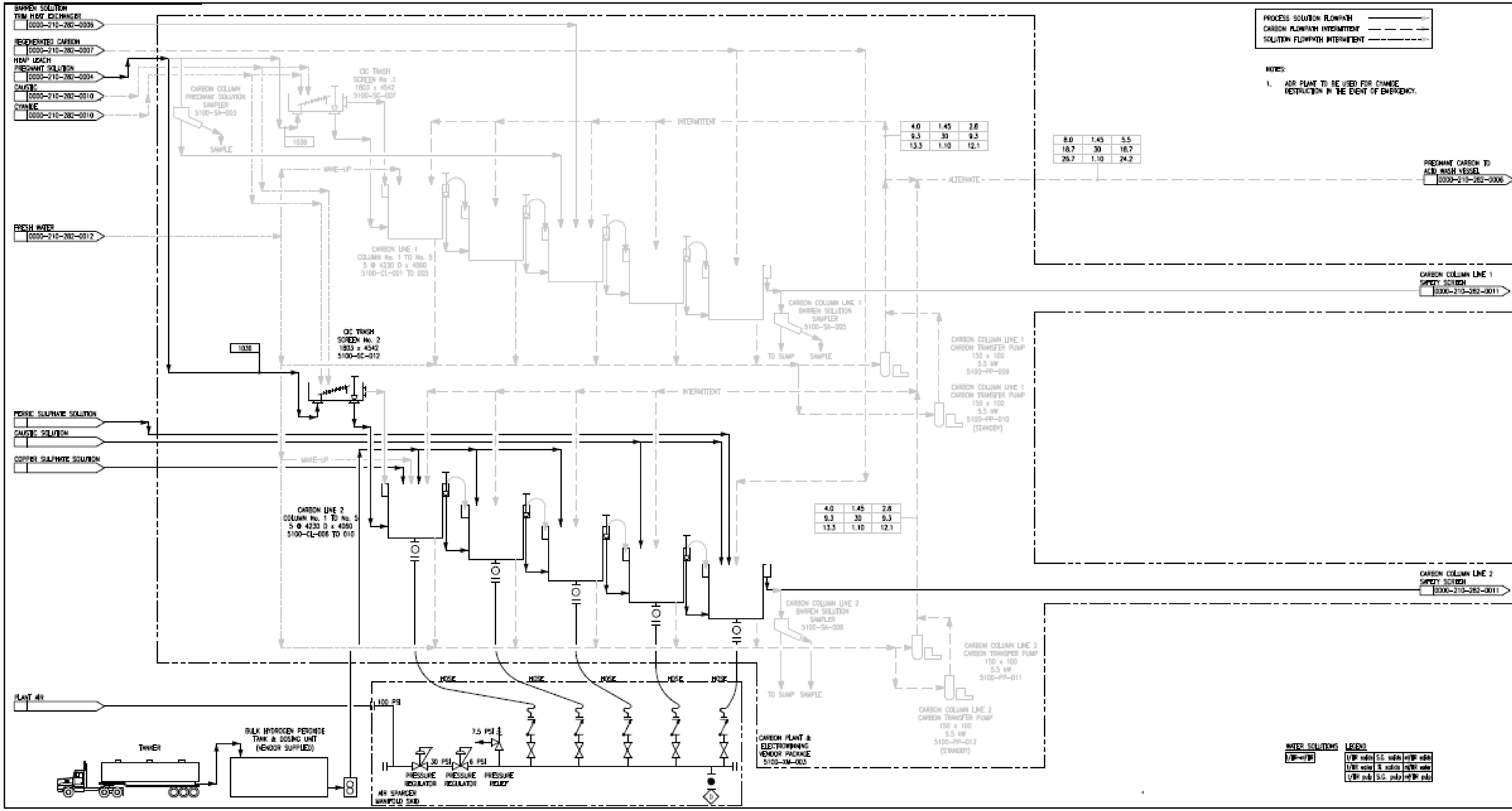

Figure 5.3-2: Cyanide Destruction Process Flowsheet 1 of 2

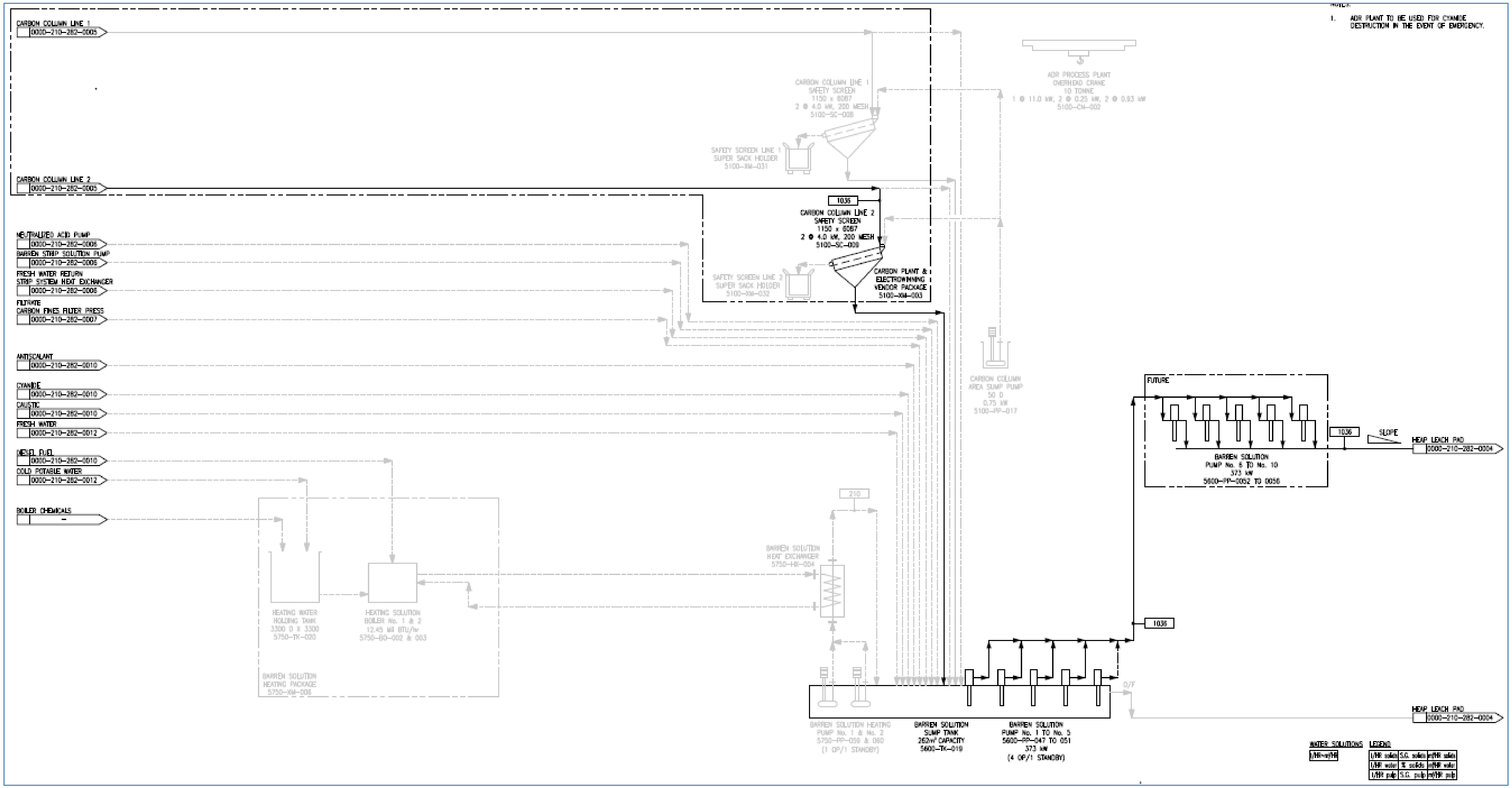

Figure 5.3-3: Cyanide Destruction Process Flowsheet 2 of 2

APPENDIX A

Daily ADR Plant Operation Log

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StrataGold Corporation

DAILY ADR PLANT OPERATIONS LOG

ADR Plant - Cyanide Mixing Area

Date	Time	Operator Initials	Sample Description/Location	pH	Temperature	Action Required	Responsible Person	Due Date

