



Amulsar Gold Project Cyanide Management Plan

Version V.05

May 2016

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

Table of Contents

Glossary	vii
Defintions	x
1 INTRODUCTION	1
1.1 Scope of the Management Plan	2
1.2 Objectives and Goals.....	3
2 Roles and Responsibilities	4
3 Requirements.....	6
3.1 Regulatory and other ESIA Requirements.....	6
3.2 IFC Environment Health and Safety Guidelines	6
3.3 International Cyanide Management Code.....	7
3.4 ESIA Commitment Register	7
3.5 Code of Practice	8
4 Cyanide.....	10
4.1 Summary of cyanide usage and facilities at Amulsar mine	13
4.2 Heap Leach Facility (HLF)	15
4.2.1 Leak prevention.....	16
4.2.2 HLF Solution Control.....	16
4.2.3 Solution Ponds	16
4.2.4 Drainage Control	19
4.2.5 Environmental Protection Measures	19
5 CYANIDE PRODUCTION AND PURCHSING	24
6 TRANSPORTATION OF SODIUM CYANIDE.....	24
6.1 Responsibilities during Transportation	25

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

6.2	Cyanide Packaging	27
6.3	Road Survey	27
6.4	Labelling of Cyanide	28
7	MANAGEMENT OF SODIUM CYANIDE	28
7.1	General	28
7.2	Cyanide Off-Loading and Storage Facility.....	28
7.3	Cyanide Mixing / Processing Plant.....	29
7.4	Preventative Maintenance	31
7.5	Inspections	31
7.6	Adsorption, Desorption and Recovery / Process Plant Design.....	32
7.7	Management of Cyanide Solutions in the Production Process	33
7.7.1	Control of Cyanide Addition Rates	34
7.8	Preventive Maintenance – ADR plant.....	35
7.9	ADR / Processing Plant Cyanide Inspections	35
8	DESIGN AND CONSTRUCTION OF THE HEAP LEACH FACILITY (HLF), SOLUTION PONDS AND ASSOCIATED PIPE WORKS.....	36
8.1	General	36
8.2	Heap Leach Facility (HLF)	37
8.3	Cyanide Solution Ponds.....	37
8.4	Associated Pipelines to and from Heap Leach Pads and Solution Ponds	38
8.5	Preventive Maintenance	39
8.6	Monitoring and Inspection	39
9	WORKER SAFETY	40

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

9.1	Measures to Limit Workers Exposure to Cyanide	40
9.2	Personal Protective Equipment (PPE)	40
9.3	Hydrogen Cyanide Monitoring Requirements and Equipment Calibration	41
9.4	Antidotes and First Aid Requirements.....	41
9.5	Other Safety Equipment Requirements	42
9.6	Signage and Fencing Requirements	43
10	CYANIDE WORKER TRAINING REQUIREMENTS.....	43
10.1	General.....	43
10.2	Emergency Response Training Requirements	44
10.3	Training Records.....	45
11	EMERGENCY RESPONSE	45
11.1	Cyanide-Related Elements in Emergency Preparedness and Spill Response Plan	45
11.1.1	Potential Release / Exposure Scenarios.....	46
11.1.2	Emergency Response Team / Off-site Responders.....	46
11.2	Response Equipment and Maintenance / Inspection Requirements	47
11.3	Response Actions.....	47
11.4	Internal and External Notification Requirement.....	47
11.5	Remediation of Releases and Management of Contaminated Materials .	48
11.5.1	Emergency Response Drills.....	49
11.6	Public Disclosure of Cyanide-Related Information.....	49
11.7	Materials Safety Data Sheet	49
11.8	Distribution of Information via Stakeholder Engagement Plan	49
12	CYANIDE ACTION PLAN.....	50
13	DECOMMISSIONING AND CLOSURE PLANS	52

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

14	Performance Monitoring	53
14.1	Verification and Monitoring.....	53
14.2	Review of Non Compliances	53
14.3	Regular Inspections.....	53
14.4	Annual Audit.....	54
15	REFERENCES	54
16	Revision Control.....	54
17	Authorization	54

DRAWINGS

01	Project Location Map
02	Project Facilities – General Management Plan
03	Phases 1-3 Heap Leaching Facilities layout and grading plan
04	Phase 1 Leach pad layout and Ore Heap Plan
05	Phases 1-2 Leach pad layout and Ore Heap Plan
06	Phases 1-3 Leach pad layout and Ore Heap Plan
07	Phases 1-3 Leach Pad layout and Ore Heap Sections
08	Leach Pad and Diversion channel sections
09	Leach Pad sections and details
10	Lead Pad details
11	Underlain Sections and details
12	Phases 1-3 Leach Pad drain pipework plan

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

- 13 Drain pipework details and sections**
- 14 Collection ponds layout and grading plan**
- 15 Collection ponds sections**
- 16 Collection pond details**
- 17 Collection ponds details and sections**
- 18 North Embankment details and sections**
- 19 General Arrangement – Reagents – Sodium Cyanide, Sodium Hydroxide
and Acid Buildings Plan**

APPENDICES

Appendix 1 Audit Protocol Checklist

Appendix 2 Example MSDS for Sodium Cyanide

Glossary

ADR	Adsorption, Desorption and Recovery
Amulsar	Amulsar Open Pit Gold Mine Project
BAT	Best Available Techniques
BMP	Best Management Practice
CAP	Cyanide Action Plan
CEFIC	European Chemical Industry Council
CMP	Cyanide Management Plan
CN	Cyanide ion
Code	International Cyanide Management Code
CQA	Construction Quality Assurance
DMAP	Dimethyl Aminophenol
EIA	Environmental Impact Assessment (National Criteria)
EMP	Environmental Monitoring Plan
ERC	Emergency Response Coordinator
EPSRP	Emergency Preparedness and Spill Response Plan
ERT	Emergency Response Team
ESIA	Environmental and Social Impact Assessment (International criteria)
ESMS	Environmental and Social Management System
EU	European Union

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

FS	Feasibility Study
g/l	Grams per litre
g/m ²	Grams per square metre
g/t	Grams per tonne
GRE	Global Resource Engineering
HCN	Hydrogen Cyanide
HCS	Hazardous Chemical Substances
HDPE	High Density Poly Ethylene
HLF	Heap Leach Facility
HLP	Heap Leach pad
HR Policy	Human Resources Policy
CODE	International Cyanide Management Code
ICMI	International Cyanide Management Institute
ICMM	International Council on Mining and Metals
KCN	Potassium Cyanide
l/h/m ²	Litres per hour, per square metre
LCA	Lead Cyanide Auditor
LCRS	Leak Collection and Recovery System
LD50	Lethal Dose 50%
LLDPE	Linear Low Density Polyethylene

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

LSR	Lydian Sustainability Report
Lydian	Lydian International Ltd
MAC	Maximum Allowable Concentration
MCRP	Mine Closure and Rehabilitation Plan
M3/hr	Cubic Metres per hour
m/L	millilitres
m/m	mass/mass
m/s	metres per second
MSDS	Material Safety Data Sheets
NaCN	Sodium Cyanide
oz/yd ²	ounces per square yard
pH	pH Value
PPE	Personal Protective Equipment
ppm	Parts per million
QA/QC	Quality Assurance / Quality Control
ROM	Run of Mine
SCBA	Self Contained Breathing Apparatus
SCN	Thiocanate ion
SEP	Stakeholder Engagement Plan
SNIP	Sanitary Norms and Rules

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

SOP	Standard Operating Procedure
SQAS	Safety and Quality Assessment Systems
SR	Safety Report
UN	United Nations
UNEP	United Nations Environment Programme
WAD	Weak Acid Dissociable
WAI	Wardell Armstrong International
WMP	Waste Management Plan
100y	One hundred years

Defintions

- Management Plans (MPs): Establishes specific requirements for various important environmental and social disciplines such as water, air and waste management, spill prevention, progressive site rehabilitation/closure, stakeholder engagement, cultural heritage protection, biodiversity preservation, etc. The main users of Management Plans are the department heads, superintendents and supervisors who track action implementation and translate specific actions to workers as necessary to ensure work is conducted in a responsible manner.
- Operating Procedures (OPs): Provide details on how to manage a specific environmental or social issue or area of risk. The main users of Operating Procedures are operations superintendents, supervisors and workers.
- Work Instructions (WIs): Define specific tasks to be conducted by workers to ensure effective controls are in place related to their work activity. The main users of Work Instructions are supervisors and workers who need to understand the risks associated with their work and how to control the associated risks.

 GEOTEAM	Cyanide Management Plan	May 2016
--	--------------------------------	----------

- Forms / Templates / Checklists: Provide the means for ensuring effective management and control of documented information.

 GEOTEAM	Cyanide Management Plan	May 2016
--	--------------------------------	----------

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

1 INTRODUCTION

Lydian International Ltd (Lydian) and its wholly owned Armenian subsidiary, Geoteam CJSC (Geoteam), is currently developing the Gold Amulsar Project (the Project), located in the central part of the Republic of Armenia (RA). The proposed Project will develop the gold deposit via open-pit mining and heap-leach processing using dilute cyanide solution.

A Mining Right (MR) for the Project was granted by the RA government in November 2014. This was based, in part, on the approval of the regulatory Environmental Impact Assessment (EIA) for the Project in October 2014. Some permits also exist for ongoing exploration and development activities with additional permits required for the construction and operation phase. The Project is currently in the early stages of development, with construction activities planned to start during the second quarter 2016 subject to financing.

In parallel with the EIA, an Environmental and Social Impact Assessment (ESIA) was undertaken in compliance with, amongst others, the Performance Standards (PS) of the International Finance Corporation (IFC) and the Performance Requirements (PR) of the European Bank for Reconstruction and Development (EBRD).

In mid-2015, a Value Engineering (VE) and Optimization process was initiated, with Lydian commissioning Samuel Engineering Inc. (Samuel) and other consultants to perform engineering design on several identified VE and Optimization concepts. The objective was to reduce capital expenditure without increasing operating costs or increasing environmental and social impacts. The results from this work done in 2015, which were published in the NI “43-101 Technical Report: Amulsar Value Engineering and Optimization” in November 2015, included reduced capital and operational costs, making the Project more viable in a challenging economic environment.

Changes to the Project design as a result of the VE and Optimization work have resulted in the need to prepare a revision to the new EIA approved in October 2014 and amend the ESIA completed and disclosed in April 2015. Lydian is in the process of preparing a new EIA and to apply to government for a new MR, both expected for approval in the second quarter of 2016.

The Project is subject to various health, safety, environmental and community/social (HSEC) commitments arising from the ESIA undertaken in compliance with the IFC PS and EBRD PR. The draft final version of the ESIA, denoted v10, was published for public review and comment in March, 2016 with a series of public consultation and disclosure meetings planned for March to May 2016.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

Both the EIA and ESIA make a number of commitments pertaining to the mitigation and management of E&S impacts. These commitments and requirements must be fulfilled as the Project moves forward. To facilitate implementation, all commitments made in the ESIA have been compiled into a full Commitments Register (CR) which will be used by Lydian for tracking purposes throughout the Project. Although many of the commitments apply to E&S management during Project implementation (construction, operation and closure), some apply to the Project design and engineering phase and must be addressed before construction work starts on site.

E&S commitments are being managed by Lydian and Geoteam using the Environmental and Social Management System (ESMS). The ESMS includes the Management Plans (MPs), such as this one, that detail requirements that Geoteam and its contractors will follow in order to fulfil the Project's environmental and social commitments. For the purpose of this MP, "Contractor" means any all project participants, including contractors working in the field on the project including but not limited to drilling contractors, construction contractors, camp service contractors, engineers, fabricators, suppliers, etc. Contractors should implement parts of the plans relevant to their activities, issuing their own management plans in line with the Geoteam ESMS.

1.1 Scope of the Management Plan

This Cyanide Management Plan (CMP) has been prepared to define the management practices to be adopted in all processes and facilities using and/or storing cyanide at the site during construction and operation of the mine. The CMP applies to the construction and operational (development) phases of mine development, although many principles will be relevant to closure and post-closure also. The CMP addresses management procedures and application of relevant mitigation measures identified in both the EIA required for state approval, and the ESIA recently undertaken.

It also provides a mechanism for assessing the HSEC performance and for maintaining records of any changes in the scope of the Project. It aims to record data that is required for inclusion in the Amulsar Annual Monitoring Report (AMR) and the forthcoming Lydian Sustainability Report, regarding HSEC performance on a yearly basis.

This current version is based on the description in the Project Execution Plan (PEP) and impact assessment and the mitigation measures identified in the ESIA. The Plan has been prepared in general accordance with requirements stated in the International Cyanide Management Institute Code (the Code) and the ESIA findings v10 in particular the Commitment Register (CR) and the

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

regulatory requirements of the Republic of Armenia (RA) as included in the Legal Register of the ESMS. The CMP is to be read in conjunction with the Preliminary Mine Reclamation, Closure and Rehabilitation Plan (pMRCRP) (Appendix 8.18) Emergency Preparedness Response Plan (EPRP) (Appendix 8.9) and Integrated Waste Management plan (IWMP) (Appendix 8.13).

For the purpose of this ESMS, contractor means any contractor working in the field on the project including but not limited to drilling contractors and camp service contractors. They should implement parts of the plans relevant to their activities. The plan and all supporting documents will be made available in both English and Armenian.

The project requirements are identified in the CR and the EIA Approval, both have been incorporated in all management plans as part of the ESMS.

1.2 Objectives and Goals

This CMP has been prepared to minimize the risk of cyanide exposure to employees, adjacent local communities, and the surrounding environment. The Plan has been aligned with the International Cyanide Management Code (CODE) (the Code) and will facilitate compliance with the Code at a later date. For the purposes of this plan, it is assumed that Geoteam will manage operations at Amulsar Mine and will employ contractors (local where possible) and sub-contractors directly.

The objectives of this plan are to ensure that good international industry practice (GIIP) is implemented to reduce impacts resulting from cyanide management and that the Project complies with all RA national legislation, EBRD Performance Requirements and IFC Performance Standards as well as the WBG EHS Guidelines and EU Directives.

Under the ESMS, this plan has been formulated as a procedural and reference document for use and implementation by Geoteam and contractor personnel. This plan should be treated as a 'Working Document' that will periodically be revised and expanded as required.

The main Objectives of Amulsar Cyanide management to:

- Protect communities and the environment during cyanide transport;
- Protect workers and the environment during cyanide handling and storage;
- Manage cyanide process solutions and waste streams to protect human health and the environment;

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

- Protect communities and the environment from cyanide through development and implementation of decommissioning plans for cyanide facilities;
- Protect workers' health and safety from exposure to cyanide;
- Protect communities and the environment through the development of emergency response strategies and capabilities;
- Train workers and emergency response personnel to manage cyanide in a safe and environmentally protective manner; and
- Adhere to the legal requirements & licence conditions per the Legal Register.

2 Roles and Responsibilities

Geoteam will be responsible for:

- Communicating this plan, specifying Geoteam's management commitments and requirements, to the Contractors;
- Monitoring and auditing of the implementation of this plan and Contractors' performance with respect to the requirements of this plan;
- Determining appropriate corrective action for any non-compliance (as per the Non-conformance and Corrective Action Report (CAR)) and
- Conducting compliance assurance, in accordance with the Compliance Assurance Plan.

Specific Responsibilities for Geoteam personnel relating to the CMP are as follows:

Chief Operating Officer	• Responsible for maintaining the effective operation of the CMP, in accordance with the Commitments Register and other management plans.
Project Director	• Select appropriate (accredited or working towards accreditation) cyanide manufacturers and transporters in accordance with the Code or be able to demonstrate that the facility is using BMP to international standards. • Ensure that risk assessments are conducted with regard to cyanide management and that acceptable resulting recommendations are duly implemented • Review the safety reports for the process plants and implement any remediation/corrective action

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

	• Responsible for ensuring that the Amulsar project complies with the requirements of this plan • Ensuring that designated managers understand their responsibilities and that they have sufficient resources to carry out their functions effectively • Review and approve the Standard Operating Procedures (SOP's)
Executive Vice President Sustainability	• Regularly review CMP and all other "live" documents relating to cyanide use / management
Environmental Health and Safety Manager	• Responsible for monitoring compliance with this plan and related procedures and developing training and auditing tools that will raise awareness • Ensuring that all employees and contractors undergo environmental and health and safety inductions • Ensuring appropriate records and documentation maintained for all areas of work • Ensuring adequate training and awareness of departmental staff to implement this plan • Prepare ESMS and full Emergency Preparedness and Spill Prevention Plans and supporting Procedures • Reporting outcomes to the Project director and EVPS • Work with local authorities to prepare joint external to internal emergency response plan • Ensure cyanide transporter has an Emergency Response Plan • Prepare Safety Report for process plant • Review the road route survey – (rail terminal) to Mine site which will be conducted by the supplier and or transporter • Prepare all relevant SOP's and develop SOP training programme; • Undertake basic "cyanide awareness" training for key staff • Establish emergency response teams; • Review closure plans and update to accommodate plant / areas associated with cyanide use; • Devise on-going training programme for cyanide staff as part of health and safety training
Independant Cyanide Auditor	• The Auditor will review the operation, training and documentation to certify the operation meets the Code compliance requirements.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

	The Auditor will undertake a pre-operational cyanide audit as per the requirements of the Code.
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3 Requirements

3.1 Regulatory and other ESIA Requirements

In accordance with Armenian regulations, cyanide is classed as a 'Group 2' highly toxic substance. Therefore, the design and operation of cyanide storage facilities are subject to various health and safety criteria outlined in a guidance document Sanitary Norms and Rules (SNIP) by the Institute of Colour Metallurgy entitled 'Temporary Rules for Storage of Highly Toxic Substances in the Colour Metallurgical Enterprises'. This outlines the requirements for the storage facility location (including sanitary protection zones), foundation design, capacity, exits, ventilation and air sampling, atmospheric exposure limits (0.3 mg/m³ for hydrogen cyanide and NaCN), detoxification and antidote procedures, spill capture and disposal measures, handling protocol, HR policy, storage containers/labelling and Personal Protective Equipment (PPE). The majority of the content of this document (CMP) is covered by the Code, which extends beyond the scope of the Armenian requirements. However, the mine has been designed to operate in accordance with the Code. Details of the Code where relevant should be reflected in Geoteam's Occupational Health and Safety Management System (OHSMS Ref GEOTEAM-HSE-PLN0016).