ADR Plant - Carbon in Column Area

Date	Time	Operator Initials	Sample Description/Location	pH	Temperature	Action Required	Responsible Person	Due Date

ADR Plant - Carbon Regeneration Area

Date	Time	Operator Initials	Sample Description/Location	pH	Temperature	Action Required	Responsible Person	Due Date

ADR Plant - Acid Wash Area

Date	Time	Operator Initials	Sample Description/Location	pH	Temperature	Action Required	Responsible Person	Due Date

APPENDIX C

ADR Plant Preventative Maintenance Plan

EAGLE GOLD PROJECT

ADR PLANT MAINTENANCE PLAN

Version 2019-01

FEBRUARY 2019

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1 INTRODUCTION

This Adsorption, Desorption and Recovery (ADR) Plant Maintenance Plan (Plan) for the Eagle Gold Project (the Project) was prepared by StrataGold Corporation (SGC) to provide a framework for scheduled and non-scheduled maintenance actions to ensure the safe operation of the ADR Plant. This Plan considers the following key areas:

- routine and event-driven maintenance;
- documentation and reporting; and,
- roles and responsibilities of personnel.

The Plan presents maintenance tasks that will be implemented by appropriate mine personnel to ensure continued operations and proper functioning of the ADR Plant. The Plan outlines routine inspections, surveillance, and maintenance of equipment that make various ADR Plant facilities or systems and describes how the maintenance team will:

- ensure that equipment functions as necessary for safe operations;
- identify routine maintenance surveillance and inspections that would trigger routine, preventative or corrective maintenance actions;
- generate work orders for all required actions; and
- track work order completion.

The Plan is designed to be compliant with the International Cyanide Management Code, and to ensure that cyanide facility-related actions receive the highest priority. This Plan will be periodically updated to account for any facility design or operational change that may occur during the life of mine (LOM).

2 ROLES AND RESPONSIBILITIES

2.1 ASSIGNMENT OF RESPONSIBILITIES

The Maintenance Manager is responsible for all maintenance activities in the ADR Plant and is accountable to the Mine General Manager, and responsible for informing, as appropriate, the Process Manager, Health and Safety Manager and the Environmental Manager of ADR Plant maintenance activities. Personnel responsibilities as they relate to the ADR Plant are shown in Table 2.1-1, and the overall Maintenance Organization Chart is shown in Figure 2-1.

Table 2.1-1: Personnel and Responsibilities

Description of Tasks	Position				
	Mine General Manager	Maintenance Manager	Process Manager	Health & Safety Manager	Environmental Manager
Operations	A	I	R	I	I
Maintenance	A	R	I	I	I
Surveillance	A	I	R	I	I
Emergency Preparedness	A	I	I	R	I
Training	A	R	R	R	I
Change Management	A	R	R	R	I

NOTE: R= Responsible (performing); A = Accountable (managing); I = Inform

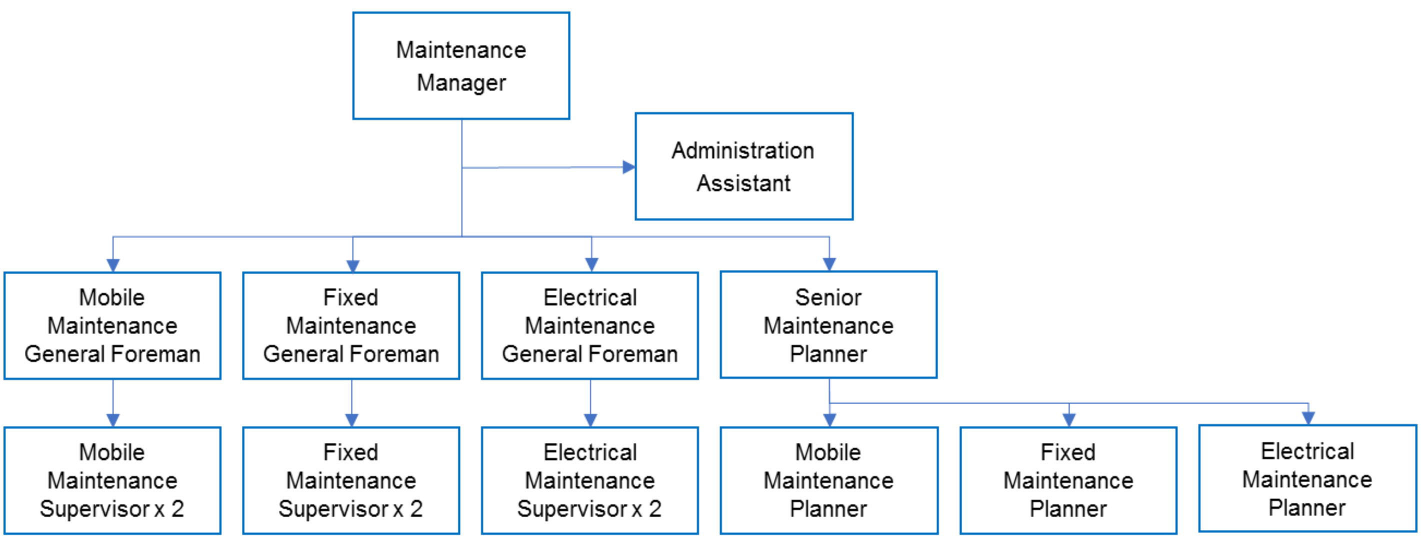


Figure 2-1: Maintenance Organizational Chart

2.2 TRAINING

Training programs will be implemented to ensure maintenance personnel are able to conduct their jobs effectively, comply with regulatory requirements, remain safe, and are prepared to act effectively in the event of an emergency. Mandatory training for all maintenance personnel includes:

- Company Core Values
- Human Resources Policies
- Project Site Orientation
- Health & Safety Policies, PPE Requirements and Safety Absolutes
- Incident Reporting
- WHMIS (Workplace Hazardous Materials Information System)
- Occupational Safety and Health Awareness Training
- *Occupational Health and Safety Act* and *Regulations*
- Emergency Response Plan and Procedures
- Spill Response
- Environmental Policies and Procedures
- Cyanide Hazard Awareness Training
- Area Specific Training
- Lock Out – Tag Out
- Equipment Pre-start checks
- Working at Heights
- Confined Space

SGC has selected Pronto as its Enterprise Resource Planning (ERP) software for the management of maintenance work orders and work flows, planning, scheduling through completion, close-out and record keeping. All maintenance personnel will have basic Pronto training. Trades and supervisory personnel will have intermediate level Pronto training, including entering notifications, parts reservations, entering information and closing notifications. Maintenance planners, will have high-level, fully operational Pronto training on work management process.