3.2 IFC Environment Health and Safety Guidelines

The IFC EHS Guidelines (April 2007) state that Cyanide use should be consistent with the principles and standards of practice of the International Cyanide Management Code which has been described in the subsequent section. Discharge guidance limits for effluents containing cyanide entering the Arpa and Vorotan rivers have been set using the IFC mining effluent guideline value of:

- Free cyanide 0.1 mg/l
- WAD cyanide 0.5 mg/l

Water quality standards for the two rivers is contained in Chapter 2 Table 2.11 of the ESIA. We understand that the Armenian authorities will establish site specific discharge limits as the project develops.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

3.3 International Cyanide Management Code

The Code is a voluntary Code of practice for the use of cyanide in the mining industry. The Code was developed in 2001 under the auspices of United Nations Environment Programme (UNEP) and the International Council on Mining and Metals (ICMM). A multi-stakeholder Steering Committee with participants from the gold mining industry, governments, non-governmental organizations, labour, cyanide producers, and financial institutions, worked co-operatively toward the common goal articulated in the Code's Mission Statement: "To assist the global gold mining industry in improving cyanide management, thereby minimizing risks to workers, communities, and the environment from the use of cyanide in gold mining, and reducing community concerns about its use".

The Code consists of 9 "Principles" and 31 "Standards of Practice" that address best management practice (BMP) for all aspects of the safe use of cyanide at mine sites; including production of cyanide and its transportation to the mine site, handling of reagent-strength cyanide, use of cyanide in the gold production process, decommissioning of cyanide facilities, worker safety, worker training, emergency response, and public dialogue. Implementation of the Code is overseen by the ICMI and Companies that become signatories to the Code need to demonstrate compliance by having their operations inspected by independent third-party auditors. Even if the company does not wish to become signatories to the Code, they can still benefit by adhering to the Principles and Standards of Practice and incorporating the measures included in the Code's Implementation Guidance into the facility's design, construction, operation and closure. This CMP has been developed to document the measures necessary for Geoteam to comply with these principles and meet BMP in a manner consistent with the Code.

3.4 ESIA Commitment Register

Hazardous Chemical Substance Management Programmes (CHSS48)

Appropriate hazardous chemical substance (HCS) management programmes will be developed in alignment with IFC PS3 and EBRD PR3 and training will be provided to staff regarding handling HCS, with a special focus on cyanide handling and storage.

Training and PPE (CHSS49/SL28)

Specialized training and PPE will be provided as necessary to employees working in proximity to cyanide-bearing solutions and in the HLF area. Special attention will be given to issues around

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

hydrogen cyanide gas (HCN). The Cyanide Management Plan will provide specific procedures for cyanide handling in accordance with the International cyanide Code. The CMP will also include procedures for spill avoidance and for spill containment and cleanup.

Adherence to International Cyanide Management Code (CHSS50)

A CMP will be developed which is compliant with the the Code. Lydian is to become a signatory to the Code in June 2016.

Communication with Community (CHSS51)

Effective communication programmes with the local community on the use, handling and risks of cyanide will be implemented. This needs to be performed carefully so as not to cause alarm but to allay fears and misconceptions.

Measures in case of exposure to HCN (CHSS54)

Staff that are exposed to HCS may represent a risk if they are sent off site and must shower and change their clothes prior to leaving site. Soiled personal protective clothing must be washed on site and not by family members off site.

Monitoring and Management (CHSS55)

Effective workplace cyanide monitoring and management programmes will be implemented. A detailed hazard identification plan will be developed to manage cyanide from supplier to site. Emergency preparedness and response planning will be included in the overall cyanide management.

Health Monitoring (CHSS56)

Medical surveillance (including biological monitoring) of employees handling HCS will be incorporated into the Project's occupational health and safety management system. Occupational hygiene and exposure assessment of control systems will be an important element to have in place.

3.5 Code of Practice

As part of the Environmental Social Management System (ESMS) CMP development, Geoteam will prepare a register of all the regulatory bodies and legal compliances required for the transportation and use of cyanide in the Republic of Armenia and at site. It is important that

	Cyanide Management Plan	May 2016
---	--------------------------------	----------

from design stage onwards, Geoteam has a clear understanding of both international and national legislation (if any) for this project with regard to the management of cyanide.

Cyanide is defined as a dangerous substance under European Commission Directive 96/82/EC, 9th December 1996 and European Commission Directive 2003/105/EC, 16 December 2003. Although Armenia does not conform to EU legislation, and has no legislation appertaining to cyanide management, it would be prudent to adopt the EU guidance. This will help to prevent major accidents and limit any environmental impacts and/or effects on the local community and workforce.

Geoteam will consider it mandatory to provide information to the authorities about the proposed activities for the Amulsar project, such as the quantity and physical form of the cyanide to be used. Aspects of the immediate surrounding environment which are liable to cause or aggravate a major accident should be recorded. Geoteam will develop and prepare a policy for the prevention of major accidents and it will be made available to the competent authorities and disclosed to local communities who may be affected.

The major accident prevention policy will be defined in the Amulsar project Emergency Preparedness Response Plan (EPRP), which takes into consideration the United Nations Environment Program (UNEP) Technical Report No. 41, APELL for Mining: "Guidance for the Mining Industry in raising awareness and preparedness for emergencies at local level".

As part of the permitting process, Geoteam will prepare and submit to the competent authority a Safety Report (SR) demonstrating that the facility has been designed, constructed, operated and maintained to prevent and respond to major accidents. The Geoteam Safety Report will contain or make reference to the process plant, HLF and all solution pond design information.

A document review and revision process will be developed for the Amulsar project and will include the CMP, EPRP and SR. Geoteam will provide the EPRP to competent authorities such that they can prepare an external Emergency Response Plan, working with Geoteam. The aim is to develop a joint emergency plan which ensures adequate chains of command, training, equipment, policy and procedures are implemented both internally and externally, to prevent response failures due to lack of communication or coordination. The following elements will be included in the EPRP and will be communicated to the public via the most appropriate mechanism, in accordance with Geoteam/Lyidian's Stakeholder Engagement Plan and policy:

- An explanation in simple terms of the activity undertaken on the site;

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

- The common names of the substances on site which could give rise to a major accident, with an indication of their principal dangerous characteristics;
- MSDS for all substances at site and associated information if appropriate;
- General information relating to the nature of the major-accident hazards, including their potential effects on the population and the environment;
- Information on how the population concerned will be warned and kept informed in the event of an accident;
- Information of the actions the population concerned should take, and on the behaviour they should adopt, in the event of an accident;
- Confirmation that the company is required to make adequate arrangements on site, including liaison with the emergency services, to deal with accidents and to minimise their effects;
- A reference to one or more off-site and/or joint emergency plans drawn up by local authorities to cope with any off-site effects from an accident;
- Details of where further relevant information can be obtained; and
- This information will be communicated to the public via the most appropriate mechanism, in accordance with Geoteam's Stakeholder Engagement Plan and Policy.

4 Cyanide

Most gold ores contain gold at a relatively low concentration. At these concentrations the use of hydrometallurgical (aqueous chemical) extraction processes represent the most economically viable methods for gold extraction. Gold recovery using hydrometallurgy generally involves a leaching step, followed by the separation of the gold bearing solution from the residues, or adsorption of the gold onto activated carbon. After elution from the activated carbon the gold is refined further by precipitation or electrodeposition.

A number of leaching solutions can be considered in the extraction of gold. Chloride, bromide, thiourea, and thiosulfate species form less stable gold complexes compared to cyanide solution and require more aggressive conditions and oxidants to dissolve the gold. These reagents also present risks to health and the environment, and are generally more expensive compared to the use of cyanide.

 GEOTEAM	Cyanide Management Plan	May 2016
--	--------------------------------	----------

The process of extracting gold from ore using cyanide solution (usually NaCN but can also be KCN) is called cyanidation. The affinity of cyanide for gold means it will be preferentially extracted compared to other metals (e.g. iron). Cyanidation is adversely affected by the presence of free sulphur or sulphide minerals in the ore. Cyanide will preferentially leach sulphide minerals and will react with sulphur to produce thiocyanate. These reactions will also enhance the oxidation of reduced sulphur species, increasing the requirement for lime addition to control the pH at a sufficient level to avoid the volatilization of hydrogen cyanide (HCN).

Cyanide is a singularly charged anion consisting of one carbon atom and one nitrogen atom joined with a triple bond, CN^- . The most toxic form of cyanide is free HCN, in a gaseous or aqueous state. At a pH of 9.3 - 9.5, CN^- and HCN are in equilibrium, with equal amounts of each present. At a pH of 11, over 99% of the cyanide remains in solution as CN^- , while at pH 7, over 99% of the cyanide will exist as HCN. Although HCN is highly soluble in water, its solubility decreases with increased temperature and under highly saline conditions. Both HCN gas and liquid cyanide are colourless and have a slight odour of bitter almonds.

Cyanide is very reactive, forming simple salts with alkaline earth cations and ionic complexes containing metal cations; the stability of these salts is pH dependent, and therefore, their potential environmental impacts and interactions (i.e. their acute or chronic effects, attenuation and re-release) can vary.

The alkaline earth cation salts of sodium cyanide are quite toxic, as they are highly soluble in water, and thus readily dissolve to form free cyanide. Weak or moderately stable complexes, such as those derived from metal containing ionic complexes, are classified as weak-acid dissociable (WAD). Although metal-cyanide complexes by themselves are much less toxic than free cyanide, their dissociation releases free cyanide as well as the metal cation which can also be toxic. Even in the neutral pH range of most surface water, WAD metal-cyanide complexes can dissociate sufficiently to be environmentally harmful if in high enough concentrations.

Cyanide forms complexes with gold, mercury, cobalt and iron that are stable even under mildly acidic conditions. However, both ferro- and ferricyanides decompose to release free cyanide when exposed to direct ultraviolet light in aqueous solutions. This decomposition process is reversed in the dark.

Metal Cyanide complexes may also react with alkaline earth cations forming salt-like compounds, these compounds tend to be very soluble and dissociate to the liberated metal cyanide complex and free cyanide.

 GEOTEAM	Cyanide Management Plan	May 2016
--	--------------------------------	----------

The cyanide ion also combines with sulphur to form thiocyanate (SCN⁻). Thiocyanate dissociates under weak acidic conditions, but is typically not considered to be a WAD cyanide species. Thiocyanate is approximately 7 times less toxic than HCN but is very irritating to the lung and oxidizes into carbonate, sulphate and ammonia. The oxidation of cyanide, either by natural processes or from the treatment of effluents containing cyanide, can produce cyanate, OCN⁻. Cyanate is less toxic than HCN, and readily hydrolyzes to ammonia and carbon dioxide.

Relatively low concentrations of cyanide can be highly toxic to humans and wildlife. Liquid or gaseous HCN and alkali salts of cyanide can enter the body through inhalation, ingestion or absorption through the eyes and skin. The rate of skin absorption is enhanced when the skin is cut, abraded or moist; inhaled salts of cyanide are readily dissolved and absorbed upon contact with moist mucous membranes.

The toxicity of HCN to humans is dependent on the nature of the exposure. Due to the variability of dose-response effects between individuals, the toxicity of a substance is typically expressed as the concentration or dose that is lethal to 50% of the exposed population (LD50). The LD50 for gaseous HCN is 100-300 parts per million (ppm). Inhalation of 2,000 ppm HCN causes death within one minute. The LD50 for ingestion is 50-200 milligrams, or 1-3 milligrams per kilogram of body weight, calculated as HCN. For contact with unabraded skin, the LD50 is 100 milligrams (as hydrogen cyanide) per kilogram of body weight.

Initial symptoms of cyanide poisoning can occur from exposure to 20 to 40 ppm of gaseous HCN, and may include headache, drowsiness, vertigo, weak and rapid pulse, deep and rapid breathing, a bright-red colour in the face, nausea and vomiting. Convulsions, dilated pupils, clammy skin, a weaker and more rapid pulse and slower, shallower breathing can follow these symptoms. Finally, the heartbeat becomes slow and irregular, body temperature falls, the lips, face and extremities take on a blue colour, the individual falls into a coma, and death occurs.

The body has several mechanisms to effectively detoxify cyanide, resulting in the excretion of thiocyanate. Although increased thiocyanate concentrations in the body resulting from chronic cyanide exposure can adversely affect the thyroid. Some of the available antidotes to cyanide poisoning take advantage of these natural detoxifying mechanisms. Sodium thiosulfate, administered intravenously, provides sulphur to enhance transformation of cyanide to thiocyanate in the body. Amyl nitrite, sodium nitrite and dimethyl aminophenol (DMAP) are used to increase the amount of methemoglobin in the blood, which then binds with cyanide to form non-toxic cyanomethemoglobin. Cobalt compounds are also used to form stable, non-toxic cyanide complexes, but as with nitrite and DMAP, cobalt itself is toxic.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

4.1 Summary of cyanide usage and facilities at Amulsar mine

The proposed Amsular mine will develop an epithermal gold deposit via open pit mining, Heap Leach Facility (HLF) and Absorption Desorption and Recovery (ADR) plant processing techniques, using a dilute Sodium Cyanide (NaCN) solution, The project is owned by Lydian International and will be operated by Geoteam. This CMP has been developed to support Amulsar as they progress towards an operational stage. In due course this document will be updated and evolve to an operational CMP in accordance with the Code guidelines.

The CMP outlines the identification of issues and managerial practices using or storing NaCN at the site. The CMP is also pertinent to the construction and development phases and many principles will be relevant to closure and post closure of the mine.

Following the ore being extracted from the open pit the Run of Mine (RoM) ore will be hauled by dump truck to the primary jaw crusher in the crushing plant, to reduce and prepare the RoM ore to a maximum size of 300mm, it will then be transported by conveyor belt to vibrating screens and then to two cone crushers. The crushed ore is conveyed to a stockpile for truck loading. The pebble Lime is added to the ore prior to the stockpile. The ore is loaded into trucks and trucked to the Heap Leach Pad (HLP). When the ore placed in an area for irrigation at the HLP a cyanide solution will be applied. The cyanide mixing tanks and the cyanide storage area is located within the ADR plant. Drawing No. 03 to 017 all relate to the location and design of the Heap leach Facility (including all solution ponds) and form part of this Cyanide Management Plan

 GEOTEAM	Cyanide Management Plan	May 2016
--	--------------------------------	----------

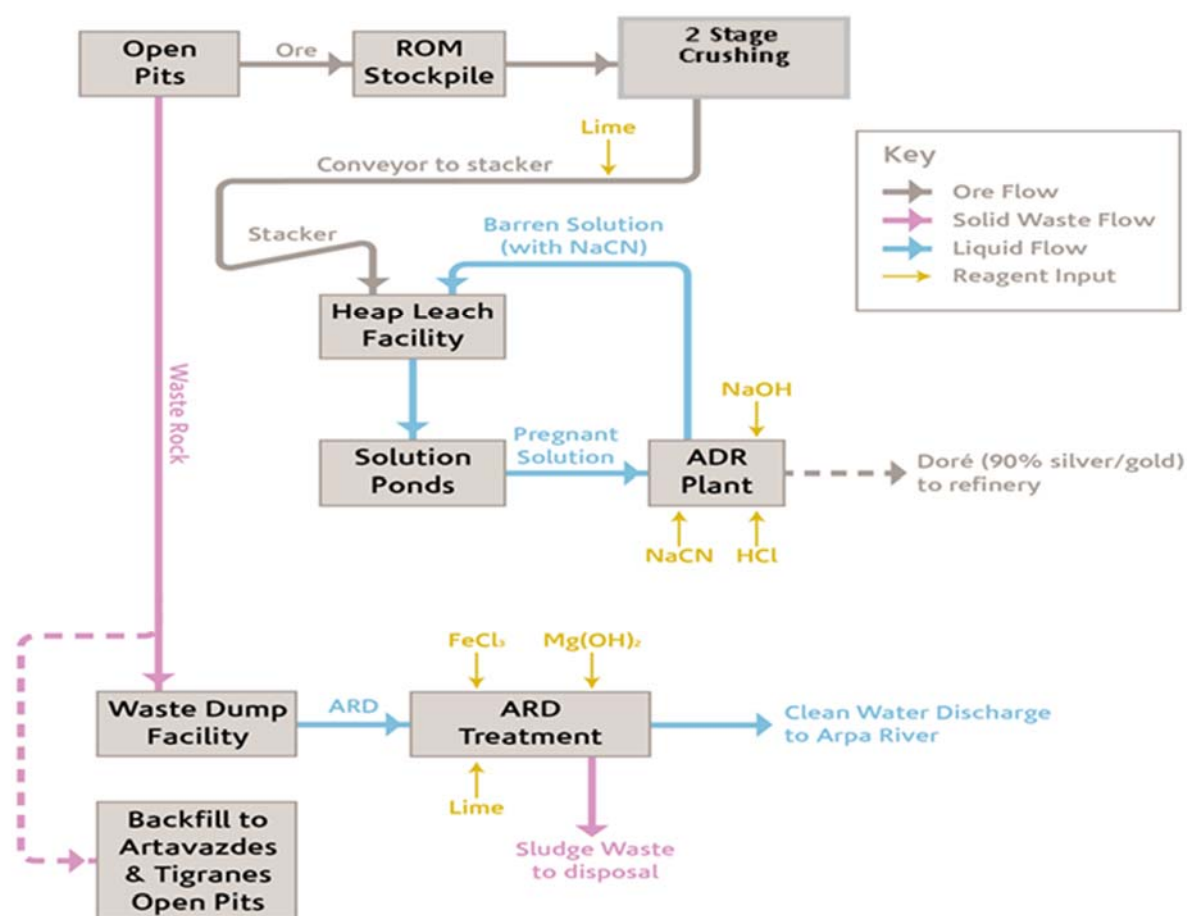


Figure 1: Process Flow Diagram of the Proposed Metallurgical Process during Operation Phase

It has been predicted that 0.1kg of sodium cyanide will be required per tonne of ore. Cyanide will be used in briquette form. The cyanide briquettes will be delivered in either flo-bins/drums or approved sealed containers to site by road and stored at site in a secure compound within the ADR plant area see Drawing No 19 entitled General Arrangements Reagents Sodium Cyanide, Sodium Hydroxide and Acid Building Plan. The ADR plant area, will have a basal area composed of impervious material (e.g. concrete). Gold production is scheduled to commence 2017, therefore the cyanide manufacturer and mode of transportation to site has not yet been confirmed, but will be selected in accordance with the requirements of the Code (See section 4 for guidance).

The Cyanide solution will be mixed in the ADR Plant. Raw water or barren solution and sodium hydroxide briquettes are added to the mixing tank to a pH level of 12-13, before adding the sodium cyanide (NaCN) to the mixing tank to obtain a 20-25% cyanide concentration. The cyanide solution is then transferred to the sodium cyanide storage tank before being distributed to the

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

barren solution surge tank and the barren strip solution tank. This reagent handling station is supported by a safety shower with a sump and pump discharging to the barren solution surge tank.

It is anticipated that the geosynthetically lined HLP will be constructed in three phases with approximate areas of 489,510m², 276,950m² and 346,620m² giving a total HLP area of 1,113,080m². The HLF is being designed as part of the Feasibility Study (FS) by Samuel Engineering (SE). The following information has been taken from the SE Report with regard to the HLF.

Crushed ore will be stacked on the HLF in a series of engineered lifts. Barren leach solution will be applied to the ore heap using tube drippers at a design application rate of 6 l/h/m². Leaching will commence soon after the piping is installed, a single 60 day leach period is planned.

At all stages of the design and construction stage, environmental degradation will be taken into consideration, including wildlife mortality. Exposure to cyanide can be avoided if at all stages the site is appropriately designed and managed. Various environmental, social and health and safety protection measures have been included in the mine design. These are outlined as appropriate in below and summarised in Table 1. The HLF consists of Heap Leach Pad (HLP), solution ponds and ADR plant.

4.2 Heap Leach Facility (HLF)

The HLF is situated in a localised valley within the Arpa River Valley, approximately 6km west of the mine pit area (6.14km from Erato and 6.81km from Tigranes open pits) and over 1km south of Gndevaz village. All components of the HLF are outside of the designated 5km buffer zone of the Spondaryan Kechut tunnel, and the northern 1km buffer zone limit south of Gndevaz village. The site is anticipated to accommodate 104Mt of ore.

Superficial springs were observed at two locations within the heap leach pad area. The first is located northwest of the main drainage near the highway H-42 to Jermuk, where the base of the basalt flow is exposed. The second spring is on top of cherty mudstone bed located southeast of the drainage in the northwest portion of the site.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

The composite liner is designed to prevent basal seepage of cyanide solution to underlying soils and groundwater. The HLP will be designed and constructed to the following parameters for environmental protection):

- 1.5mm (60 m/L (maximum height of stack is 60m or less) and 2mm (80m/L) elsewhere of Linear Low Density Polyethylene (LLDPE) geomembrane;
- 300mm low permeability (1×10^{-8} m/s) compacted engineered clay liner;
- Leak collection and recovery system, (LCRS); and
- Prepared foundations.

4.2.1 Leak prevention

A limited and targeted Leak Collection and Recovery System (LCRS) will be installed at the base of the pad, beneath the liner, in areas where the highest potential for elevated hydraulic head and/or concentrated flows occur. This system will enable the capture and diversion of any abnormal leaks in a closed system and provide a stimulus for additional monitoring protocols to be implemented. The LCRS comprises of:

- Transmissive drains underlain by a secondary non-woven geotextile liner to;
- Down-gradient sumps at the low point of each pad cell with; and
- Sump pumps which remove any leaked solution and returned to the cyanide circuit.

4.2.2 HLF Solution Control

An enhanced solution collection system will maximise solution recovery and reduce the risk of losses by minimising hydraulic head on the underlying liner (600mm maximum). This will consist of:

- A network of perforated collection pipes within a minimum 600mm thick free-draining granular fill layer; and
- 2mm thick LLDPE geomembrane 'rubsheets' beneath large diameter collection pipes to reduce wear and damage to the HLP liner.

4.2.3 Solution Ponds

The HLF collection ponds will include the process pond, Storm Pond 1, Storm Pond 2 and Storm Pond 3. The collection ponds were sized in accordance with the Project design criteria using the

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

results of the HLF water balance calculations. The process pond and Storm Pond 1 will be constructed during Phase 1 pad construction, Storm Pond 2 will be constructed during Phase 3 pad construction and Storm Pond 3 will be constructed during Phase 4 pad construction.

Process solution and storm/snowmelt water flows within the leach pad will gravity-drain to the pad's lowest point and through a spillway to the process pond. A cascading spillway system will be constructed between the process pond, Storm Pond 1, Storm Pond 2 and Storm Pond 3 for potential solution and storm/snowmelt runoff during pad operations. The storm ponds will be configured to cascade downgradient starting with Storm Pond 1.

The process pond is designed to contain:

- 8 hours of solution during normal operational flow;
- 24 hours of solution of emergency drain down flow from the ore heap in case of operational shutdown due to pump failure or power loss;
- The maximum cumulative excess water volume predicted for the Phase 1 pad under typical wet year climatic conditions;
- The maximum cumulative excess water volume predicted for Phases 1-2 pad under average year climatic conditions.

Storm Pond 1 is designed to contain:

- The maximum cumulative excess water volume predicted for Phases 1-2 pad under typical wet year climatic conditions, less the excess water volume that can be stored in the process pond;
- The maximum cumulative excess water volume predicted for Phases 1-4 pad under average year climatic conditions, less the excess water volume that can be stored in the process pond.

Storm Pond 2 is designed to contain the maximum cumulative excess water volume predicted for Phases 1-3 pad under typical wet year climatic conditions, less the sum of the Storm Pond 1 capacity and the excess water volume that can be stored in the process pond.

Storm Pond 3 is designed to contain the maximum cumulative excess water volume predicted for Phases 1-4 pad under typical wet year climatic conditions, less the sum of Storm Pond 1 capacity, Storm Pond 2 capacity and the excess water volume that can be stored in the process pond.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

Standby pumps and an independent backup power supply system will be provided at the storm ponds to evacuate the ponds during large storms and power outages, if needed to prevent pond overflow into the natural drainage.

The process pond will have a composite double-geomembrane liner system comprised of top (primary) and bottom (secondary) geomembranes, with an intermediate LCRS layer, and underlain by a 0.3 m minimum thickness compacted low-permeability soil liner layer. The bottom geomembrane will be 1.5-mm (60-mil) smooth LLDPE, and the top geomembrane will be 2-mm (80-mil) single-side textured HDPE with texturing at top for traction. The LCRS between the two geomembranes will be a transmissive geocomposite (drainage net) that is connected to the pond's LCRS sump. The geocomposite will be 5-mm (200-mil) geonet heat-laminated on both sides with 270-gr/m² (8-oz/yd²) nonwoven geotextiles. Should a leak ever occur through the top geomembrane, it would flow through the geocomposite to the LCRS sump, where it would be removed via a pump. The design intent of the LCRS is to ensure that no hydraulic head occurs on the bottom geomembrane, thereby removing any driving force required for seepage to occur through that geomembrane.

Storm Pond 1 will initially have a single-geomembrane composite liner system consisting of 2-mm (80-mil) single-side textured HDPE geomembrane with texturing at top for traction, underlain by a 0.3-m minimum thickness compacted low-permeability soil liner layer. The pond will be double-geomembrane-lined and a LCRS geocomposite added between the geomembranes during Phase 3 pad construction. The added top geomembrane will be 2-mm (80-mil) single-side textured HDPE with texturing at top for traction, and the geocomposite will be 5-mm (200-mil) geonet heat-laminated on both sides with 270 gr/m² (8-oz/yd²) nonwoven geotextiles.

Storm Pond 2 and Storm Pond 3 will have a single-geomembrane composite liner system consisting of 2-mm (80-mil) single-side textured HDPE geomembrane with texturing at top for traction, underlain by a 0.3-m minimum thickness compacted low-permeability soil liner layer.

A stock-proof mesh fence with locking gates will be constructed around the perimeter of the collection ponds to prevent wildlife from reaching the fluids in the ponds. An additional purpose of the fence is for public safety and to deter unauthorized access into the collection ponds area

Ponds where a cyanide solution is present will implement bird deterrents to protect wildfowl from landing in the ponds e.g. "Bird Balls".

 GEOTEAM	Cyanide Management Plan	May 2016
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4.2.4 Drainage Control

Diversion embankments and channels will be constructed around the perimeter and upgradient of the HLF to divert storm and snowmelt runoff from upstream catchments away from the pad and collection ponds. The leach pad will have perimeter berms to prevent applied solution and rainfall/snowmelt water within the pad from overflowing the pad.

Underdrains will be constructed at the locations of existing drainages and seeps within the leach pad and collection pond footprints to drain groundwater/subsurface seepage to downgradient of the ponds. The underdrains will discharge into a collection sump, where the discharge water quality will be monitored as required.

The leach pad will have a 1.5m high toe berm and 1 m high perimeter berms to prevent applied solution and rainfall/snowmelt water within the pad from overflowing the pad. The solution and storm water flows will be collected by a drain pipe network constructed above the pad liner and routed by gravity to the process ponds.

Cross sectional drawing showing construction details are contained in the Feasibility Design report dated 22 October 2014 drawing No 01-20 inclusive.

4.2.5 Environmental Protection Measures

As part of The International Cyanide Management Code, environmental monitoring and protection features will be incorporated in the HLF construction to minimize potential impacts on the surrounding environment, wildlife, and groundwater. These features, most discussed above, will include the following:

- Diversion systems to divert storm and snowmelt runoff from upstream catchments away from the leach pad and collection ponds;
- Underdrains beneath the leach pad and collection pond footprints to drain groundwater/subsurface seepage to a collection sump located downgradient of the ponds, where the underdrain discharge water quality will be monitored as required;
- A composite liner system for the pad consisting of a geomembrane underlain by a compacted low-permeability soil liner layer or GCL;
- Process solution and storm/snowmelt water collection and drainage system above the pad composite liner consisting of a network of drain pipes within a free-draining granular

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

fill layer designed to enhance fluids collection and maintain a low hydraulic head on the liner;

- Placement of wear sheets beneath the large-diameter drain pipes within the pad to reduce the potential for wear and damage to the pad geomembrane liner from pipe movement;
- A toe berm with a minimum height of 1.5 m, and perimeter berms with a minimum height of 1 m around the pad phases, for solution and storm/snowmelt water containment;
- A 4 m minimum setback between the crests of the pad toe berm, perimeter berms and phase berms and the ore heap toes to reduce the risk of solution release due to upset conditions during operations;
- Stock-proof fencing around the pad to prevent access;
- A process pond with sufficient capacity to contain the required solution normal operational flow and emergency draindown flow from the ore heap;
- Storm ponds with sufficient capacity to contain the storm/snowmelt flows from the HLF areas;
- A composite double-geomembrane liner system for the process pond comprised of a top (primary) geomembrane and a bottom (secondary) geomembrane, with an intermediate LCRS layer. The bottom geomembrane will be underlain by a compacted low-permeability soil liner;
- An initial composite single-geomembrane liner system for Storm Pond 1 consisting of a geomembrane underlain by a compacted low-permeability soil liner. This storm pond will be double-geomembrane-lined and an intermediate LCRS layer added to its liner system during Phase 3 pad construction to contain potential process solution overflow from the process pond during Phases 3-4 pad operations;
- A composite single-geomembrane liner system for Storm Pond 2 and Storm Pond 3 consisting of a geomembrane underlain by a compacted low-permeability soil liner;
- Placement of wear sheets above the geomembrane liners of the collection ponds, underneath pipes and in the corner sump areas, for geomembrane protection from pipe movement and pumping operations;

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

- Standby pumps and an independent backup power supply system at the storm ponds to evacuate the ponds during large storms and power outages, if needed to prevent pond overflow into the natural drainage;
- Stock-proof fencing around the collection ponds to prevent access;
- Bird ball will be used on cyanide containing solution ponds to deter avians; and
- Monitoring wells around the HLF for monitoring groundwater quality.

Monitoring wells will be installed around the HLF to monitor the groundwater quality during operations and after closure. The number of wells and their locations and depths will be determined and the wells installed prior to HLF construction so that baseline data can be compiled. A groundwater quality and environmental monitoring program will also be developed for the facility.

Table 1 below is a summary of the features that will be considered during the detailed design of Amulsar mine site development, with regard to the use of cyanide. These measures will all be addressed and implemented in order to ensure environmental protection and minimise the risk of exposure to workers, the community and such like to cyanide. This list is limited, however when and if necessary further design features will be included to ensure a robust cyanide protection.

Table 1: Summary of Environmental, Community and Health and Safety Design Measures	
CODE Compliance	• Cyanide Management Plan (WAI ZT520088 dated February 2016) • Internal audit protocol; and • Use of independent external Code auditor.
Operational Status	• Site at design stage
Environmental, Community and Worker Health and Safety	Heap Leach Facility (HLF): • Leak detection system installed at crucial points of the HLF; • Composite geosynthetic geomembrane lined • Ground water monitoring bore hole installation; • Surface water course diversion system; • Diversion tunnels for river water connections to reservoir • Outside 100 year flood plan; • Secure fencing; • Warning signs;

 GEOTEAM	Cyanide Management Plan	May 2016
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Table 1: Summary of Environmental, Community and Health and Safety Design Measures

	• Restricted access; • PPE for all employees working on the HLF; • Cyanide awareness training for all employees; • Preparation of Standard Operational Procedures (SOPs); • Minimise cyanide in solution; • Controlled stacking; • 4m stand off from perimeter • Directional lighting; and • Groundwater monitoring wells. Solution Collection Pipes • All collection pipes in secondary containments; • Culvert for pipes under any access roads; • Pipes clearly marked; • Flow direction; • All pipes checked daily; • All valves check daily; • Maintenance programme developed. Solution Ponds: • All solutions waters re-used (closed circuit operation). • Leak detection system; • Double composite geosynthetic liner; • Freeboard on pond design criteria; • Groundwater monitoring wells; • Stock fencing (mesh); • Restricted access; • Lifesaving equipment; • Resuscitation equipment; • Bird deterrents • PPE for workers;
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 GEOTEAM	Cyanide Management Plan	May 2016
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Table 1: Summary of Environmental, Community and Health and Safety Design Measures

	• Training for workers; • Preparation of SOPs; • Daily inspections; and • Piping in secondary containments. Cyanide storage facilities • Stored on competent surfaces (concrete); • Separate to other substances; • Well ventilated area; • Restricted access; • Limit Cyanide stored on site; • Empty and waste packaging returned to manufacturer; • Cyanide awareness training; • Training for handling of cyanide containers; • Spill kits available in area; • Preparation of SOPs; • Provision of PPE. Cyanide Mixing tanks • HCN monitors on all mixing tanks; • CCTV and supervision at mixing times; • Tank integrity inspections daily; • Pipe integrity inspections daily; • Check lists and reports prepared; • Flow directions on all pipes; • Restricted access; • Cordoned off during mixing times; • Personal HCN monitors; • Cyanide awareness training; • Preparation of SOPs; • Showers by mixing tank; • Eye wash shower • pH level alarm indicator;
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 GEOTEAM	Cyanide Management Plan	May 2016
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Table 1: Summary of Environmental, Community and Health and Safety Design Measures

	• Tank level gauge; • Spill kits available in area; and • Emergency Response protocols for incidents.
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5 CYANIDE PRODUCTION AND PURCHASING

Geoteam will use a procurement process and procedure to encourage responsible production practices for sodium cyanide and shall wherever possible purchase sodium cyanide from a manufacturer that is a signatory to the CODE (or working towards CODE compliance). It is Geoteam's intention to become a signatory to the Code.

Geoteam also reserves the right to conduct their own inspections of manufacturer's premises and operations and these should be incorporated into tenders and subsequent procurement documents. Geoteam will retain record copies of all contracts and all audit results.

Geoteam will purchase sodium cyanide from suppliers who will retain responsibility for all cyanide packaging materials, by returning all empty containers back to the supplier using the same shipping container that delivered the material to site e.g. flo-bins. However, should this not be possible Geoteam will dispose of all cyanide packaging by incineration (wooden crates) and triple rinsing of the inner polythene bags, before disposal to ensure no cyanide residues are on the polythene bags. The shipping containers will be tested for cyanide contamination. Should the shipping container prove positive for cyanide contamination, they will undergo triple washing before being re-tested to fully ensure no contamination is present. Lydian will review emerging technologies, such as solid to liquid delivery systems which eliminate virtually all packaging material. If/when these become commercially viable, Lydian will consider implementation.

The internal audit and protocol developed by WAI covers production purchasing under Section 1 (Production), see Appendix 1.

6 TRANSPORTATION OF SODIUM CYANIDE

Even though Geoteam has no direct legal responsibility for cyanide transport, Geoteam recognises that it is important that cyanide is delivered by an approved safe and an environmentally friendly way to the Amulsar mine site. Solid sodium cyanide (brickettes) will only be transported to site in UN-approved ISO (or similar) shipping containers that are approved to

	Cyanide Management Plan	May 2016
---	--------------------------------	----------

be used to carry controlled substances, Geoteam will undertake to decontaminate all shipping containers should the testing of a container prove positive before returning to the transportation company or manufacturer.

The supplier of cyanide will contract with cyanide transportation companies that are reliable, have well trained drivers, modern and well-maintained vehicles, and can demonstrate a commitment not only to limiting the exposure of its work force to cyanide, but also to preventing, controlling, and/or responding to releases of cyanide to the environment. The supplier of cyanide will keep a register of appropriate transportation companies. Companies that are certified under the Code will automatically be deemed appropriate and should be the first choice. In the event that a Code-approved Company cannot be used due to lack of availability or excessive haul distances, an independent audit will determine the suitability of an alternative company's. Such audits will be required at least every 3 years. The independent audit should satisfy the protocols given in the Code.