In addition to mandatory training, Table 2.2-1 shows the Maintenance Department's required role-specific training.

Table 2.2-1: Maintenance Department Role-Specific Training Requirements

Role	Training Requirement					
	Rigging	High Voltage	Site Drivers Licence	Forklift Training	Manlift / Scissor Lift Training	Bench Grinders
Fixed Maintenance (Foreman and Supervisors)	X		X			
Maintenance Planners (Senior, Mobile, Fixed and Electrical)			X			
Heavy Duty Mechanic	X				X	X
Electrical Maintenance (Foreman and Supervisors)	X	X	X	X	X	X

Role	Training Requirement					
	Rigging	High Voltage	Site Drivers Licence	Forklift Training	Manlift / Scissor Lift Training	Bench Grinders
Heavy Duty Apprentice	X		X	X	X	X
Fuel/Lube Technician	X		X	X	X	X

NOTE: X= Training required

Up-to-date training records for all personnel will be kept on site, and periodic refresher training will be required depending on the type of training. For example, all maintenance personnel who are working in the ADR Plant will be required to refresh their Cyanide Hazard Awareness training annually.

3 MANAGEMENT OF CHANGE

Proposed changes or modifications to any aspect of cyanide management facilities or processes will be reviewed for their potential impact on the environment, occupational or public health and safety considerations in accordance with SGC-CMP-SOP-012 “Cyanide Facility Change Management Process”. Identified impacts will be mitigated by making appropriate modifications, additions, or improvements to the changes proposed. Figure 3-1 illustrates the basic, systematic, change management process to be followed by the maintenance team, as further detailed in the above-mentioned SOP.

Figure 3-1: Basic Change Management Process

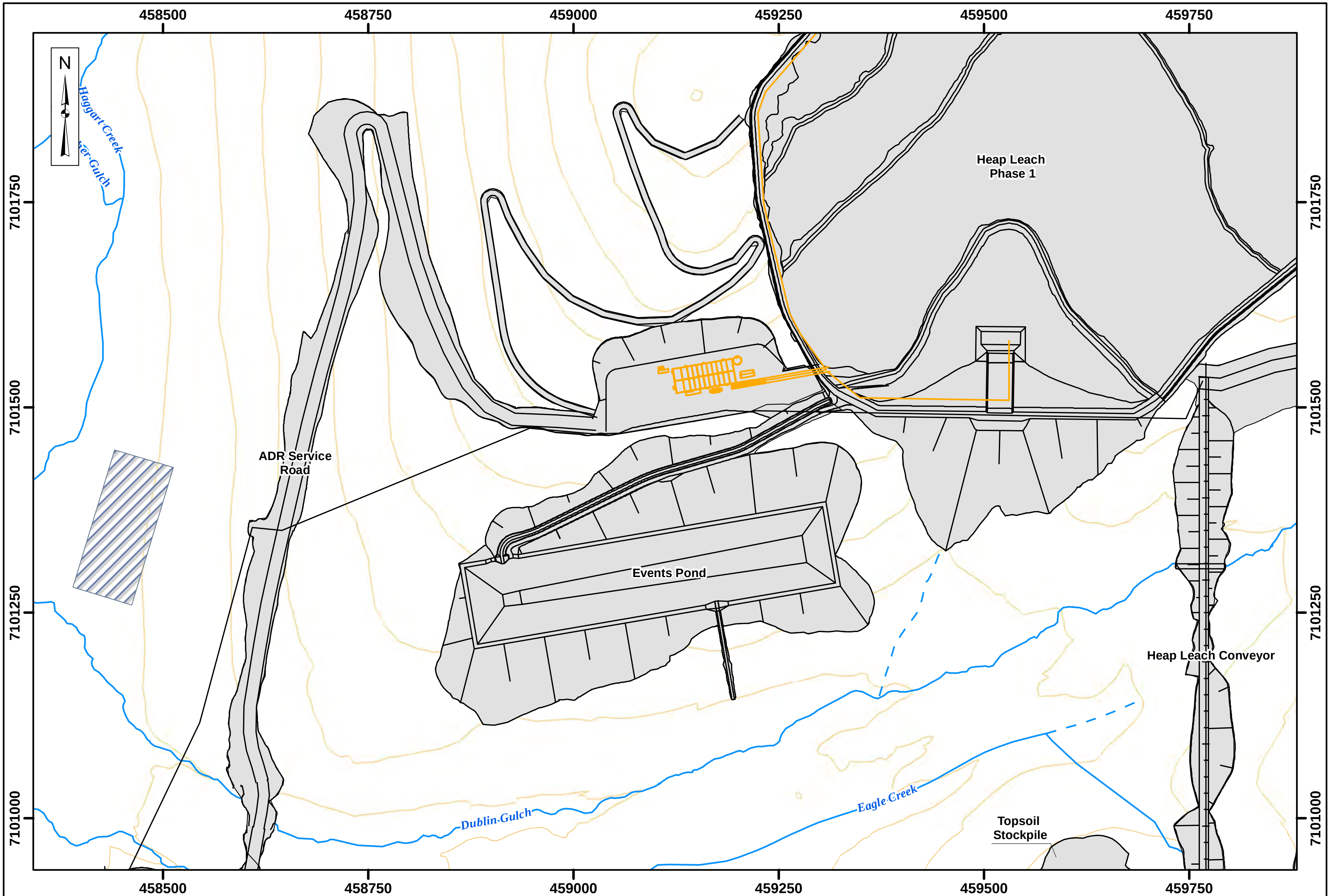
4 ADR PLANT DESIGN LAYOUT

The ADR Plant is located west of the Heap Leach Facility (Figure 4-1), and is connected to the HLF through the process pumping system which includes pumps, pipelines, valves, and associated controls to move barren and pregnant leach solution between the ADR plant and the HLF. The ADR Plant metal recovery processing steps include carbon adsorption, carbon acid wash, gold elution (desorption, carbon stripping, heat exchanging), electrowinning, refining, carbon regeneration and carbon handling.

The ADR Plant facilities and systems, shown in Figures 4-2, 4-3, and 4.4 include:

- two carbon-in-column (C-I-C) trains operating in parallel each with five carbon adsorption columns, cascade type;
- a carbon regeneration system including a dewatering screen, a carbon regeneration kiln, a quench tank and regenerated carbon storage tank;
- a carbon transfer solution system including carbon conditioning and dewatering, a filter press, a transfer pump, valves and associated piping;
- cyanide unloading and storage area, and incinerator for cyanide packaging materials;
- reagents and cyanide mixing system;
- process solution pumps for the carbon transfer solution system;
- process solution pumps for the transfer of barren solution from the pump boxes to the barren solution sump tank;
- a barren leach solution heating circuit to provide supplemental heat to the barren solution during the winter months; and
- an acid wash tank, elution/desorption column, cool-down heat exchangers, strip solution tank, electrowinning circuit, cathode wash box, plate and frame sludge filter press, a sludge drying oven and a crucible furnace for smelting.

Maintenance personnel will be provided with required background information and knowledge of the ADR Plant to schedule and safely and efficiently perform maintenance on ADR Plant equipment.