Certification of transporters under alternate, widely recognized schemes [e.g., the Safety and Quality Assessment Systems (SQAS) program implemented under the Chemical Manufacturers Association's voluntary Responsible Cargo initiative by the European Chemical Industry Council (CEFIC)] may be considered if an equal or greater level of care and control over cyanide transportation services can be demonstrated adequately. Geoteam will also reserve the right to conduct its own inspections of contractor operations in accordance with the Code before entering into any contract. Geoteam will retain copies of the contract and all contractor audit results, for inclusion in their own cyanide audit. If the cyanide transport contractor is certified under the CODE, a Summary Report Form and Auditor Credentials Form will be available for public review on the ICMI web site: www.cyanideCode.org.

The Internal Audit Protocol covers transportation , see Section 2 (Transportation), contained in Appendix 1.

6.1 Responsibilities during Transportation

As part of its contractual arrangements, Geoteam will prepare written agreements with the cyanide manufacturer and transporter, which will outline which party will be responsible for health, safety and environmental issues during each phase of cyanide transportation, as applicable:

- Driver/operator qualifications and vehicle operation training;

	Cyanide Management Plan	May 2016
---	--------------------------------	----------

- Accident prevention, emergency response, and safety training for transporter and drivers/operators throughout the transportation process (including responsibilities for strict monitoring of drivers for alcohol and drugs);
- Packaging required by UN for international shipments;
- Labelling languages necessary to identify the material;
- Storage prior to shipment;
- Evaluation and selection of routes to reduce risks, including community consultation and disclosure;
- Establishment of protocols for driver/Geoteam communications and automated shipment tracking via global positioning systems (GPSs) or other automated systems;
- Storage and security at ports of entry and cargo transfer points;
- Interim loading, storage and unloading during shipment;
- Transport to the Amulsar process plant;
- Unloading at the process plant;
- Safety and maintenance, and operation of transportation vehicles throughout each delivery;
- Co-ordination of security and emergency response actions throughout the transportation process;
- Preparation and submittal of trip reports and immediate reporting of transportation hazards or unsafe roadways or driving conditions;
- Task and safety training for cyanide transporters; and
- Emergency response throughout the transport.

These agreements will also specify any designated responsibilities that apply to Geoteam, the cyanide manufacturer, and the cyanide transporter are extended to any subcontractors used by these parties for any activities related to cyanide transportation and that all affected parties are required to inform subcontractors of their designated responsibilities. Copies of these agreements will be retained for external information requests and be included in the Amulsar cyanide audit/s.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

6.2 Cyanide Packaging

Cyanide packaging container requirements will be contractually defined and conform to the requirements of the Code. Strict compliance with these requirements ensures that the packaging containers undergo rigorous maintenance and testing and that they are robust enough to withstand typical transport incidents and minimise the risk of product release. Where practical Lydian will purchase sodium cyanide from suppliers who will retain responsibility for all packaging materials e.g. Flo-bins, bag-boxes or iso-containers. Flo-bins are purpose built to contain sodium cyanide and constructed to facilitate easy deposition into site mixing tanks. The shipping containers are constructed to International Bulk Container (IBC) specification for dangerous goods. Bag-boxes comprise polythene sealed sacks, inside wooden crates, which will be delivered to site in the shipping containers. Before these shipping containers are re-used or returned to the shipping company, they will be tested for cyanide contamination before being released back to the transportation company. The de-contamination protocol will include analytical sampling, before the containers will be released for other purposes or collection. All actions will be supervised by the processing manager or designated responsible site staff.

6.3 Road Survey

The supplier of cyanide will undertake or arrange a detailed road route survey from the appropriate railhead(s) or seaport terminal to the Amulsar mine site no less than one year prior to the commencement of the operational phase of the project, and periodically thereafter at Geoteam's discretion and as circumstances warrant. Geoteam will review this plan and survey. Transporters will be required to submit brief reports from each trip to the project site, and be required to contact Geoteam logistics and environmental department staff if unsafe driving conditions or significant hazards are observed on any major site access roads.

This detailed road survey is likely to be undertaken as part of the engineering feasibility study with respect to heavy and oversize loads accessing site. The survey team will include a member with responsibility for reviewing the route with issues related to cyanide and other hazardous materials (such as explosives) in mind. The results of the survey will be included in further detailed risk assessments with regard to the transport of cyanide (and other hazardous chemicals) to site. Routes avoiding centres of population and river crossings will be chosen where possible and viable.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

6.4 Labelling of Cyanide

The labelling of cyanide packaging is the responsibility of the transporter. Labelling protocols must conform to UN standards as defined in Recommendations on the Transport of Dangerous Goods: Model Regulations (UN, 2003) as well as any applicable Armenian regulations.

7 MANAGEMENT OF SODIUM CYANIDE

7.1 General

Geoteam will ensure that all design, construction, operation, maintenance, and monitoring /inspection procedures at the Amulsar facility associated with the handling of sodium cyanide will prevent any releases and exposure of cyanide to workers and the public and hence, minimise any impacts as far as is practicable. All information that demonstrates these procedures have been developed in such a way as to prevent major accidents will be collated and retained for auditing and external validation.

Safety protocols/procedures and plans will be prepared for the management of cyanide. Detailed written Standard Operating Procedures (SOPs) and training programs for workers managing cyanide will be prepared and implemented, to further minimise the potential impacts of any cyanide releases or exposures. In addition, emergency medical procedures will be established and antidote kits made available in the event that workers suffer any toxic health exposures to cyanide. Administration of antidotes to cyanide need to be performed only by qualified physicians, nurses, medical technicians, or trained emergency response team personnel. Geoteam Emergency Response Teams (ERTs) need to include or have immediate access to qualified medical personnel, as this forms part of the Code.

7.2 Cyanide Off-Loading and Storage Facility

Transport containers carrying sodium cyanide will be off-loaded in the presence of trained staff under appropriate supervision and placed immediately within a secure, fenced hard-standing compound or dedicated, ventilated warehouse. Off-loading and the storage facility should be located away from any surface waters on an impermeable base (concrete) and bunded appropriately. This minimises the risk of soil contamination and potential for cyanide infiltration in the event of unplanned spillages. Appropriate signage to the UN standards for dangerous goods

 GEOTEAM	Cyanide Management Plan	May 2016
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should be displayed on the fence. No unauthorized access will be permitted in the compound area. The compound fences and gates will be checked for damage, tampering and security on a regular basis.

No acids, oxidizers or other reagents that may be incompatible with cyanide will be stored within the cyanide compound. The compound will be well ventilated at all times. Consideration will be given to the provision of appropriate cyanide monitors. When required for use, containers will be moved closer to the mixing tank area and supervised by trained personnel. This area will also be bunded and have an impermeable base and fence or barrier if required. A manually activated alarm will be installed in the storage areas. An SOP will be prepared and implemented to cover these measures.

7.3 Cyanide Mixing / Processing Plant

The cyanide mixing area will be delineated and cordoned off during mixing times, with a trained supervisor in attendance. All workers undertaking duties in close proximity to the cyanide will be instructed in the use and wearing of appropriate Personal Protective Equipment (PPE) and have undergone cyanide awareness training. The area will be bunded and have a concrete base.

The cyanide will be emptied into the mixing tank containing solution with a pH of 12-13. The solution will dissolve the cyanide and then the solution will be pumped to the barren pond and onward to the HLP and irrigation system. The mixing tank will be constructed within a concrete bunded area which will be constructed to a capacity of 110% volume of the mixing tank. The mixing tank containment structures will include sumps and other engineered features to facilitate the recovery of any spilled materials by pumping them back to the process circuit.

The secondary containment area for the mixing tank will not have any drains or other outlets. Sumps within the containment areas will be equipped with dedicated suction pumps to return any released cyanide solution to the processing circuit.

All fixed piping for cyanide solution will be constructed from stainless or carbon steel or high density polyethylene (HDPE), or other materials known to be compatible with cyanide solution.

The design and the construction of the cyanide mixing facilities will specifically include requirements for the implementation of QA/QC programs to recognised international standards, in order to provide a high measure of confidence that the facilities will function as designed. Design and construction quality assurance/quality control records and 'as-built' certifications of these facilities will be retained.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

Hydrogen Cyanide (HCN) gas detectors will be located at the cyanide mixing tank and surrounding areas. The detectors are designed to sound a highly audible evacuation alarm and initiate a flashing beacon (mixing tank and process plant detectors) if the airborne HCN gas concentration reaches the most stringent of the worker exposure limits of 10ppm, with warning alarms set at 4.7ppm. The detectors on the mixing and processing plant will also be designed to send an electronic alert signal to the process plant operations control room. Signs in all appropriate languages will be posted at the facility, detailing the procedures for operation of the dissolution transfer equipment, requirements for response to releases and first aid in the event of an emergency. All operatives working in the mixing area and processing plant will wear a personal HCN gas detector with the alarm set at 4.7ppm. Guidance on personal alarms is contained in the Code guidance notes.

The cyanide mixing tank will be equipped with a visible solution level gauge and a high level alarm that will sound in the control room to prevent over-filling. Any cyanide solution accidentally released during mixing will be captured in the sump and pumped back to the production circuit. It is good practice to be able to monitor the mixing operation remotely using CCTV and this will be included in the Detailed Design.

General emergency response equipment such as spill kits, neutralisers and dry absorbent materials, a medical oxygen and resuscitator, cyanide antidote (to be administered only by medical personnel or trained ERT members), a source of potable water, an eye wash/safety shower station, a non-acidic fire extinguisher (dry chemical) and portable self-contained breathing apparatus (SCBA) equipment will be available in close proximity to the mixing tank and process plant for use in the event of a cyanide release. A manually activated alarm will also be installed in the mixing and processing areas. Authorised personnel will also have a two-way radio or cellular telephone with them during cyanide mixing activities to summon assistance in an emergency.

An SOP will be developed and implemented for cyanide mixing which provides specific instructions and guidance for safe operation. These procedures should contain a checklist of measures to be completed prior to mixing cyanide and include as a minimum:

- PPE requirements;
- Description of the method used to ensure that the solution is at the appropriate pH;
- Details of the trained supervisor present during these activities to respond in the event of an emergency;

	Cyanide Management Plan	May 2016
---	--------------------------------	----------

- Pre-work inspections conducted prior to each shift;
- Emergency procedures (accidental exposures and releases);
- Recording and reporting systems; and
- Documentation.

7.4 Preventative Maintenance

All pumps, hoses, and other critical equipment used in cyanide mixing and processing will be included in a preventive maintenance program. The preventive maintenance program should generate work orders on a regular basis so the equipment can be inspected and maintained or replaced, as necessary, to assure its continued function and to prevent cyanide exposures and releases.

7.5 Inspections

Inspections of the cyanide off-loading, mixing and process plant facilities will be conducted regularly (at least monthly). Inspection procedures and checklists will be prepared by Geoteam which should include a plan for corrective actions and follow-ups. All records will be retained for verification during internal and external audits.

Use of a detailed checklist serves to focus the attention of the inspector to specific items that must be observed. Tank and pipeline inspections will focus on structural integrity, signs of corrosion and leakage and legibility of labels indicating piping or tank contents and the direction of flow in pipelines. Secondary containment systems, and associated supply and discharge piping components, will be inspected for their integrity, the presence of fluids or evidence of leakage, cracks, and available capacity.

Any visible signs of leaks involving cyanide or suspected unsafe conditions will prompt immediate corrective and preventive action. Examples of such actions could include pumping the solution to the production process, repairing leaking equipment (and inspecting similar equipment to prevent similar occurrences), increasing testing/inspection frequencies, conducting more rigorous types of leak detection tests or other measures necessary with the nature and significance of the release.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

An audio alarm system will be installed as described above and will be activated if any cyanide releases occur. Following this, the area will be cordoned off and only appropriately protected and trained personnel will be admitted. All such occurrences will to be documented and recorded a 'non-conformance' so that formal corrective and preventive actions can be undertaken.

The cyanide storage compound security fencing will also be inspected at monthly intervals to evaluate its integrity, ensure that access restriction signs are legible, and verify that access to this area is restricted to authorised personnel only via a signing -in and -out procedure. All hard copy inspection records will be kept for a minimum of 2 years. Retention of documents and / or electronic records will be in accordance with the ESMS Document Control Procedure (Ref GEOTEAM-ENV-PRO0210).

7.6 Adsorption, Desorption and Recovery / Process Plant Design

The facilities will be designed and constructed to accepted engineering specifications consistent where practical with the CODE, EU guidance and international Best Available Techniques (BAT) and where practical all applicable local and national Armenian regulatory requirements.

All tanks and pipelines for process solutions will be constructed of steel, HDPE or other materials known to be compatible with solution containing cyanide. Such vessels and piping will be colour Coded to comply with necessary Code requirements. The sections of the processing plant where any solution containing cyanide is used need to be located within a concrete secondary containment with sufficient capacity to hold at least 110% of the largest tank within the containment, as well as any piping that drains back to the area. Secondary containment structures for any tanks that are external to buildings will have additional capacity in case of a storm event. Sumps within the containment areas will have to be equipped with dedicated suction pumps to return any released solution to the processing circuit. Float switches or other high level indicators will be placed at key locations within the secondary containment areas to identify the presence of solution and to alert operators in the process control room. Process pumps will be interconnected to an automatic shut-down system to prevent a potential cyanide release if a downstream pump should fail.

Geoteam will maintain portable electrical generators on site to supply back-up power to critical pumps, motors and control systems in the event of a power failure. SOPs will be prepared for emergency power generation for cyanide handling equipment which specify the frequency for

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

generator maintenance and testing and describe the plans for automatically starting and supplying back-up power to keep critical pumps and equipment operating during a power outage.

The processing plant will be fenced and access restricted. Procedures will be implemented to control/prevent the potential for unauthorised exposure to cyanide and other hazardous conditions on site. A security perimeter fence will be installed around the entire boundary of the site to control site access to the process plant and other critical areas of the operation, (e.g. sodium cyanide storage areas). Procedures for site security will be developed and a signing in/out regime implemented. Security procedures will include inspection of perimeter fencing, site security practices and legibility of access restriction signs. Inspections will be carried out monthly.

Contractors responsible for the design and construction of processing facilities will be required to implement a QA/QC programs to recognised international standards in order to provide a high measure of confidence that the facilities will function as designed. Design and construction quality assurance/quality control records and 'as-built' certifications of these facilities will be retained by Geoteam.

7.7 Management of Cyanide Solutions in the Production Process

Detailed written SOPs and training programs for workers managing cyanide will be implemented as described to further minimise the potential for any cyanide releases or exposures. In addition, emergency medical procedures will be established and antidote kits made available in the event that workers suffer any toxic health exposures to cyanide. Cyanide antidotes will be administered only by qualified personnel such as physicians, nurses, medical technicians, or trained ERT personnel. Geoteam ERTs will include, or have immediate access to, qualified medical personnel.

SOPs will be developed covering operation of the ADR plant. These should include specific instructions for the operation of this facility. In addition to describing how the facility is to be operated, these procedures will identify cyanide related risks and specify the necessary Personal Protective Equipment (PPE), pre-work safety checks and employee-training requirements and references. Contingency Action Plans for downtime in process plant operations should also be discussed in the procedures.

It will be Geoteam policy that no physical or operational changes should be made to any part of the cyanide circuit without first informing the Environmental and Health and Safety Departments to determine:

- If the proposed change is allowed under applicable permits and licenses;
- WA/Appendix 8.11

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

- If such changes could increase the potential for cyanide exposure or release; and
- If the proposed change has any implications with respect to the Code.

This includes any proposed changes in the handling both of reagent cyanide and process solutions. Approval of any process plant changes involving the cyanide circuit will prompt a review of this CMP and/or subsequent CMP's and the EPSRP for adequacy and accuracy. Routine maintenance activities, equipment replacement and changes in processing rates that are within design parameters and permit limits do not require this notification.

Hydrogen Cyanide gas detectors will be located in the following areas within the processing plant:

- Carbon column tops;
- Carbon desorption area; and
- Cyanide unloading, mixing and storage areas.

The HCN detectors will sound an evacuation alarm and initiate a flashing beacon if the hydrogen cyanide concentration is above an established trigger threshold (warning alarms set at 4.7ppm and evacuation effected if levels read 10ppm or above). Limits should be in accordance with international recommended standards, the CODE and any national Armenian regulations. The detectors will also send an alert signal to the operators in the process control room. Cyanide antidote kits as well as medical oxygen and resuscitators will be available for use by medical professionals at the processing plant in the event of any such occurrence. Potable water sources, eye wash/safety shower stations and dry powder fire extinguishers will be located at strategic locations throughout the plant.

Personnel working in processing areas that involve cyanide handling or management will be trained on how to perform their assigned tasks in a manner that minimises the potential for exposure to and release of cyanide. Training sessions should be conducted and documented as part of induction procedures for employment. Training should also include regular drills for responding to cyanide spill scenarios. All training records will be maintained for each individual employee.

7.7.1 Control of Cyanide Addition Rates

During operations, Geoteam will monitor the use of cyanide in the leach process and to adjust cyanide addition rates accordingly. The design goal of such a system is to maximise the efficiency of the leaching process and reduce the potential for use of excess cyanide. This will help ensure

	Cyanide Management Plan	May 2016
---	--------------------------------	----------

that the lowest overall cyanide usage is adopted, which in turn will minimize the amount of cyanide being transported to the site, and reduce overall risks to human health and the environment.

In order to further minimise any exposure possibility, Geoteam will expedite the capture and cleanup of any releases of cyanide solution, including any solutions released to secondary containments that are not within buildings. Geoteam will train employees in the process area to observe their workplace for incidents of wildlife mortality and to immediately report any such observations to their supervisors. Procedures will be developed for reporting incidents and include routine daily inspections as part of the process plant operator's duties. If any incidents have occurred, a formal investigation will be undertaken for corrective and preventive actions. All incidents will be reported and all follow-up actions recorded. Any external cyanide ponds will be assessed as to whether other mitigation measures such as "Bird Balls" or audio bird scarers are required.

7.8 Preventive Maintenance – ADR plant

A preventive maintenance program will be developed to include, as a minimum, all primary and backup pumps and power generators and other equipment critical to the handling of cyanide solution. The preventive maintenance system will generate work orders on a predetermined schedule so that such equipment can be inspected and maintained or replaced as necessary to assure its continued functioning, thereby preventing cyanide exposures and releases. An SOP will be prepared for preventative maintenance and will include decontamination of cyanide handling equipment. This will describe the necessary measures for decontamination of any such equipment that has been in contact with cyanide solution prior to it being taken out of service for maintenance or decommissioning, sale or disposal.

7.9 ADR / Processing Plant Cyanide Inspections

Pre-work inspections will be conducted prior to each shift as a mandatory precaution and a check list with a safety procedure prepared. The results of all such inspections will be recorded and the records maintained.

Any observed releases of cyanide solutions or unsafe conditions will receive immediate corrective action to address the problem/incident. Because of the importance of inspections, the observations made of any of these conditions will be documented as a non-conformance and formal corrective and preventive actions taken.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

All tanks, piping, valves and secondary containment structures in the processing area will be subject to periodic formal inspections. Procedures will be developed for the inspections of cyanide tanks, pipelines and any other cyanide facilities. These inspections will develop a detailed checklist to focus the inspector on the specific items to be observed. Tank and pipeline inspections need to focus on structural integrity, signs of corrosion and leakage and legible labels indicating their contents and the direction of flow in pipelines. Secondary containment structures, and associated supply and discharge piping systems, will be inspected for their integrity, evidence of cracks or leakage, the presence of fluids, and their available capacity. Procedures will be prepared which describe how follow-up corrective and preventive actions should be undertaken and completed.

The internal audit protocol Section 3 handling and storage is contained in Appendix 1.

8 DESIGN AND CONSTRUCTION OF THE HEAP LEACH FACILITY (HLF), SOLUTION PONDS AND ASSOCIATED PIPE WORKS

8.1 General

Geoteam will work with the design engineering firm to ensure that the design and operation of the HLF and any solution ponds prevents unnecessary releases and exposure of cyanide solutions to the environment and limits workers exposure to acceptable limits.

Information demonstrating that the facilities have been designed, constructed, operated and maintained to prevent major accidents will be collated and maintained. Detailed written operating procedures and training programs for workers managing and working with cyanide will be implemented to further minimise the potential impacts, releases and exposures.

The HLF and process pond design include sufficient measures to ensure that ground and surface waters will not be adversely affected under well managed, normal operating conditions. This will be ensured and demonstrated by initiation of a comprehensive water monitoring programme. Cyanide will be tested for in all ground and surface water samples in accordance with Geoteam's ESMS Environmental Monitoring Plan (EMP). The EMP will include targeted sampling around the HLF and storage areas. A series of monitoring boreholes will be installed beneath and close to the HLF location to establish baseline conditions. Additional wells will be required down

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

gradient of the HLF and solution ponds to allow pre-construction, construction, operation, closure and post-closure groundwater monitoring.

During operations, if cyanide contaminated water is detected in the wells, the solution will be pumped back to the solution ponds. Details of sampling locations, sample preservation protocols, chain of custody procedures and analytical methods will be addressed in accordance with the EMP. Records of all monitoring activities and associated analytical results will be retained in accordance to the Document Control Procedure (Ref GEOTEAM-ENV-PRO0210).

Should cyanide be detected away from the HLF and storage areas, this will be reported, immediately investigated and appropriate remedial actions will be agreed. Procedures will be developed for the monitoring of ground and surface waters in the EMP and corrective actions put into place.

8.2 Heap Leach Facility (HLF)

The HLF comprises the Heap Leach Pad (HLP), ADR Plant and associated ponds. The pad of the HLF has been designed and will be constructed to accepted engineering standards using Construction Quality Assurance (CQA) Plans and Specifications consistent with international BMPs, and all applicable Armenian (local and national) regulatory requirements. The HLF design has taken into consideration the stockpile tonnage in conjunction with the design capacity of the HLF lining system. All documents relating to the design and construction works will be retained on site and be available for inspection/auditing if required.

8.3 Cyanide Solution Ponds

Any cyanide solution ponds have been designed and will be constructed to CQA Plans and specifications consistent with international BMPs and conform to all applicable Armenian (local and national) regulatory requirements. The pregnant pond will overflow into the “storm event pond”. The storm event pond has been designed to accommodate 1 in 100 year rainfall event. If the storm event pond over flows, it will overflow into the next storm event pond. The pregnant pond will be lined (composite double-geomembrane liner system) and contain a LCRS system. Regular inspections of the freeboard status will be undertaken to ensure that sufficient capacity is always available. Information will be made available to demonstrate that the facility is designed, constructed, operated and maintained in order to prevent major accidents. Evidence of inspections will be recorded as a mandatory requirement of the Code.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

In addition to the general features described above the following items will be taken into consideration and included in the design as appropriate:

- System to detect insufficient freeboard in the pregnant pond;
- System to detect over topping limit of the barren tanks;
- System for detection of cyanide levels in excess of specified limits;
- Severe weather conditions;
- Power outage;
- Pump failure (primary or backup);
- Detection of cyanide in routine groundwater monitoring points down gradient of HLF pads and solution ponds;
- Temporary production stoppages;
- HLF pad and solution pond decommissioning;
- Integrity of the solution pond lining system; and
- Provision of bird scarers or “Bird Balls”.

All solution pond construction works will be subject to QA/QC procedures and conform to international BMPs.

8.4 Associated Pipelines to and from Heap Leach Pads and Solution Ponds

All pipelines used for cyanide solution to and from the HLP and solution ponds will be constructed of HDPE and/or steel. The cyanide solution pipeline may be constructed either above or below ground. The buried sections may need to suit topographical and roadway conditions and possible operational safety needs of particular pipeline sections. Above ground sections will be laid in HDPE-lined trenches, with backup trenches provided to facilitate the capture and retrieval of solution in the event of a rupture. The LCRS will enable the detection of any cyanide leakage in solution ponds and ensure that solution is handled appropriately. Underground sections may be culverted and double-walled and the route clearly marked, particularly in the proximity of other service lines and at access crossing points.

 GEOTEAM	Cyanide Management Plan	May 2016
--	--------------------------------	----------

Consideration will also be given to extreme climatic temperatures to minimise the expansion and contraction of pipes. A procedure will be prepared for the operation of the HLP, solution ponds and associated pipelines. The cyanide solution will be applied using a dipper system on the surface and maybe buried 200mm-300mm below the surface of the ore during the winter.

8.5 Preventive Maintenance

A preventive maintenance program for the HLF will include primary and backup pumps for solution to and from the ADR plant, backup generators, level gauges, monitoring devices, and any other critical equipment. The preventive maintenance system will generate work orders on a regular basis so that this equipment can be inspected and maintained or replaced as necessary to assure its continued proper functioning, and thereby prevent or minimise the likelihood of any cyanide exposures or releases. A visual inspection of the HLP, solution ponds and pipe work will be undertaken routinely for any damage and repairs carried out. Records will be kept of all inspections and where corrective actions are required, these will be undertaken promptly. On completion of corrective actions, documentation and records will be kept.

8.6 Monitoring and Inspection

Routine safety inspections for any unsafe working conditions and practices will be noted in an operator's logbook and appropriate corrective actions taken to address the problem. Significant safety problems or any releases of cyanide solutions will also be documented and corrective actions taken. Any wildlife mortality will be recorded and reported and consideration given to the provision of additional mitigation measures.

SOPs involving the use of inspection checklists/performers will be developed to incorporate how the inspections are to be conducted and documented, and how follow-up corrective actions are to be initiated and tracked. Detailed checklists will be developed and used to focus the inspector on specific items to be observed. All documents will be retained and filed, in accordance with the Document Control Procedure (Ref GEOTEAM-ENV-PRO0210).

Pipeline inspections will focus on structural integrity of the pipeline (HLP and solution ponds) system. As a minimum the following will be included in the check list:

- Signs of corrosion and leakage;
- Legibility/adequacy of labels;

	Cyanide Management Plan	May 2016
---	--------------------------------	----------

- Colour coding;
- Other markings indicating pipeline contents and direction of flow; and
- Any evidence of unauthorized and/or undocumented system modifications or tampering.

All secondary containment structures and associated piping systems will be inspected for their integrity, indications of cracks or leakage, presence of fluids, and available capacity.

The inspection / monitoring programme will be specifically re-evaluated if any proposed process modifications are incorporated and subsequently this CMP and all related procedure will be amended / adjusted accordingly.

All modification and changes will be subject to CQA and documented, for compliance to CODE.

9 WORKER SAFETY

9.1 Measures to Limit Workers Exposure to Cyanide

By designing the facility using international best practice all worker exposure will be limited and be compliant with Code guidance.

Geoteam will ensure that a pH of 10 or greater is maintained in all solutions used in the HLF, throughout operation to minimise the generation of hydrogen cyanide gas. Geoteam will develop procedures to continually assess pH levels in all solution ponds.

Geoteam will conduct regular safety meetings to solicit worker input to safety issues and to ensure that employees perform their tasks in a manner that is protective of their health and safety and that of their co-workers. At each meeting, employees will have the opportunity to ask questions and identify health and safety (H&S) concerns. Geoteam will also establish a suggestion box that employees may use to identify H&S issues and better practices. All workers who come into contact with cyanide will be given appropriate training including basic cyanide awareness training. Training records for all employees will be kept up to date and maintained for inspection.

9.2 Personal Protective Equipment (PPE)

All employees will be made aware of and provided with the PPE required for each task they undertake on site. Trained supervisors should check that the appropriate PPE is being worn correctly at all times. A comprehensive procedure for the use of PPE equipment should be

	Cyanide Management Plan	May 2016
---	--------------------------------	----------

developed and communicated to all staff prior to assuming duties in the work place. Reference to PPE will be mandatory in all SOPs.

SOPs will identify all the PPE requirements for each task that present the potential for worker exposure to cyanide, when all practical process changes and/or engineering controls have been implemented to eliminate, reduce, or control cyanide exposure.

The program will also describe the training necessary for use of the PPE. In general PPE is likely (as a minimum) to consist of:

- Tyvek type suit;
- Rubber boots;
- Gloves;
- Goggles (safety glasses);
- Hard hat; and
- Dust Respirator and canister.

9.3 Hydrogen Cyanide Monitoring Requirements and Equipment Calibration

Geoteam will continuously monitor its facilities for cyanide release and (cyanide) gas generation. Employees in critical areas, such as mixing tanks, will be provided with personal monitors. Geoteam will maintain, test, and calibrate both its fixed and portable cyanide monitoring equipment, as directed by the manufacturer. Inspection records of these checks need to be retained. Checking of all personal detectors will also be conducted periodically, in order to ensure that employees are not exposed to potentially harmful concentrations of hydrogen cyanide gas. All monitoring results need to be retained.

9.4 Antidotes and First Aid Requirements

Geoteam will maintain cyanide first aid equipment which includes medical oxygen and a resuscitator (oxyi-viva) at the mixing tank and process plant areas in the event that a worker is exposed to cyanide. First aid kits will be routinely inspected to ensure that required equipment and materials are available and in good condition. The cyanide antidote selected will be

	Cyanide Management Plan	May 2016
---	--------------------------------	----------

acceptable and applicable under Armenian and EU laws and regulations. The antidote will be stored and replaced with new antidote kits at intervals recommended by the manufacturer. A checklist will be prepared and used for inspections of first aid equipment. Inspection records need to be retained.

All workers who may be called upon to respond to cyanide incidents will be trained in first aid procedures and take part in routine drills to test and improve their response skills. Because antidotes must be provided intravenously or intramuscularly, administration of antidotes will be restricted to qualified medical personnel or specially trained members of Geoteam emergency response teams. Appropriate training programmes will be implemented and documented.

Guidelines will be prepared for transport of exposed workers to local medical facilities that have adequate, qualified staff, equipment and expertise to provide additional treatment in cases of cyanide exposure. Geoteam will identify and alert the medical facility that would be able to accept cyanide poisoning cases.

Any incidents involving cyanide exposure need to be documented and investigated. Specific procedures for accident and incident investigations, reporting and record keeping will be developed. Because of the importance of hazards associated with cyanide operations, any incidents involving cyanide exposure need to be addressed as non-conformances and will be formally investigated and resolved, regardless of the circumstances of the incident. Geoteam programs and procedures will be developed to protect worker H&S and be continuously reviewed to ensure that responses to cyanide exposures remain adequate and appropriate. Any procedural modifications or improvements will be implemented where necessary to minimise the potential recurrence.

9.5 Other Safety Equipment Requirements

Low-pressure safety shower/eye wash stations and non-acidic dry powder extinguishers will be located at strategic locations throughout the operation where cyanide is present, including the off-loading compound, mixing tank and process plant areas. A site plan will be prepared and posted in the control room and all major cyanide work areas shown together with locations of all safety equipment. The equipment will be maintained and inspected on a routine basis. An inspection checklist will be developed. All inspection records and check lists will be retained.

 GEOTEAM	Cyanide Management Plan	May 2016
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9.6 Signage and Fencing Requirements

Warning signs printed in appropriate languages (English and Armenian) will be placed on perimeter fencing and in all areas where cyanide is stored or used to alert workers that cyanide is present; smoking, open flames, eating and drinking near sources of cyanide is not allowed under any circumstances; signs depicting the levels of PPE will also be displayed. This information will be discussed with site workers and any persons connected with the cyanide process, and will include all external workers e.g. cyanide delivery drivers. Materials Safety Data Sheets (MSDS) for sodium cyanide be posted in all areas where cyanide is used. An example of a MSDS is provided in Appendix 2.

All tanks and piping containing cyanide will be identified either by colour-coding or by signs, labels, tags or decals to alert workers regarding their contents. Labels, signs, tags, arrows or other means will be used to indicate the direction of flow in pipes carrying solutions containing cyanide. All signs, labels and other means of notification and identification associated with cyanide management will be printed in both Armenian and English.

The ADR plant will be fenced and controlled to prevent unauthorised access. The HLP and process ponds will be fenced with stock proof fencing to prevent access by livestock.

10 CYANIDE WORKER TRAINING REQUIREMENTS

10.1 General

The Management will identify all training requirements by job description and will prepare and provide basic procedures for conducting and documenting all training activities.

As part of the relevant SOP, job-specific training of employees directly involved with cyanide management tasks will receive specific cyanide awareness training on how their job responsibilities must be performed to prevent unplanned releases of cyanide, and to minimise cyanide-related risks to their own health and safety and the H&S of their co-workers and the general public.

Training topics will, at a minimum, include a general introduction to this CMP, the SOP applicable to individual work assignments and applicable portions of the EPSRP. Training will include recognition of cyanide or cyanide-bearing materials that may be present at the site, information regarding the health effects of cyanide, symptoms of cyanide exposure, and procedures to follow

	Cyanide Management Plan	May 2016
---	--------------------------------	----------

in the event of exposure (cyanide awareness training). The documents will be made available to all Geoteam project staff via controlled document distribution and records management.

Training will be undertaken wherever necessary by knowledgeable personnel who are experienced in effective communication techniques. All employees receiving cyanide worker training will be required to pass a written test to ensure they have a full understanding of the subject matter. Refresher training will also be conducted for all cyanide workers on a regular basis; this will form part of the training record system.

10.2 Emergency Response Training Requirements

Employees who could come into contact with cyanide will receive training in the procedures to be followed if a cyanide release is discovered, including notification of the appropriate site personnel, ensuring co-worker and public safety, and taking direct action to control or contain the release wherever possible. Site personnel who may be called upon to respond to workplace exposures to cyanide will be trained in the neutralization, decontamination, and first aid procedures. An EPSRP supports the ESIA submission and this will be expanded as part of the ESMS. This training will include the procedure for notifying appropriate site personnel and will stress that the responder must first ensure their own protection through use of cyanide-specific PPE. Specialised training will also be provided to those workers designated as Emergency Response Coordinators (ERC) and members of the ERT. All employees receiving specialised cyanide-related emergency response training will be required to pass a written and practical test to assure their understanding of the subject matter covered.

ERTs shall also include qualified medical staff or other trained personnel who will be authorised to administer cyanide antidotes, if required. Emergency drills simulating worker exposures and environmental releases will be conducted at least annually to provide practical, hands-on training for all categories of workers having access to cyanide during the performance of a particular job. A report will be prepared on all emergency drills so results can be evaluated from a training perspective to confirm that personnel have the knowledge and skills required for rapid, safe, and effective response, and that the procedures are adequate. Records and reports of drills will be retained.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

10.3 Training Records

Records documenting all levels of training related to the use of cyanide in the workplace will be retained. Training records will include the names of the employee, trainer, date of training, topics covered, and employee proficiency test results, where required.

11 EMERGENCY RESPONSE

11.1 Cyanide-Related Elements in Emergency Preparedness and Spill Response Plan

An Emergency Preparedness and Spill Response Plan will be prepared for the Amulsar project and will include procedures for responding to all types of emergency situations. Examples of scenarios and response procedures should form part of the Geoteam EPSRP at Amulsar mine. It may be advisable that all cyanide response procedures are incorporated in a single document may serve as the primary reference during emergencies.

The EPSRP will be designed to fulfil Geoteam's obligations under Armenian regulations and best practice. The plan will include information on Amulsar project activities, quantity and form of cyanide and should identify any environmental and social factors that may cause or aggravate the consequences of a major accident. The EPSRP will identify the Project-specific risks and describe Geoteam project policies and procedures for the prevention of major accidents in addition to describing the elements of the facility's design and construction that limit the potential for such events.

The EPSRP will be developed with the involvement of the project workforce and external stakeholders, so that it addresses site-specific risks and is responsive to stakeholder concerns. External stakeholders will include local communities, potentially affected individuals or groups, community leaders or representatives, and/or local response agencies and medical facilities. Geoteam will periodically consult with employees and stakeholders to ensure that the EPSRP continues to address current conditions and risks. Consultations regarding the EPSRP need to be documented and records retained as required. The plan should be tested, including involving local communities and local response agencies where appropriate.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

11.1.1 Potential Release / Exposure Scenarios

The development of an effective ERP requires a realistic evaluation of all potential cyanide releases and/or exposure scenarios that may occur at Amulsar regardless of the probability or likelihood of occurrence.