Legend:

ADR Plant
Reserved Area
Ephemeral
Contour (25m)
Facility
Perennial
Intermittent

StrataGold Corporation

0 40 80 160
Metres

Projection: NAD 83 UTM Zone 8N

Drawn By: HC

Date: 2019/02/25

Figure: 4-1

EAGLE GOLD PROJECT
YUKON TERRITORY

ADR PLANT LOCATION

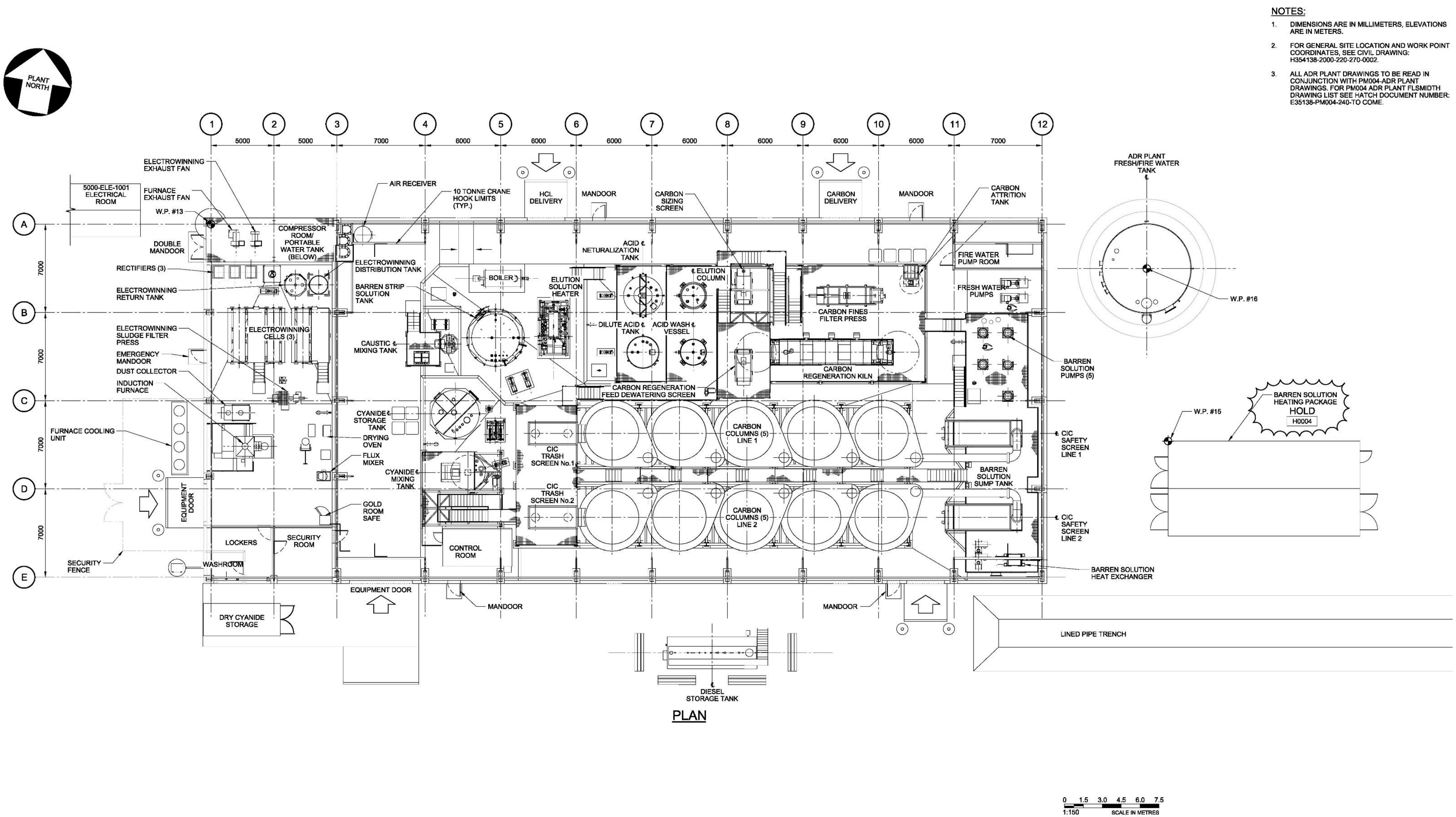


Figure 4-2: **ADR Plant General Arrangement Layout**

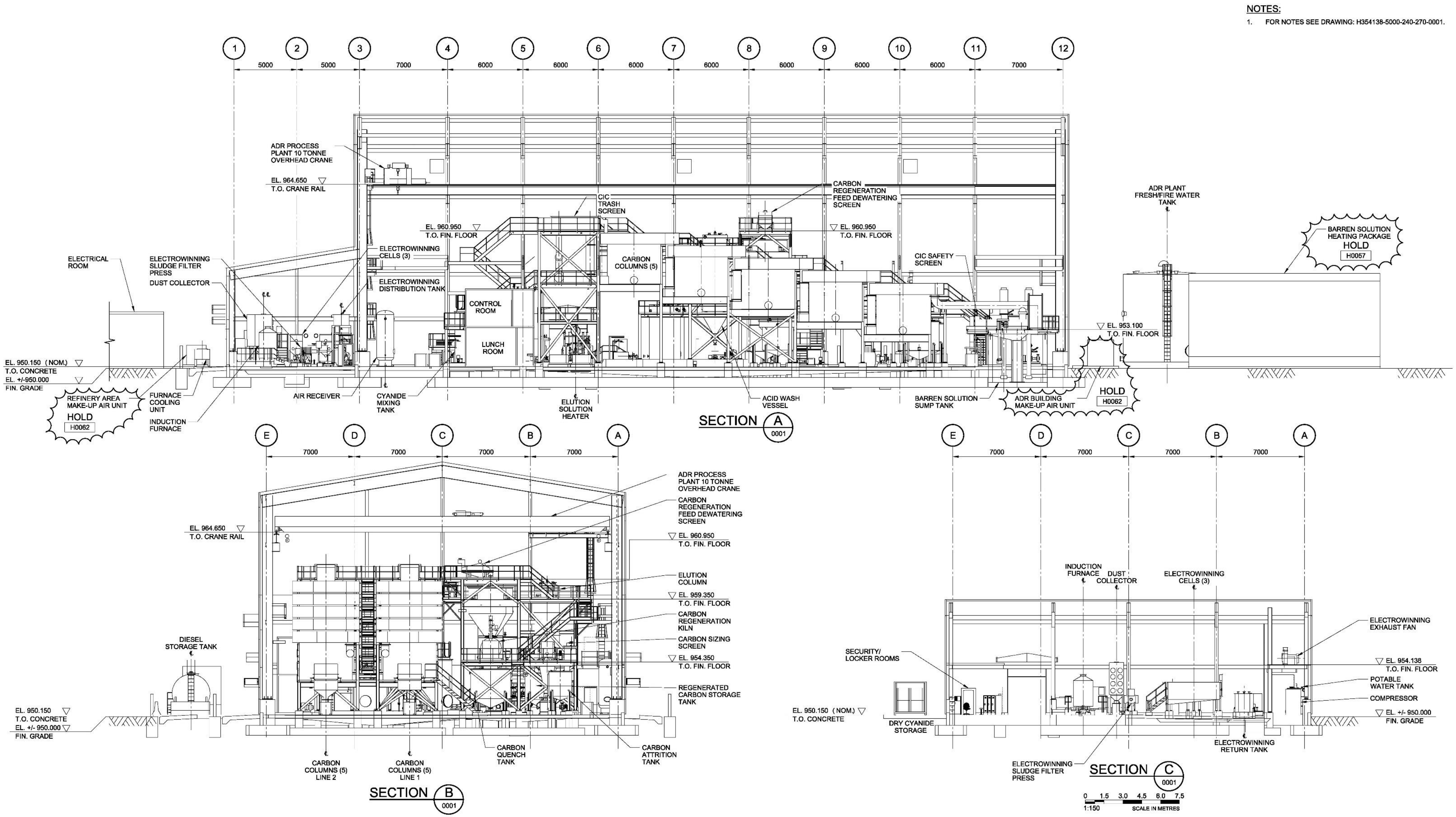


Figure 4-3: ADR Plant General Arrangement Sections

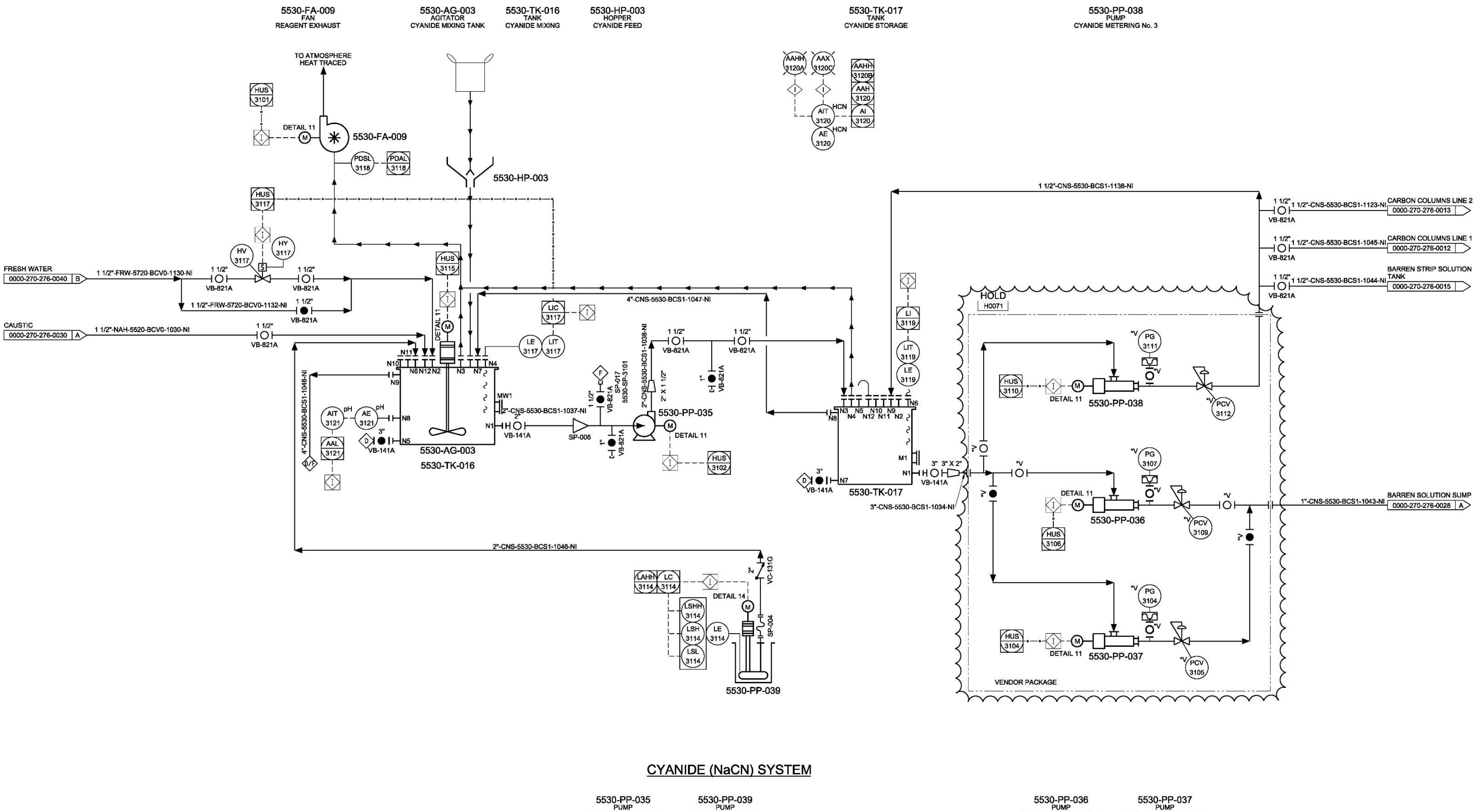


Figure 4-4: Cyanide System Piping and Instrumentation

5 ADR PLANT SURVEILLANCE AND INSPECTIONS

Regular surveillance and inspections are essential to ensure efficient operation and ongoing safety of the ADR Plant, and to identify areas requiring maintenance before problems and safety concerns develop. The performance of ADR Plant facilities and systems are assessed by routine visual inspections, and through surveillance (monitoring of instrumentation). Surveillance in this case is defined as the use of various instruments that monitor the performance of a particular system of equipment (e.g., video camera, pumping system monitors, flow meters, HCN monitors, fire alarms, etc.). Inspections in this case are defined as the visual examination of a condition of equipment, system or area to confirm proper functioning and performance (e.g., housekeeping in order, proper signage in place, proper use of PPE, structural integrity of a tank or support). A flow chart of the inspection and surveillance process is shown in Figure 5-1. If the performance (or behaviour) of a facility component is identified as abnormal, personnel must notify the maintenance department.

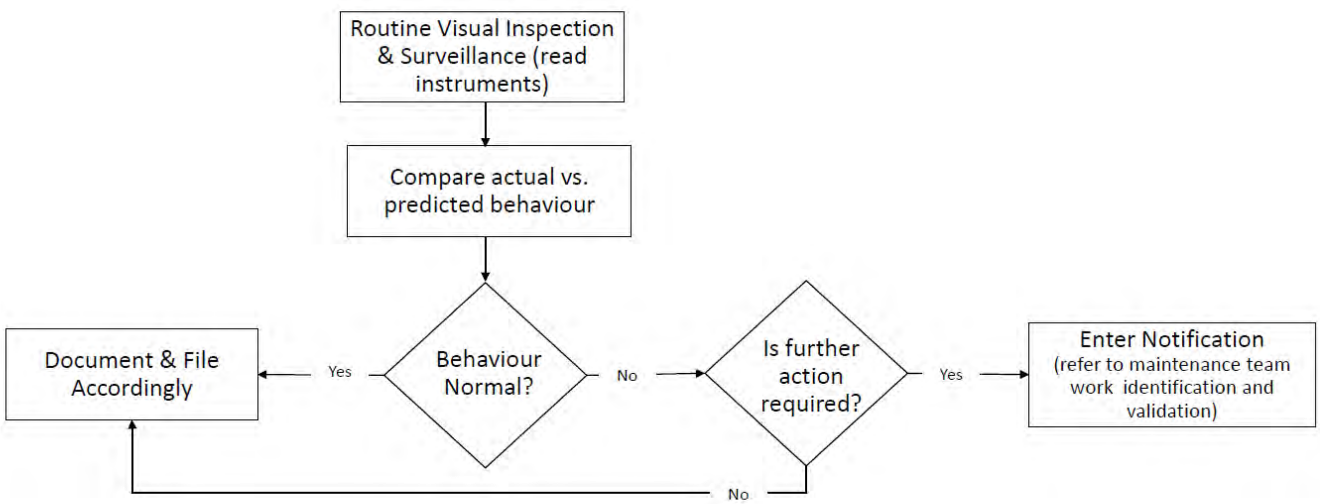


Figure 5-1: Inspection and Surveillance Flowchart

5.1 ADR PLANT COMPONENT SURVEILLANCE AND INSPECTIONS

The purpose of surveillance and inspection programs is to identify problems and/or unsafe conditions that are visually evident. Surveillance monitoring and visual inspections are an integral part ensuring proper maintenance and performance of process facilities.