11.1.2 Emergency Response Team / Off-site Responders

The EPSRP identifies the primary and any alternate ERCs, ERT members and off-site response agencies. The ERT should receive appropriate training to undertake these duties. The EPSRP will include contact information and call-out procedures for response personnel. The EPSRP also requires that any off-site response personnel, who will be called to assist in the event of an emergency, be familiar with the contents of the EPSRP, the nature of the risks present at Amulsar (including cyanide), and the planned response actions.

In the event of a cyanide-related emergency, the primary or alternate EPC will be immediately contacted. The ERC will subsequently activate the ERT. The ERCs are responsible for coordinating all emergency response measures. They shall be thoroughly familiar with all aspects of the EPSRP, all operations and activities at Amulsar involving cyanide, the location and characteristics of cyanide, cyanide solutions and cyanide facilities, the location of response equipment, and the facility layout. Both the internal and external ERCs should have the authority to commit resources needed to implement the ERP requirements in response to a cyanide emergency.

All members of the ERT are responsible for implementing the EPSRP under the direction of the EC. ERT members will be trained in response procedures included in the ERP and in the use of the response equipment listed.

Geoteam will also work with the communities adjacent (and along the transit routes) to the Project in order to develop the information necessary for preparation of external community emergency plans, and co-ordinate with potential off-site responders such as local police and fire-fighters to make them aware of the nature of potential cyanide-related risks and the possible need for their assistance in an emergency.

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

11.2 Response Equipment and Maintenance / Inspection Requirements

All response equipment will be regularly maintained, inspected, and tested to ensure its availability if an event occurs. A list of required equipment for use in the management of cyanide exposures and releases should be developed. This will include preparation of cyanide cleanup, spillage, traffic control, first aid and PPE and any special equipment for response vehicles.

11.3 Response Actions

All plausible cyanide incidents accidents and cyanide release scenarios will be identified to facilitate the development of a comprehensive list for all necessary repair equipment. For example, where a release from a pipeline or tank can be stopped by closing a valve or shutting down a pump, it is intended that the procedure identifies the specific equipment and that adequate spares are stored at site in case of a malfunction. Such details could be incorporated into an update of the EPSRP when facility design characteristics are finalised.

11.4 Internal and External Notification Requirement

Reporting of cyanide releases and exposures will follow the same procedures established in the EPSRP for the internal and external reporting of accidents and incidents. In the event of a major accident, Geoteam will need to comply fully with Armenian government requirements and international regulations, and be prepared to give interviews and issue statements in Armenia or from Lydian Head Office to the national or international press. It would be prudent to consider specific media training for key personnel with periodic refresher training if required.

The following information will be collected and recorded as a minimum:

- The circumstances of the accident;
- Identification of the dangerous substance(s) involved;
- Information to enable an assessment of the effects of the accident on human health and the environment;
- The emergency measures taken; and

 GEOTEAM	Cyanide Management Plan	May 2016
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- The measures to be taken to alleviate medium- and long-term effects of the accident, as well as to prevent recurrence.

11.5 Remediation of Releases and Management of Contaminated Materials

As discussed previously, the unloading, storage compound, mixing tanks, HLP, solution ponds and processing plant where cyanide operations are conducted has been designed to contain any cyanide spillages/leakages. The process plant design requires individual containment areas to be a minimum 110% of any reporting solid or liquid. Any liquid spills within the containment area can be returned directly to the cyanidation process (pumped to the process pond) and no residual spill material will be generated in normal operations that will require management or disposal as waste. Spills of dry sodium cyanide briquettes or granules in the unloading or storage area will be captured and deposited in the mixing tanks. Any spills of process solution will be captured in containment sumps and returned to appropriate locations in the process (i.e. areas that will not contribute to a process upset) using portable suction pumps.

Containment areas associated with cleaned-up spills will likewise be washed into containment sumps, from which the collected effluent can be pumped back to the process. Because spills can be captured and returned directly to the cyanidation process no residual spill material should be generated during normal working operations.

In the event of solid sodium cyanide briquettes spills in areas outside the storage areas, the ground surface during delivery to the site, the ERC will contact and coordinate necessary response actions with local, regional, and national officials, as indicated by the community ERPs from the affected transportation route. The spill site will be secured as soon as possible and air quality monitoring initiated ensuring inadvertent access by non-authorised persons. Down-wind residential areas will be notified and evacuated as indicated by the EPSRP. Shovels and/or front-end loaders shall be used to over-excavate the affected soil area. Where possible contaminated soil will be disposed of within the heap at site in accordance with the provisions of the Integrated Waste Management Plan (IWMP, Ref Appendix 8.13). Other cyanide spill cleanup residues that cannot be used in the process or recycled will be drummed and managed as hazardous waste in accordance with the SWMP.

	Cyanide Management Plan	May 2016
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11.5.1 Emergency Response Drills

Geoteam will conduct emergency drills for response to cyanide exposures and/or releases at least annually. The drills will be designed to simulate one or more of the types of releases that should be identified as mandatory procedure. Each drill will be evaluated to determine the adequacy of response procedures and responder training. Written documentation of the scope and evaluated results of each drill will be retained and analysed for improvements.

11.6 Public Disclosure of Cyanide-Related Information

Geoteam recognises that a full and open disclosure of information regarding the use of cyanide is necessary to assure the public that the management measures are appropriate and sufficiently protective of the environment and the communities, and that this will be a continuous and flexible procedure. It is also required in order to comply with international directives and guidance, such as the United Nations Environment Programme 'APELL for Mining – Guidance for the Mining Industry in Raising Awareness and Preparedness for Emergencies at Local Level' (2001) and the International Council on Mining and Metal's 'Good Practice in Emergency Preparedness and Response' (2005).

11.7 Materials Safety Data Sheet

Geoteam will obtain Material Safety Data Sheets (MSDS) from their cyanide supplier in both Armenian and English languages. An example is provided in Appendix 2. The MSDS will be made available to all employees in either electronic or paper format and posted in all areas where cyanide is managed. It will also be used to support hazard recognition in training programmes for workers and contractors. MSDS will also form part of the EPSRP procedures and will be made available to members of local communities, stakeholders, and the general public upon request.

11.8 Distribution of Information via Stakeholder Engagement Plan

Geoteam has developed a Stakeholder Engagement Plan (SEP, Ref Appendix 8.6) to guide consultation throughout mine development. This will include a number of measures to provide opportunities for stakeholder input into the project regarding the use of cyanide. These include open public meetings, the creation of a citizens' advisory panel' (or use of the Focus Groups and committees already established), and site tours for interested parties, as well as the public

 GEOTEAM	Cyanide Management Plan	May 2016
---	--------------------------------	----------

meetings related to facility permitting and licensing. Copies of this CMP and supporting procedures can be made available to stakeholders.

Geoteam performance reports should be prepared to include any information on confirmed cyanide exposure incidents, especially those that might or have resulted in any hospitalisation or injuries, and on any cyanide releases that:

- Required off-site response or remediation;
- Resulted in significant adverse effects to human health or the environment, on or off the mine site;
- Caused exceedances of applicable regulatory limits for cyanide; and/or
- Have otherwise required reporting under applicable regulations.

12 CYANIDE ACTION PLAN

Key actions for the Cyanide Action plan at Amulsar are identified in Table 2 below, this list should not be considered exhaustive but should ensure compliance and commitment in the CODE. The actions will be undertaken as and when appropriate to the development of the project.

 GEOTEAM	Cyanide Management Plan	May 2016
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Table 2: Cyanide Action Plan – Amulsar Mine		
Item	Description of Action	Responsibility
1	Prepare register of all regulatory bodies + legal compliance required for transportation of cyanide in Armenia	Geoteam
2	Select appropriate (accredited or working towards accreditation) cyanide manufacturers and transporters in accordance with the Code or be able to demonstrate that the facility is using BMP to international standards.	Geoteam
3	Ensure cyanide transporter has ERP	Geoteam and an accredited cyanide auditor
4	Prepare ESMS and full Emergency Preparedness and Spill Prevention Plans and supporting Procedures	Geoteam
5	Prepare Safety Report for process plant	Geoteam
6	Work with local authorities to prepare joint external to internal ERP	Geoteam and an accredited cyanide auditor
8	Undertake a road route survey – (rail terminal) to Mine site	Geoteam and an accredited cyanide auditor Geoteam and WAI LCA
9	Collate all design drawings / documentation relating to the construction of cyanide facilities	Geoteam
10	Prepare all relevant SOP's;	Geoteam and an accredited cyanide auditor
11	Undertake basic “cyanide awareness” training for key staff	Geoteam and an accredited cyanide auditor
12	Prepare SOP training programme;	Geoteam and an accredited cyanide auditor
13	Devise on-going training programme for cyanide staff as part of H&S MS	Geoteam and an accredited cyanide auditor
14	Establish ERTs;	Geoteam
15	Appoint an appropriate independent consultant/engineer to oversee and report on the site preparation and construction of cyanide facilities to provide design and construction quality assurance/quality control records and ‘as-built’ certifications for retention as part of the Code Compliance n.	Geoteam
16	Review closure plans and update to accommodate plant / areas associated with cyanide use;	Geoteam
17.	Regularly review CMP and all other “live” documents relating to cyanide use / management	Geoteam
Note: The International Code will be used to develop site protocols and Standard Operation Procedures. WAI LCA will provide advice and peer review of all documents.		

 GEOTEAM	Cyanide Management Plan	May 2016
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13 DECOMMISSIONING AND CLOSURE PLANS

A closure plan has been designed and forecasted a cost of HLF closure. Geoteam will outline decommissioning procedures for any cyanide facility as part of the overall full Preliminary Mine Reclamation ,Closure and Rehabilitation Plan (pMRCRP, Ref Appendix 8.18). Decommissioning and closure of cyanide facilities will entail the use in process or detoxification of unused sodium cyanide and the clean-up of cyanide-containing residues in process tanks and equipment. HLF material goes through several stages after the facility is no longer loaded with ore:

- Residual leaching with cyanide;
- Rinsing;
- Drain-down; and
- Final closure.

Residual leaching has two stages: the first stage is with added makeup water and cyanide to extract more gold and silver from the HLF. This will continue until it is no longer economically viable to do so. The next stage is to rinse with the cyanide present in the system without adding additional reagents or water..

The next stage is rinsing with clean water. This continues until cyanide concentrations are below discharge standards. This will be done in zones on the HLF surface moving from top to bottom, and rinsed areas will be immediately covered by a post-closure ET cover comprising 1 meter of stockpiled topsoil. During this period, the volume of rinse water will be decreased by utilizing the PD-8 as an evaporation pond. During this stage, spray evaporation will be used to decrease the total volume of rinse water. All cyanide process tanks and piping systems should be triple flushed with clean water to remove residual cyanide, and the effluent routed to the heap or a detoxification circuit for reduction of residual cyanide concentrations to below prescribed Armenian standards, or other appropriate guidelines for cyanide.

As soon as rinsing is complete, the HLF will be fully capped and revegetated (see Section 4.3.2). At this point, the water is expected to have the chemistry equal to the worst-case meteoric water mobility procedure (MWMP) sample taken on the spend heap material.

 GEOTEAM	Cyanide Management Plan	May 2016
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Any decant water remaining in the solution ponds after process plant decommissioning will be pumped to the heap after treatment to oxidize the cyanide. The CODE threshold for discharges to surface waters is 0.5 mg/l (WAD). Geoteam report that the Armenian Maximum Allowable Concentration (MAC) for cyanide in household and community water is 0.1mg/l and in drinking water is 2.0mg/l. The Code threshold is considered appropriate. Geoteam will adhere to Project-specific discharge limits as agreed with the Armenian authorities and to govern operational practices and dictate closure requirements.

14 Performance Monitoring

14.1 Verification and Monitoring

Geoteams's assurance monitoring will be undertaken as described in the Amulsar Environmental Monitoring Plan (Ref GEOTEAM-ENV-PLN0225). Whenever monitoring indicates a non-conformance related to Project standards, requirements and commitments, Geoteam reserves the right to issue a Non-conformance Report (NCR), Corrective Action Request (CAR), Work Improvement Notice (WIN) and Temporary Work Suspensions (TWS) to the relevant applicant, which will include a time frame for addressing the issue.

In addition to internal verification and monitoring and audits conducted by Geoteam, external audits may also be carried out by recognised third parties including Armenian regulatory authorities.

14.2 Review of Non Compliances

Geoteam shall investigate fully any non-conformances with this plan. In the event that such a non-conformance invokes an external investigation, Geoteam will cooperate fully with the competent authorities in any investigation and review of non-compliances with this plan.

14.3 Regular Inspections

Regular inspections will be carried out to ensure that the Project complies with this plan. All activities and processed will be regularly monitored to ensure that the required approvals are in place and method statement being followed. Any control measures specified in this plan will be included in these inspections.

 GEOTEAM	Cyanide Management Plan	May 2016
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14.4 Annual Audit

TheHealth Environmental, Safety and Security Manager shall ensure that all activities and contingency plans covered by this Plan are subject to an ESMS audit (the minimum frequency shall be annual). The results of audits are to be discussed during annual management meetings,

15 REFERENCES

- http://www.cyanidecode.org/cyanide_chemistry.php

16 Revision Control

Revision History					
Revision	Date	Details	Prepared by	Checked by	Approved by
V1	31 July 13	CMP developed for ESIA version 8	WAI	C Blackmore	C Broadbent
V2	26 August 14	Revisions for ESIA Version 9	WAI	C Blackmore	C Broadbent
V3	17 February 2015	Amendments based on lender feedback	WAI	C Blackmore	C Broadbent
V4	12 November	Amendments based on design changes of 43-101	Lydian International	U.Sibilski	
V5	9 February 2016	Revision following comments and design changes	WAI	C Blackmore	C Broadbent

17 Authorization

Approved By: _____

Executive Vice President Sustainability

Date

Code Requirement	WAI Compliance Scores		Comment/Evidence	By Date
S1 - Production				
Encourage responsible cyanide manufacturing by purchasing from manufacturers that operate in a safe and environmentally protective manner.				
S1.1 - Standard of Practice				
Purchase cyanide from manufacturers employing appropriate practices and procedures to limit exposure of their workforce to cyanide, and to prevent releases of cyanide to the environment.				
Q1.1.1 - Production - Question 1.1.1				
Does the operation’s contract with all cyanide manufacturer(s) or distributor(s) require either that a) the cyanide be produced at a facility that has been certified as being in compliance with the Code or b) the manufacturer(s) provide the results of an				
Q1.1.2 - Production - Question 1.1.2				
Is the cyanide purchased by the gold mine manufactured at a facility or facilities certified as being in compliance with the Code? If so, questions 3 and 4 under this Standard of Practice do not apply.				
Q1.1.3 - Production - Question 1.1.3				
Does the gold mining operation have a copy of an audit of the cyanide production facility or facilities demonstrating that it implements programs, practices and procedures consistent with ICMI’s Cyanide Production Audit Protocol?				
Q1.1.4 - Production - Question 1.1.4				
Was the audit(s) conducted within the past three years by an independent third-party meeting the qualifications established by ICMI?				
Q1.1.5 - Production - Question 1.1.5				
If cyanide is purchased from an independent distributor(s), has the distributor(s) provided evidence that the cyanide shipped to the gold mining operation is from a manufacturer(s) meeting either #2 or #3 and #4 above?				
Average				

Code Requirement	WAI Compliance Scores		Comment/Evidence	By Date
S2 - Transportation				
Protect communities and the environment during cyanide transport.				
S2.1 - Standard of Practice				
Establish clear lines of responsibility for safety, security, release prevention, training and emergency response in written agreements with producers, distributors and transporters.				
S2.1.1 - Transportation - Question 2.1.1				
Is there a written agreement between the operation, the cyanide producer, distributor, and transporter(s) designating responsibility for the following, as applicable?				
a) Packaging as required by the United Nations for international shipments and by the political jurisdiction(s) the shipment will pass through				
b) Labelling in languages necessary to identify the material in the political jurisdiction(s) the shipment will pass through, and as required by these jurisdiction(s) and by the United Nations (for international shipments)				
c) Storage prior to shipment				
d) Evaluation and selection of routes, including community involvement				
e) Storage and security at ports of entry				
f) Interim loading, storage and unloading during shipment				
g) Transport to the operation				
h) Unloading at the operation				
i) Safety and maintenance of the means of transportation (e.g., aircraft, vessels, vehicles, trains, etc.) throughout transport				
j) Task and safety training for transporters and handlers throughout transport				
k) Security throughout transport				
l) Emergency response throughout transport				
Q2.1.2 - Transportation - Question 2.1.2				
Does the written agreement specify that the designated responsibilities extend to any subcontractors used by the producer, distributor, transporter or the operation for transportation-related activities?				
S2.2 - Standard of Practice				
Require that cyanide transporters implement appropriate emergency response plans and capabilities and employ adequate measures for cyanide management.				
Q2.2.1 - Transportation - Question 2.2.1				
Does the operation’s contract with the cyanide transporter(s) require that the transporter(s) either a) be certified under the Code or b) provide the results of an independent third party audit of the cyanide transportation activities?				