On regular occasions the main components of the ADR Plant will be physically inspected. The purpose of physical inspections is to observe and record sufficient information to allow for the identification of areas, components, or issues that are not functioning as designed or could potentially require modification, repair, or rehabilitation.

Physical inspections consist of visual inspections conducted by the daily operator and by other qualified and experienced engineers or technicians. Inspection frequency and level of detail is initially dependent on manufacturer recommendations, contact with cyanide, or other priority established protocols. Inspection results and any repairs needed will be documented and retained. Should any component inspected be found to be sub-standard or repairs needed, work orders and tasks will be developed and prioritized as described below in Section 6. The inspection and repair process will be documented and recorded in the ERP system.

The routine ADR Plant inspection focus areas are summarized in Table 5.1-1. Inspection and maintenance frequency will be as recommended in the manufacturer's instructions for each piece of equipment. Manufacturer's instructions and maintenance manuals will be kept in hard copy in the Maintenance Office and in the ADR Plant as well as kept digitally within the ERP system.

Table 5.1-1: Routine ADR Plant Surveillance and Inspection Focus Areas

Facilities or Systems	Surveillance and Inspection Focus Area
Cyanide unloading and storage area	• general housekeeping practices, presence of water or debris • proper segregated storage of incompatible materials • integrity and proper positioning and stacking of stored crates • presence of properly rated fire extinguishers • functionality of HCN alarms and video monitors • legibility of hazard warning signage • availability of Material Safety Data Sheets (MSDSs) for cyanide briquettes • cordoning of container unloading area during unloading operations, and restriction of access by unauthorized personnel • use of appropriate operator PPE during unloading operations • functionality of eyewashes/emergency showers and water supply line pressure condition of emergency response equipment and first aid storage cabinets
Cyanide bag cutter arrangement, mixing and storage tanks, and secondary containments	• general housekeeping practices, presence of spilled solution or debris • structural integrity, signs of corrosion, buildup of cyanide salts, or leakage (tanks, valves, pumps, and other piping system components) • structural integrity, cracks, spalling, or deterioration of concrete impoundments • functionality of HCN alarms and video monitors • functionality of tank level indicators • condition of chain hoist and bag lifting bridle • functionality of eyewashes/emergency showers and water supply line pressure • temperature, cleanliness, and condition of cyanide antidote kits and first aid storage cabinets • condition of emergency response equipment and PPE • use of appropriate operator PPE during mixing operations • legibility of hazard warning and direction flow signage • integrity of lock out/tag out mechanisms on major solution or containment drain valves • maintenance of physical separation from chemically incompatible materials
Incinerator for cyanide packaging materials	• legibility of hazard warning signage • adequacy and integrity of security fencing, gate and lock • completeness of combustion of packaging residues • control of windblown debris outside of fenced area • evidence of animal intrusion
ADR plant and secondary	• general housekeeping practices, presence of spilled or leaked solution or debris

Facilities or Systems	Surveillance and Inspection Focus Area
containments including carbon columns, elution and strip tanks, acid wash tank and carbon transfer system, electrowinning circuit, sludge filter, drying oven and furnace	• structural integrity, signs of corrosion, buildup of cyanide salts, or leakage involving process solution storage tanks, valves, pumps, and other piping system components (meters and float switch alarms) • structural integrity, cracks, spalling, or deterioration of concrete impoundments • management of fluids in impoundments • functionality of HCN alarms and video monitors • functionality of tank level indicators • functionality of eyewashes/emergency showers and water supply line pressure • temperature and condition of cyanide antidote kits • condition of emergency response equipment and PPE • legibility of hazard warning and direction flow signage • integrity of lockout/tag-out mechanisms on major solution or containment drain valves • maintenance of physical separation from chemically incompatible materials
Pregnant and barren solution tanks, pipelines and pumping stations/ containments	• structural integrity, signs of corrosion, buildup of cyanide salts, or leakage (pipelines, valves, pumps, and other components) • structural integrity, cracks, spalling, or deterioration of concrete impoundments • functionality of eyewashes/emergency showers • temperature and condition of cyanide antidote kits • condition of emergency response equipment and PPE • legibility of hazard warning and direction flow signage • integrity of lock out/tag out mechanisms on major solution or containment drain valves • checking operability of pregnant and barren flow meters
HLF earthworks, risers, distribution lines, emitters, internal pond, and leak detection system	• signs of erosion, slumps, or cracks in earthworks • signs of pipeline/flange leakage and associated ponding • signs of ponding on HLF surface; if present, adequacy of screening or other appropriate avian exclusion devices • signs of animal trails or intrusion • management of fluids in impoundments • functionality of leak detection system and maintenance of associated detection logs • legibility of hazard warning and direction flow signage
Event pond and leak detection systems	• adequacy of available freeboard (comparison to surveyed markers, staff gauges or level loggers) • tears or holes in liner material or signs of erosion or slumps in underlying earthworks • signs of pipeline/flange leakage and associated ponding • Adequacy of screening or other appropriate avian exclusion devices • signs of animal trails or intrusion • functionality of leak detection system, operability and record of level loggers, and maintenance of associated detection logs • legibility of hazard warning and direction flow signage
Surface water interceptor ditches	• tears or holes in liner material (if lined) or signs of erosion, slumps, or cracks in earthworks • signs of animal trails or intrusion • flow blockage due to debris

5.2 DOCUMENTATION OF SURVEILLANCE AND INSPECTIONS

Documentation of surveillance and inspection activities will be completed by the responsible person (inspector) and then provided to the Process Manager and Health and Safety Manager for record keeping, and will include recording of:

- routine visual observations (departures from normal conditions);
- instrumentation monitoring and testing;
- analyses and evaluations; and
- recommendation (required action noting importance and/or urgency).

The analyses and evaluations completed by the inspector will consider the importance or severity of the required repair, whether there are imminent health and safety concerns, who should be notified and then provide recommendations for any follow up action. This process is outlined in more detail in Section 6. Documentation will include inspection reports and incident reports which will incorporate inspection logs, photographic and video records, instrumentation readings, and instrumentation plots. Additionally, annual inspections and third-party reviews will also be conducted and follow the same protocols for documentation.

Records from all ADR Plant inspections conducted by Process, Health and Safety and Environmental personnel will identify the inspector, indicate the date of inspection, describe any observed deficiencies and the nature of corrective actions, will note the work order number(s) and dates associated with any required corrective or preventive action. All inspection records will be retained for at least seven years.

5.3 REPORTING

The Process Manager will review collected data and information from ADR Plant inspection records and assess the need for maintenance activities or response. The reporting procedures for various levels of surveillance are dependent on environmental monitoring and reporting requirements, and whether:

- performance meets design expectations;
- conditions require adjustment to design, operation, maintenance activities or inspection frequency; and,
- there is a need to adjust H&S practices and awareness or there is a potential emergency response alert or action.

6 ADR PLANT MAINTENANCE PROGRAM

The ADR Plant maintenance program will initiate work orders with tasks as needed. SGC has selected Pronto as its ERP software for managing the maintenance program. Once a maintenance task is initiated, completion of the task generally follows the work flow process shown in Figure 6-1, from, issuance of a work order, generation of the task list, scheduling and work execution through to completion.

There are three primary types of maintenance, from which, a work order may be generated. These are:

- **Routine maintenance:** All components, including health, safety and emergency response equipment require routine maintenance; however, some equipment (Table 6.1-1) will have a higher criticality and will require more frequent and/or in-depth inspections. The maintenance program is designed to ensure that cyanide facility related actions receive the highest priority.
- **Predictive maintenance:** Maintenance triggered following the results of Oil and Vibrations Analysis reports.
- **Corrective maintenance:** Maintenance work that is identified by an observer. This type of work may be triggered based on observations resulting from daily operator inspections, routine environmental, health, and safety inspections or triggers from surveillance equipment. The observer and/or their supervisor will create a work request, which will then go to the Maintenance Department for assessment to be turned into a work order. In addition, any potential corrective maintenance work that is identified by the Maintenance Department as part of a maintenance task will be brought to the attention of the Maintenance Supervisor. If a new work request is accepted it will be added to the existing work order or an additional work order will be generated.

The above maintenance system planning and scheduling is coordinated with the ADR Plant Process Department (e.g., timing for routine maintenance shutdowns) and with the Health and Safety Department.

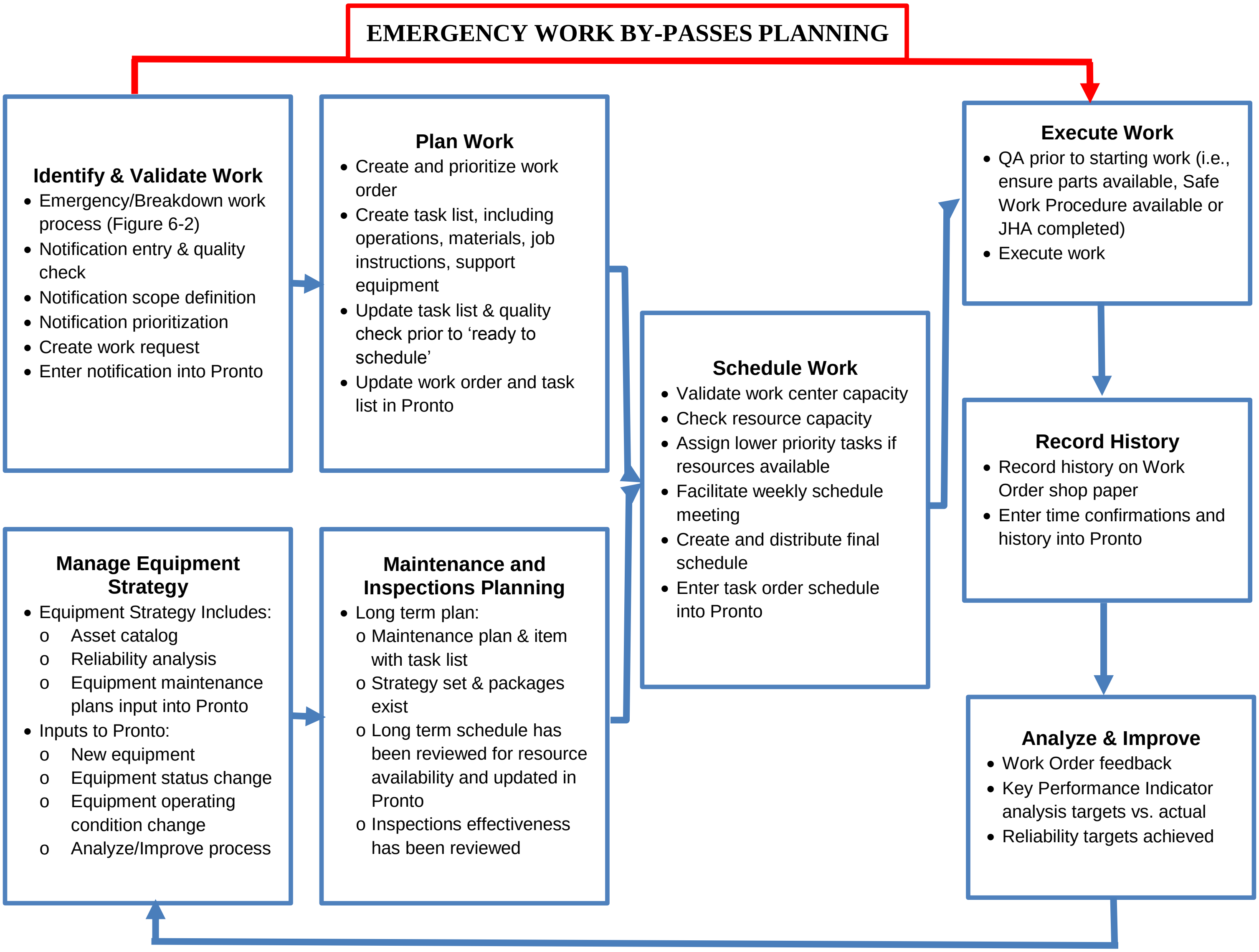


Figure 6-1: Basic Work Management Process

Table 6.1-1: List of Reagent Mechanical Equipment

Equipment ID	Equipment Type	Description
5500-AG-005	Agitator	Copper Sulphate Mixing Tank
5500-HP-005	Hopper	Copper Sulphate Feed
5500-PP-067	Pump	Peroxide Metering # 1
5500-PP-068	Pump	Peroxide Metering # 2
5500-PP-069	Pump	Copper Sulphate Metering # 1
5500-PP-070	Pump	Copper Sulphate Metering # 2

Equipment ID	Equipment Type	Description
5500-TK-025	Tank	Copper Sulphate Mixing
5510-PP-045	Pump	Hydrochloric Acid Metering
5520-AG-003	Agitator	Cyanide Mixing Tank
5520-AG-004	Agitator	Caustic Mixing Tank
5520-HP-004	Hopper	Caustic Feed
5520-PP-043	Pump	Caustic Metering # 1
5520-PP-044	Pump	Caustic Metering # 2
5520-TK-018	Tank	Caustic Mixing
5530-CH-038	Frame	Cyanide Area Sump Pump
5530-FA-009	Fan	Reagent Exhaust
5530-HP-003	Hopper	Cyanide Feed
5530-PP-035	Pump	Cyanide Transfer
5530-PP-036	Pump	Cyanide Metering # 1
5530-PP-037	Pump	Cyanide Metering # 2
5530-PP-038	Pump	Cyanide Metering # 3
5530-PP-039	Pump	Cyanide Area Sump
5530-TK-016	Tank	Cyanide Mixing
5530-TK-017	Tank	Cyanide Storage
5540-PP-040	Pump	Antiscalant Metering # 1

6.1 EQUIPMENT REGISTER AND SPARE PARTS

The Maintenance Department maintains an equipment register within the ERP system. The register provides each piece of equipment with its own unique number, which allows for the rapid identification of items, and ensures maintenance details are allocated to the correct item. The equipment register includes manufacturer details, supplier warranty dates, etc.

A spare parts inventory will also be maintained as recommended by equipment manufacturers. The inventory of spare parts will be managed by the Supply Chain Manager with input from the Maintenance Department.

6.2 WORK ORDER DEFINITION

Scheduling and performing routine maintenance tasks are initially based on equipment manufacturers' recommendations, as well as operational, environmental and safety requirements. The frequency recommended by manufacturers is considered a minimum standard for all ADR Plant equipment. The frequency of routine maintenance will be increased as necessary based on the results of the ADR Plant surveillance and inspections and the performance of equipment.