Q2.2.2 - Transportation - Question 2.2.2				
Is the cyanide transporter(s) certified under the Code? If so, no further demonstration is required to comply with this Standard of Practice.				
Q2.2.3 - Transportation - Question 2.2.3				
Does the gold mining operation have a copy of an audit of each individual transporter's cyanide transport activities and/or of the cyanide transport activities along its supply chain demonstrating the implementation of programs, practices and procedures consistent with ICMI's Cyanide Transportation Audit Protocol?				
Q2.2.4 - Transportation - Question 2.2.4				
Was the audit conducted within the past three years by an independent third-party meeting the qualifications established by ICMI?				
Q2.2.5 - Transportation - Question 2.2.5				
Does the operation have chain of custody records identifying all elements of the supply chain (producer, transporter(s), interim storage facilities) that handle the cyanide brought to its site? Have all identified				
Average				
Notes:				
0-None Compliance				
1-Partial Compliance				
2-Substantial Compliance				
3-Full Compliance				

Code Requirement	WAI Compliance Score		Comment/Evidence
S3 - Handling & Storage			
Protect workers and the environment during cyanide handling and storage.			
S3.1 - Standard of Practice			
Design and construct unloading, storage and mixing facilities consistent with sound, accepted engineering practices, quality control/quality assurance procedures, spill prevention and spill containment measures.			
Q3.1.1 - Handling and Storage - Question 3.1.1			
Have facilities for unloading, storing and mixing cyanide been designed and constructed in accordance with cyanide producers' guidelines, applicable jurisdictional rules and/or other sound and accepted engineering practices for these facilities?			
Q3.1.2 - Handling and Storage - Question 3.1.2			
Are unloading and storage areas for liquid and solid cyanide located away from people and surface waters? If not, has the operation evaluated the potential for releases to surface water and/or human exposure, and implemented precautions to minimize these potentials?			
Q3.1.3 - Handling and Storage - Question 3.1.3			
Is liquid cyanide unloaded on a concrete or other surface that can minimize seepage to the subsurface?			
Q3.1.4 - Handling and Storage - Question 3.1.4			
Is the cyanide unloading area designed and constructed to contain, recover or allow remediation of any leakage from the tanker truck?			
Q3.1.5 - Handling and Storage - Question 3.1.5			
Is there a method to prevent the overfilling of cyanide storage tanks, such as a level indicator and high-level alarm?			
Q3.1.6 - Handling and Storage - Question 3.1.6			
Are cyanide mixing and storage tanks located on a concrete or other surface that can prevent seepage to the subsurface?			
Q3.1.7 - Handling and Storage - Question 3.1.7			
Are secondary containments for cyanide storage and mixing tanks constructed of materials that provide a competent barrier to leakage?			
Q3.1.8.1 - Handling and Storage - Question 3.1.8a			
Is cyanide stored:			
a) With adequate ventilation to prevent the build-up of hydrogen cyanide gas?			
Q3.1.8.2 - Handling and Storage - Question 3.1.8b			
b) Under a roof, off the ground or with other measures to minimize the potential for contact of solid cyanide with water?			
Q3.1.8.3 - Handling and Storage - Question 3.1.8c			
c) In a secure area where public access is prohibited, such as within the fenced boundary of the plant or within a separate fenced and locked area?			
Q3.1.8.4 - Handling and Storage - Question 3.1.8d			
d) Separately from incompatible materials such as acids, strong oxidizers and explosives and apart from foods, animal feeds and tobacco products with berms, bunds, walls or other appropriate barriers that will prevent mixing?			
S3.2 - Standard of Practice			
Operate unloading, storage and mixing facilities using inspections, preventive maintenance and contingency plans to prevent or contain releases and control and respond to worker exposures.			
S3.2.1 - Standard of Practice - Question 3.2.1			

Q3.2.1.1 - Handling and Storage - Question 3.2.1a			
With respect to empty cyanide containers, are procedures in place and implemented to:			
a) Prevent empty cyanide containers from being used for any purpose other than holding cyanide?			
Q3.2.1.2 - Handling and Storage - Question 3.2.1b			
b) Rinse empty cyanide drums, plastic bags and liners with water three times and add the rinse water to the cyanidation process or otherwise dispose of it in an environmentally sound manner?			
Q3.2.1.3 - Handling and Storage - Question 3.2.1c			
c) Crush empty cyanide drums prior to disposal in a landfill and burn or otherwise dispose of empty wooden crates in an environmentally sound manner?			
Q3.2.1.4 - Handling and Storage - Question 3.2.1d			
d) Clean any cyanide residue from the outside of cyanide containers that are returned to the vendor and securely close them for shipment?			
Q3.2.2.1 - Handling and Storage - Question 3.2.2a			
Has the operation developed and implemented plans or procedures to prevent exposures and releases during cyanide unloading and mixing activities such as:			
a) Operation of all valves and couplings for unloading liquid cyanide and mixing solid or liquid cyanide			
Q3.2.2.2 - Handling and Storage - Question 3.2.2b			
b) Handling cyanide containers without rupturing or puncturing			
Q3.2.2.3 - Handling and Storage - Question 3.2.2c			
c) Limiting the height of stacking of cyanide containers			
Q3.2.2.4 - Handling and Storage - Question 3.2.2d			
d) Timely clean up of any spills of cyanide during mixing			
Q3.2.2.5 - Handling and Storage - Question 3.2.2e			
e) Providing for safe unloading of liquid cyanide and manual mixing of solid cyanide by requiring appropriate personal protective equipment and having a second individual observe from a safe area, or remote observation by video?			
Average			

Notes:

0-None Compliance

1-Partial Compliance

2-Substantial Compliance

3-Full Compliance

Code Requirement	WAI Compliance Score		Comments/Evidence	By Date
S4 - Operations				
Manage cyanide process solutions and waste streams to protect human health and the environment.				
S4.1 - Standard of Practice				
Implement management and operating systems designed to protect human health and the environment including contingency planning and inspection and preventive maintenance procedures.				
Q4.1.1 - Operations - Question 4.1.1				
Have written management and operating plans or procedures been developed for cyanide facilities including unloading, mixing and storage facilities, leach plants, heap leach operations, tailings impoundments, and cyanide treatment, regeneration and disposal.				
Q4.1.2 - Operations - Question 4.1.2				
Does the operation have plans or procedures that identify the assumptions and parameters on which the facility design was based and any applicable regulatory requirements (e.g., freeboard required for safe pond and impoundment operation; the cyanide once				
Q4.1.3 - Operations - Question 4.1.3				
Does the operation have plans or procedures that describe the standard practices necessary for the safe and environmentally sound operation of the facility including the specific measures needed for compliance with the Code, such as inspections and preventive maintenance activities?				
Q4.1.4 - Operations - Question 4.1.4				
Does the operation have a procedure to identify when changes in a site's processes or operating practices may increase the potential for the release of cyanide and to incorporate the necessary release prevention measures?				
Q4.1.5 - Operations - Question 4.1.5				
Does the operation have cyanide management contingency procedures for situations when there is an upset in a facility's water balance, when inspections and monitoring identify a deviation from design or standard operating procedures, and/or when a temporary closure or cessation of operations may be necessary?				
Q4.1.6 - Operations - Question 4.1.6				
Does the operation inspect cyanide facilities on an established frequency sufficient to assure and document that they are functioning within design parameters?				
S4.1.7 - Operations - Question 4.1.7				
a) Tanks holding cyanide solutions for structural integrity and signs of corrosion and leakage.				
b) Secondary containments for their integrity, the presence of fluids and their available capacity, and to ensure that any drains are closed and, if necessary, locked, to prevent accidental releases to the environment.				

c) Leak detection and collection systems at leach pads and ponds, as required in the design documents.				
d) Pipelines, pumps and valves for deterioration and leakage.				
e) Ponds and impoundments for the parameters identified in their design documents as critical to their containment of cyanide and solutions and maintenance of the water balance, such as available freeboard and integrity of surface water diversions.				
Q4.1.8 Operations - Question 4.1.8				
Are inspections documented, including the date of the inspection, the name of the inspector, and any observed deficiencies? Are the nature and date of corrective actions documented? Are records retained?				
Q4.1.9 - Operations - Question 4.1.9				
Are preventive maintenance programs implemented and activities documented to ensure that equipment and devices function as necessary for safe cyanide management?				
Q4.1.10 - Operations - Question 4.1.10				
Does the operation have necessary emergency power resources to operate pumps and other equipment to prevent unintentional releases and exposures in the event its primary source of power is interrupted? Is the back-up power generating equipment maintained				

Code Requirement	WAI Compliance Score		Comment/Evidence	By Date
S4 - Operations				
Manage cyanide process solutions and waste streams to protect human health and the environment.				
S4.2 - Standard of Practice				
Introduce management and operating systems to minimize cyanide use, thereby limiting concentrations of cyanide in mill tailings.				
Q4.2.1 - Operations - Question 4.2.1				
Does the operation conduct a program to determine appropriate cyanide addition rates in the mill and evaluate and adjust addition rates as necessary when ore types or processing practices change cyanide requirements?				
Q4.2.2 - Operations - Question 4.2.2				
Has the operation evaluated various control strategies for cyanide additions?				
Q4.2.3 - Operations - Question 4.2.3				
Has the operation implemented a strategy to control its cyanide addition?				

Code Requirement	WAI Compliance Score		Comments/Evidence	By Date
S4 - Operations				
Manage cyanide process solutions and waste streams to protect human health and the environment.				
S4.3 - Standard of Practice				
Implement a comprehensive water management program to protect against unintentional releases.				
Q4.3.1 - Operations - Question 4.3.1				
Has the operation developed a comprehensive, probabilistic water balance?				
S4.3.2 - Operations - Question 4.3.2				
a) The rates at which solutions are applied to leach pads and tailings that are deposited into tailings storage facilities.				
b) A design storm duration and storm return interval that provides a sufficient degree of probability that overtopping of the pond or impoundment can be prevented during the operational life of the facility.				
c) The quality of existing precipitation and evaporation data in representing actual site conditions.				
d) The amount of precipitation entering a pond or impoundment resulting from surface run-on from the upgradient watershed, including adjustments as necessary to account for differences in elevation and for infiltration of the runoff into the ground.				
e) Effects of potential freezing and thawing conditions on the accumulation of precipitation within the facility and the upgradient watershed.				
f) Solution losses in addition to evaporation, such as the capacity of decant, drainage and recycling systems, allowable seepage to the subsurface, and allowable discharges to surface water.				
g) The effects of potential power outages or pump and other equipment failures on the draindown from a leach pad or the emergency removal of water from a facility.				
h) Where solution is discharged to surface waters, the capacity and on-line availability of necessary treatment, destruction or regeneration systems				

i) Other aspects of facility design that can affect the water balance, such as the assumed phreatic surface in a tailings storage facility.				
Q4.3.3 - Operations - Question 4.3.3				
Do the operating procedures incorporate inspection and monitoring activities to implement the water balance and prevent overtopping of ponds and impoundments and unplanned discharge of cyanide solutions to the environment?				
Q4.3.4 - Operations - Question 4.3.4				
Are ponds and impoundments designed and operated with adequate freeboard above the maximum design storage capacity determined to be necessary from water balance calculations?				
Q4.3.5 - Operations - Question 4.3.5				
Does the operation measure precipitation, compare the results to design assumptions and revise operating practices as necessary?				

Code Requirement	WAI Compliance Score		Comments/Evidence	By Date
S4 - Operations				
Manage cyanide process solutions and waste streams to protect human health and the environment.				
S4.4 - Standard of Practice				
Implement measures to protect birds, other wildlife and livestock from adverse effects of cyanide process solutions.				
Q4.4.1 - Operations - Question 4.4.1				
Has the operation implemented measures (i.e., fencing, filling in collection ditches with gravel, and covering or netting solution in ponds and impoundments) to restrict access by wildlife and livestock to all open waters where WAD cyanide exceeds 50 mg/l				
Q4.4.2 - Operations - Question 4.4.2				
Can the operation demonstrate that the cyanide concentration in open water in TSFs, leach facilities and solution ponds does not exceed 50 mg/l WAD cyanide?				
Q4.4.3 - Operations - Question 4.4.3				
Is maintaining a WAD cyanide concentration of 50 mg/l or less in open water effective in preventing significant wildlife mortality?				
Q4.4.4 - Operations - Question 4.4.4				
Does the operation apply leach solutions in a manner designed to avoid significant ponding on the heap surface and limit overspray of solution off the heap liner?				

Code Requirement	WAI Compliance		Comments/Evidence	By Date
S4 - Operations				
Manage cyanide process solutions and waste streams to protect human health and the environment.				
S4.5 - Standard of Practice				
Implement measures to protect fish and wildlife from direct and indirect discharges of cyanide process solutions to surface water.				
Q4.5.1 - Operations - Question 4.5.1				
Does the operation have a direct discharge to surface water and if so, is it no greater than 0.5 mg/l WAD cyanide?				
Q4.5.2 - Operations - Question 4.5.2				
Is the concentration of free cyanide 0.022 mg/l or lower downstream of any established mixing zone? How has this been determined?				
Q4.5.3 - Operations - Question 4.5.3				
Does the operation have an indirect discharge to surface water? If so, does it result in a concentration of free cyanide in excess of 0.022 mg/l downstream of any established mixing zone?				
Q4.5.4 - Operations - Question 4.5.4				
If indirect discharges from the operation have caused cyanide concentrations in surface water to rise above levels protective of a designated beneficial use for aquatic life, is the operation engaged in remedial activity to prevent further degradation?				

Code Requirement	WAI Compliance Score		Comments/Evidence	By Date
S4 - Operations				
Manage cyanide process solutions and waste streams to protect human health and the environment.				
S4.6 - Standard of Practice				
Implement measures designed to manage seepage from cyanide facilities to protect the beneficial uses of ground water.				
Q4.6.1 - Operations - Question 4.6.1				
Does the operation implement specific water management or other measures to manage seepage to protect the beneficial use(s) of ground water beneath and/or immediately down gradient of the operation?				
Q4.6.2 - Operations - Question 4.6.2				
Are WAD cyanide concentrations (or other species of cyanide for which there is a numerical standard established by the applicable jurisdiction) in groundwater at compliance points below or down gradient of the facility at or below levels that are protective of identified beneficial uses of the ground water				
Q4.6.3 - Operations - Question 4.6.3				
If the operation uses mill tailings as underground backfill, have the potential impacts to worker health and the beneficial uses of ground water been evaluated and have measures been implemented as necessary to address them?				
Q4.6.4 - Operations - Question 4.6.4				
If seepage from the operation has caused cyanide concentrations of ground water to rise above levels protective of beneficial use, is the operation engaged in remedial activity to prevent further degradation and restore beneficial use?				

Code Requirement	WAI Compliance Score		Comments/Evidence	By Date
S4 - Operations				
Manage cyanide process solutions and waste streams to protect human health and the environment.				
S4.7 - Standard of Practice				
Provide spill prevention or containment measures for process tanks and pipelines.				
Q4.7.1 - Operations - Question 4.7.1				
Are spill prevention or containment measures provided for all cyanide unloading, storage, mixing and process solution tanks?				
Q4.7.2 - Operations - Question 4.7.2				
Are secondary containments for cyanide unloading, storage, mixing and process tanks sized to hold a volume greater than that of the largest tank within the containment and any piping draining back to the tank, and with additional capacity for the design				
Q4.7.3 - Operations - Question 4.7.3				
Are procedures in place and being implemented to prevent discharge to the environment of any cyanide solution or cyanide-contaminated water that is collected in a secondary containment area?				
Q4.7.4 - Operations - Question 4.7.4				
For cyanide process tanks without secondary containment, are there procedures for remediation of any contaminated soil such that adverse impacts on surface or ground water are prevented?				
Q4.7.5 - Operations - Question 4.7.5				
Are spill prevention or containment measures provided for all cyanide process solution pipelines to collect leaks and prevent releases to the environment?				
Q4.7.6 - Operations - Question 4.7.6				



Have areas where cyanide pipelines present a risk to surface water been evaluated for special protection needs?				
Q4.7.7 - Operations - Question 4.7.7				
Are cyanide tanks and pipelines constructed of materials compatible with cyanide and high pH conditions?				

Code Requirement	WAI Compliance Score		Comments/Evidence	By Date
S4 - Operations				
Manage cyanide process solutions and waste streams to protect human health and the environment.				
S4.8 - Standard of Practice				
Implement quality control/quality assurance procedures to confirm that cyanide facilities are constructed according to accepted engineering standards and specifications.				
Q4.8.1 - Operations -Question 4.8.1				
Have quality control and quality assurance programs been implemented during construction of all new cyanide facilities and modifications to existing facilities, including cyanide unloading, storage, mixing facilities and other cyanide facilities?				
Q4.8.2 - Operations - Question 4.8.2				
Have quality control and quality assurance programs addressed the suitability of materials and adequacy of soil compaction for earthworks such as tank foundations and earthen liners, the installation of synthetic membrane liners used in ponds and leach pad				
Q4.8.3 - Operations - Question 4.8.3				
Have quality control and quality assurance records been retained for cyanide facilities?				
Q4.8.4 - Operations - Question 4.8.4				
Have appropriately qualified personnel reviewed cyanide facility construction and provided documentation that the facility has been built as proposed and approved?				
Q4.8.5 - Operations - Question 4.8.5				
Where there is no available quality control and quality assurance documentation or as-built certification for cyanide facility construction, has an appropriately qualified person inspected those elements of the facility involving cyanide and issued a report?				

Code Requirement	WAI Compliance Score		Comments/Evidence	By Date
S4 - Operations				
Manage cyanide process solutions and waste streams to protect human health and the environment.				
S4.9 - Standard of Practice				
Implement monotoing programs to evaluate the effects of cyanide use on wildlife surface and ground water quality				
Q4.9.1 Operations - Question 4.9.1				
Has the operation prepared a draft monioring programs to evaluate the effects of cyanide use on wildlife, surface and ground water quality				
Q4.9.2 Operations - Question 4.9.2				
Has the operation had draft monitoring procedures developed by appropriately qualified personnel or committed to have its sampling and analytical protocols developed by such an individual?				
Q4.9.3 Operations - Question 4.9.3				
Has the operation developed draft sampling procedures, or committed to develop sampling procedures that include the following: how and where samples should be taken; sample preservation techniques; chain of custody procedure; shipping instructions and cyanide species to be analysed?				