Work orders generated as a result of predictive maintenance analysis, or the result of an observation or inspection will also follow the same work order process during the maintenance planning step. All work orders will be recorded in hardcopy, and processed and updated as work proceeds in the ERP system.

Equipment maintenance planning by the Maintenance Department identifies the tasks required to properly maintain ADR plant facilities and systems, and process/mobile equipment used across the ADR Plant site. Each equipment item, facility or system will include one or more maintenance tasks designed to ensure their continued operation. Each maintenance task includes the following:

- a descriptive title for each maintenance task to be performed
- a frequency assigned for the performance of each task
- assignment of a specific craft or workgroup and the number of each craft or workgroup required to perform the task
- equipment condition required for performance of the task (i.e. running or shut down)
- type of work – routine maintenance, predictive maintenance, corrective maintenance
- procedure number (if required) – unique identifier for the task, or file name if linked to another document that gives the individual task instructions
- estimated time to perform the task
- special tools, materials and equipment required to perform the task

6.3 WORK ORDER EXECUTION & MAINTENANCE PROCEDURE

The work order tasks continue to follow the basic workflow shown in Figure 6-1 to execute specific maintenance actions. All work that is either identified and triggered by the routine maintenance system, initiated through external sources, or the result of an emergency or breakdown is executed based on the assessed and validated priority for the work. Each task that is initiated will have a Safe Work Procedure attached that will outline the safety precautions required for each step of the task. In the event in which a Safe Work Procedure is not available, a Job Hazard Analysis will be conducted and then used in its place.

6.4 MAINTENANCE PRIORITY & SCHEDULE

Work order information is used to determine maintenance priority and schedule. During work order planning, maintenance tasks are prioritized first based on health and safety protocols. In general, work orders are prioritized by the maintenance planner based on the classification method as defined below. Typically, maintenance planners schedule routine maintenance service at specified intervals and frequencies unless an inspection reveals that the task should be a higher priority. Predictive and corrective maintenance activities are also scheduled based on the same prioritization method. Tasks are prioritized and scheduled based on the following priority definitions:

- **P1: Emergency/Breakdown** – Imminent safety (life/limb), catastrophic failure of critical equipment, major production loss; complete as immediately as reasonably possible, within 0 - 1 day

- **P2: High** – Agree work to ‘break into locked schedule’; complete within 0 - 7 days
- **P3: Medium** – Soft schedule; complete within 8 – 14 days
- **P4: Medium-Low** – Soft schedule; complete with routine maintenance or within 15-90 days
- **P5: Low** – Complete during next shutdown

Emergencies, breakdown or high priority maintenance tasks classified as P1 or P2 will be validated, planned and executed using the expedited workflow process shown in Figure 6.2.

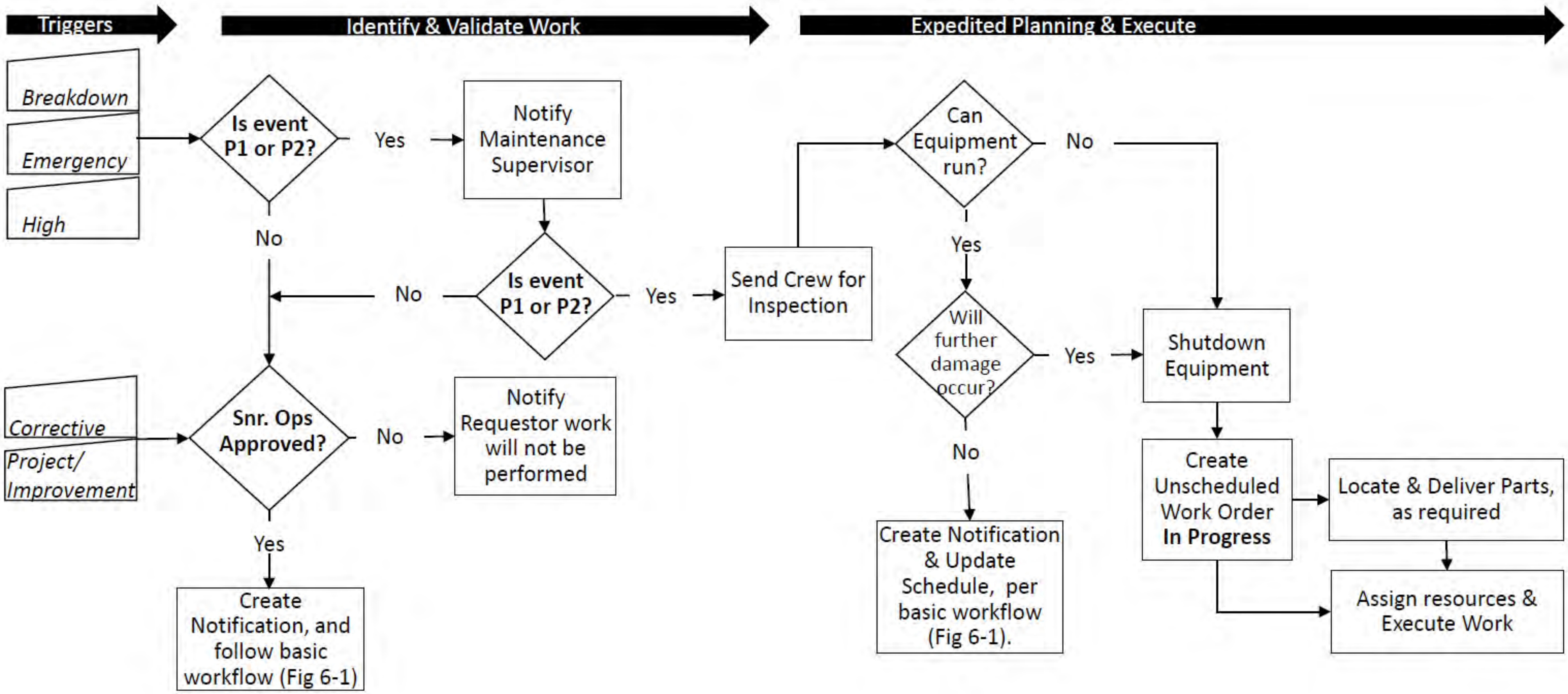


Figure 6-2: Emergency and High Priority Work Management Process

6.5 DOCUMENTATION OF MAINTENANCE ACTIVITIES

Maintenance records, including work orders and execution of maintenance tasks will be documented by the appropriate maintenance team personnel, recorded into the Pronto ERP and kept by the Process Manager. Documentation will include:

- up-to-date logs of in-service equipment, facilities and systems;
- maintenance schedules;
- maintenance history;
- inspection logs;
- repair reports including cost;
- frequency, cause of problems and planned mitigation;
- component reliability records;
- quality control records;
- photographs, videos of repair issues;
- inventory of spares, materials, tools and equipment; and
- an update to the critical spares list.

The maintenance program within the ERP system will maintain a revision history of all inspections and routine, predictive and corrective maintenance actions, as well as records of all completed work orders for at least seven years.

6.6 REPORTING

A Maintenance Report will be prepared regularly, as required by the Maintenance Manager or designate and will include:

- completed work orders;
- updated maintenance log and schedule;
- progress on partially completed work that has been halted for some reason;
- items not requiring maintenance and why;
- new items or conditions requiring maintenance;
- problems and possible solutions for items requiring greater than expected maintenance;
- cause of any neglected or late maintenance; and,
- references.