Q4.9.4 Operations - Question 4.9.4				
Does a draft sampling manual require or has the operation committed to prepare a sampling manual that will require that sampling conditions (e.g., weather, livestock/wildlife activity, anthropogenic influences, etc). And procedures be documented in writing?				
Q4.9.5 Operations - Question 4.9.5				
Has a draft sampling programme been developed that requires monitoring, or has the operation committed to monitor for cyanide in discharges of process water to surface water and in ground water down gradient of the site?				
Q4.9.6 Operations - Question 4.9.6				
Has a draft inspection form been developed for, or has the operation committed to inspect for and record wildlife mortalities related to contact with and ingestion of cyanide solutions?				
Q4.9.7 Operations - Question 4.9.7				
Has the operation specified the frequencies of monitoring activities that are adequate to characterise the medium being monitored and to identify changes in a timely manner?				
Average				

Notes:

0-None Compliance

1-Partial Compliance

2-Substantial Compliance

3-Full Compliance

Code Requirement	WAI Compliance Score		Comments/Evidence	By Date
S5 - Decommissioning				
Protect communities and the environment from cyanide through development and implementation of decommissioning plans for cyanide facilities.				
S5.1 - Standard of Practice				
Plan and implement procedures for effective decommissioning of cyanide facilities to protect human health, wildlife and livestock.				
Q5.1.1 - Decommissioning - Question 5.1.1				
Has the operation developed written procedures to decommission cyanide facilities at the cessation of operations?				
Q5.1.2 - Decommissioning - Question 5.1.2				
Does the plan include an implementation schedule for decommissioning activities?				
Q5.1.3 - Decommissioning - Question 5.1.3				
Does the operation review its decommissioning procedures for cyanide facilities during the life of the operation and revise them as needed?				
S5.2 - Standard of Practice				
Establish an assurance mechanism capable of fully funding cyanide related decommissioning activities.				
Q5.2.1 - Decommissioning - Question 5.2.1				
Has the operation developed an estimate of the cost to fully fund third party implementation of the cyanide-related decommissioning measures as identified in its site decommissioning or closure plan?				
Q5.2.2 - Decommissioning - Question 5.2.2				
Does the operation review and update the cost estimate at least every five years and when revisions to the plan are made that effect cyanide-related decommissioning activities?				
Q5.2.3 - Decommissioning - Question 5.2.3				
Has the operation established a financial mechanism approved by the applicable jurisdiction to cover the estimated costs for cyanide-related decommissioning activities as identified in its decommissioning and closure strategy? If so, no further demonstrate				

Q5.2.4 - Decommissioning - Question 5.2.4				
If the applicable jurisdiction does not require financial guarantees, has the operation established a mechanism other than self-insurance or self-guarantee to cover estimated costs for the cyanide-related decommissioning activities as identified in its de				
Q5.2.5 - Decommissioning - Question 5.2.5				
If the operation has established self-insurance or self-guarantee as a financial assurance mechanism, has the operation provided a statement by a qualified financial auditor that it has sufficient financial strength to fulfil this obligation as demonstrate				
Average				

Notes:

0-None Compliance
1-Partial Compliance
2-Substantial Compliance
3-Full Compliance

Code Requirement	WAI Compliance Score	Comments/Evidence	By Date
S6 - Worker Safety			
Protect workers' health and safety from exposure to cyanide.			
S6.1 - Standard of Practice			
Identify potential cyanide exposure scenarios and take measures as necessary to eliminate, reduce and control them.			
Q6.1.1 - Worker Safety - Question 6.1.1			
Has the operation developed procedures describing how cyanide-related tasks such as unloading, mixing, plant operations, entry into confined spaces, and equipment decontamination prior to maintenance should be conducted to minimize worker exposure?			
Q6.1.2 - Worker Safety - Question 6.1.2			
Do the procedures require, where necessary, the use of personal protective equipment and address pre-work inspections?			
Q6.1.3 - Worker Safety - Question 6.1.3			
Does the operation implement procedures to review proposed process and operational changes and modifications for their potential impacts on worker health and safety, and incorporate the necessary worker protection measures?			
Q6.1.4 - Worker Safety - Question 6.1.4			
Does the operation solicit and actively consider worker input in developing and evaluating health and safety procedures?			
S6.2 - Standard of Practice			
Operate and monitor cyanide facilities to protect worker health and safety and periodically evaluate the effectiveness of health and safety measures.			
Q6.2.1 - Worker Safety - Question 6.2.1			
Has the operation determined the appropriate pH for limiting the evolution of hydrogen cyanide gas during mixing and production activities?			
Q6.2.2 - Worker Safety - Question 6.2.2			
Where the potential exists for significant cyanide exposure, does the operation use ambient or personal monitoring devices to confirm that controls are adequate to limit worker exposure to hydrogen cyanide gas and sodium, calcium or potassium cyanide dust or potassium cyanide dust to 10 ppm on an instantaneous basis and 4.7 ppm continuously over an 8-hour period, as cyanide?			
Q6.2.3 - Worker Safety - Question 6.2.3			
Has the operation identified areas and activities where workers may be exposed to cyanide in excess of 10 ppm on an instantaneous basis and 4.7 ppm continuously over an 8-hour period, and require use of personal protective equipment in these areas or when performing these activities?			
Q6.2.4 - Worker Safety - Question 6.2.4			
Is hydrogen cyanide monitoring equipment maintained, tested and calibrated as directed by the manufacturer, and are records retained for at least one year?			

Q6.2.5 - Worker Safety - Question 6.2.5				
Have warning signs been placed where cyanide is used advising workers that cyanide is present, and that smoking, open flames and eating and drinking are not allowed, and that, if necessary, suitable personal protective equipment must be worn?				
Q6.2.6 - Worker Safety - Question 6.2.6				
Are showers, low-pressure eye wash stations and dry powder or non-acidic sodium bi-carbonate fire extinguishers located at strategic locations throughout the operation and are they maintained, inspected and tested on a regular basis?				
Q6.2.7 - Worker Safety - Question 6.2.7				
Are unloading, storage, mixing and process tanks and piping containing cyanide identified to alert workers of their contents, and is the direction of cyanide flow in pipes designated?				
Q6.2.8 - Worker Safety - Question 6.2.8				
Are MSDS, first aid procedures or other informational materials on cyanide safety in the language of the workforce available in areas where cyanide is managed?				
Q6.2.9 - Worker Safety - Question 6.2.9				
Are procedures in place and being implemented to investigate and evaluate cyanide exposure incidents to determine if the operation's programs and procedures to protect worker health and safety, and to respond to cyanide exposures, are adequate need revising?				
S6.3 - Standard of Practice				
Develop and implement emergency response plans and procedures to respond to worker exposure to cyanide.				
Q6.3.1 - Worker Safety - Question 6.3.1				
Does the operation have water, oxygen, a resuscitator, antidote kits and a radio, telephone, alarm system or other means of communication or emergency notification readily available for use at cyanide unloading, storage and mixing locations and elsewhere ?				
Q6.3.2 - Worker Safety - Question 6.3.2				
Does the operation inspect its first aid equipment regularly to ensure that it is available when needed, and are materials such as cyanide antidotes stored and/or tested as directed by their manufacturer and replaced on a schedule to ensure that they will be effective when needed?				
Q6.3.3 - Worker Safety - Question 6.3.3				
Has the operation developed specific written emergency response plans or procedures to respond to cyanide exposures?				
Q6.3.4 - Worker Safety - Question 6.3.4				
Does the operation have its own on-site capability to provide first aid or medical assistance to workers exposed to cyanide?				
Q6.3.5 - Worker Safety - Question 6.3.5				
Has the operation developed procedures to transport workers exposed to cyanide to locally available qualified off site medical facilities?				
Q6.3.6 - Worker Safety - Question 6.3.6				
Has the operation made formalized arrangements with local hospitals, clinics, etc., so that these providers are aware of the potential need to treat patients for cyanide exposure? Is the operation confident that the medical facility has adequate, qualifications?				
Q6.3.7 - Worker Safety - Question 6.3.7				
Are mock emergency drills conducted periodically to test response procedures for various cyanide exposure scenarios, and are lessons learned from the drills incorporated into response planning?				
Average				
Notes:				

4-None Compliance
3-Substantial Compliance
2-Substantial Compliance
1-Partial Compliance
0-Full Compliance

Code Requirement	WAI Compliance Score		Comments/Evidence	By Date
S7 - Emergency Response				
Protect communities and the environment through the development of emergency response strategies and capabilities.				
S7.1 - Standard of Practice				
Prepare detailed emergency response plans for potential cyanide releases.				
Q7.1.1 - Emergency Response - Question 7.1.1				
Has the operation developed an Emergency Response Plan to address potential accidental releases of cyanide?				
S7.1.2 - Emergency Response - Question 7.1.2				
Does the Plan consider the potential cyanide failure scenarios appropriate for its site-specific environmental and operating circumstances, including the following, as applicable?				
a) Catastrophic release of hydrogen cyanide from storage or process facilities.				
b) Transportation accidents.				
c) Releases during unloading and mixing.				
d) Releases during fires and explosions.				
d) Release during fires and explosions				
e) Pipe, valve and tank ruptures.				
f) Overtopping of ponds and impoundments.				
g) Power outages and pump failures.				
h) Uncontrolled seepage.				
i) Failure of cyanide treatment, destruction or recovery systems.				
j) Failure of tailings impoundments, heap leach facilities and other cyanide facilities.				
Q7.1.3 - Emergency Response - Question 7.1.3				
Has planning for response to transportation-related emergencies considered transportation route(s), physical and chemical form of the cyanide, method of transport (e.g., rail, truck), the condition of the road or railway, and the				
Q7.1.4 - Emergency Response - Question 7.1.4				
Does the Plan describe specific response actions (as appropriate for the anticipated emergency situations) such as clearing site personnel and potentially affected communities from the area of exposure, use of cyanide antidotes and first aid measures for cyanide exposure, control of releases at their source, and containment, assessment, mitigation and future prevention of releases?				
S7.2 - Standard of Practice				
Involve site personnel and stakeholders in the planning process.				
Q7.2.1 - Emergency Response - Question 7.2.1				
Has the operation involved its workforce and stakeholders, including potentially affected communities, in the cyanide emergency response planning process?				
Q7.2.2 - Emergency Response - Question 7.2.2				
Has the operation made potentially affected communities aware of the nature of their risks associated with accidental cyanide releases, and consulted with them directly or through community representatives regarding appropriate communications and response actions?				
Q7.2.3 - Emergency Response - Question 7.2.3				
Has the operation involved local response agencies such as outside responders and medical facilities in the cyanide emergency planning and response process?				
Q7.2.4 - Emergency Response - Question 7.2.4				
Does the operation engage in consultation or communication with stakeholders to keep the Emergency Response Plan current?				
S7.3 - Standard of Practice				
Designate appropriate personnel and commit necessary equipment and resources for emergency response.				
S7.3.1 - Emergency Response - Question 7.3.1				
Do the cyanide-related elements of the Emergency Response Plan:				
a) Designate primary and alternate emergency response coordinators who have explicit authority to commit the resources necessary to implement the Plan?				
b) Identify Emergency Response Teams?				
c) Require appropriate training for emergency responders?				

d) Include call-out procedures and 24-hour contact information for the coordinators and response team members?				
e) Specify the duties and responsibilities of the coordinators and team members?				
f) List emergency response equipment, including personal protection gear, available along transportation routes and/or on-site?				
g) Include procedures to inspect emergency response equipment to ensure its availability?				
h) Describe the role of outside responders, medical facilities and communities in the emergency response procedures?				
Q7.3.2 - Emergency Response - Question 7.3.2				
Has the operation confirmed that outside entities included in the Emergency Response Plan are aware of their involvement and are included as necessary in mock drills or implementation exercises?				
S7.4 - Standard of Practice				
Develop procedures for internal and external emergency notification and reporting.				
Q7.4.1 - Emergency Response - Question 7.4.1				
Does the Plan include procedures and contact information for notifying management, regulatory agencies, outside response providers and medical facilities of the cyanide emergency?				
Q7.4.2 - Emergency Response - Question 7.4.2				
Does the Plan include procedures and contact information for notifying potentially affected communities of the cyanide related incident and any necessary response measures, and for communication with the media?				
S7.5 - Standard of Practice				
Incorporate into response plans and remediation measures monitoring elements that account for the additional hazards of using cyanide treatment chemicals.				
S7.5.1 - Emergency Response - Question 7.5.1				
Does the Plan describe specific remediation measures as appropriate for the likely cyanide release scenarios, such as:				
a) Recovery or neutralization of solutions or solids?				
b) Decontamination of soils or other contaminated media?				
c) Management and/or disposal of spill clean-up debris?				
d) Provision of an alternate drinking water supply?				
Q7.5.2 - Emergency Response - Question 7.5.2				
Does the Plan prohibit the use of chemicals such as sodium hypochlorite, ferrous sulphate and hydrogen peroxide to treat cyanide that has been released into surface water?				
Q7.5.3 - Emergency Response - Question 7.5.3				
Does the Plan address the potential need for environmental monitoring to identify the extent and effects of a cyanide release, and include sampling methodologies, parameters and, where practical, possible sampling locations?				
S7.6 - Standard of Practice				
Periodically evaluate response procedures and capabilities and revise them as needed.				
Q7.6.1 - Emergency Response - Question 7.6.1				
Does the operation review and evaluate the cyanide related elements of its Emergency Response Plan for adequacy on a regular basis?				
Q7.6.2 - Emergency Response - Question 7.6.2				
Are mock cyanide emergency drills conducted periodically as part of the Emergency Response Plan evaluation process?				
Q7.6.3 - Emergency Response - Question 7.6.3				
Are provisions in place to evaluate and revise the Emergency Response Plan after any cyanide related emergency requiring its implementation? Have such reviews been conducted?				
Average				

Notes:

1-None Compliance

2-Partial Compliance

3-Substantial Compliance

4-Full Compliance

Code Requirement	WAI Compliance Score		Comments/Evidence	By Date
S8 - Training				
Train workers and emergency response personnel to manage cyanide in a safe and environmentally protective manner.				
S8.1 - Standard of Practice				
Train workers to understand the hazards associated with cyanide use.				
Q8.1.1 - Training - Question 8.1.1				
Does the operation train all personnel who may encounter cyanide in cyanide hazard recognition?				
Q8.1.2 - Training - Question 8.1.2				
Is cyanide hazard recognition refresher training periodically conducted?				
Q8.1.3 - Training - Question 8.1.3				
Are cyanide training records retained?				
S8.2 - Standard of Practice				
Train appropriate personnel to operate the facility according to systems and procedures that protect human health, the community and the environment.				
Q8.2.1 - Training - Question 8.2.1				
Does the operation train workers to perform their normal production tasks, including unloading, mixing, production and maintenance, with minimum risk to worker health and safety and in a manner that				
Q8.2.2 - Training - Question 8.2.2				
Are the training elements necessary for each job involving cyanide management identified in training materials?				
Q8.2.3 - Training - Question 8.2.3				
Do appropriately qualified personnel provide task training related to cyanide management activities?				
Q8.2.4 - Training - Question 8.2.4				
Are employees trained prior to working with cyanide?				

Q8.2.5 - Training - Question 8.2.5				
Is refresher training on cyanide management provided to ensure that employees continue to perform their jobs in a safe and environmentally protective manner?				
Q8.2.6 - Training - Question 8.2.6				
Does the operation evaluate the effectiveness of cyanide training by testing, observation or other means?				
Q8.2.7 - Training - Question 8.2.7				
Are records retained throughout an individual's employment documenting the training they receive? Do the records include the names of the employee and the trainer, the date of training, the topics covered, and if the employee demonstrated an understanding				
Q8.2.8 - Training - Question 8.2.8				
Will the records include the names of the employees and the trainer, the date of the training, the topics covered and if the employee demonstrated an understanding of the training materials?				
S8.3 - Standard of Practice				
Train appropriate workers and personnel to respond to worker exposures and environmental releases of cyanide.				
Q8.3.1 - Training - Question 8.3.1				
Are all cyanide unloading, mixing, production and maintenance personnel trained in the procedures to be followed if cyanide is released?				
Q8.3.2 - Training - Question 8.3.2				
Are site cyanide response personnel, including unloading, mixing, production and maintenance workers, trained in decontamination and first aid procedures? Do they take part in routine drills to test and				
Q8.3.3 - Training - Question 8.3.3				
Are Emergency Response Coordinators and members of the Emergency Response Team trained in the procedures included in the Emergency Response Plan regarding cyanide, including the use of necessary response equipment?				
Q8.3.4 - Training - Question 8.3.4				
Has the operation made off-site Emergency Responders, such as community members, local responders and medical providers, familiar with those elements of the Emergency Response Plan related to cyanide?				

Q8.3.5 - Training - Question 8.3.5				
Is refresher training for response to cyanide exposures and releases regularly conducted?				
Q8.3.6 - Training - Question 8.3.6				
Are simulated cyanide emergency drills periodically conducted for training purposes? Do they cover both worker exposures and environmental releases?				
Q8.3.7 - Training - Question 8.3.7				
Are cyanide emergency drills evaluated from a training perspective to determine if personnel have the knowledge and skills required for effective response? Are training procedures revised if deficiencies are identified?				
Q8.3.8 - Training - Question 8.3.8				
Are records retained documenting the cyanide training, including the names of the employee and the trainer, the date of training, the topics covered, and how the employee demonstrated an understanding of the training materials?				
Q8.3.9 - Training - Question 8.3.9				
Has the operation drafted procedures if committed to evaluate cyanide emergency drills from a training perspective to determine if personnel have the knowledge and skills required for effective response?				
Q8.3.10 - Training - Question 8.3.10				
Will training procedures be revised if deficiencies are identified?				
Average				

Notes:

0-None Compliance
1-Partial Compliance
2-Substantial Compliance
3-Full Compliance

Code Requirement	WAI Compliance		Evidence	By Date
S9 - Dialogue				
Engage in public consultation and disclosure.				
S9.1 - Standard of Practice				
Provide stakeholders the opportunity to communicate issues of concern.				
Q9.1.1 - Dialogue - Question 9.1.1				
Does the operation provide the opportunity for stakeholders to communicate issues of concern regarding the management of cyanide?				
S9.2 - Standard of Practice				
Initiate dialogue describing cyanide management procedures and responsively address identified concerns.				
Q9.2.1 - Dialogue - Question 9.2.1				
Are there opportunities for the operation to interact with stakeholders and provide them with information regarding cyanide management practices and procedures?				
S9.3 - Standard of Practice				
Make appropriate operational and environmental information regarding cyanide available to stakeholders.				
Q9.3.1 - Dialogue - Question 9.3.1				
Has the operation developed written descriptions of how their activities are conducted and how cyanide is managed? Are these descriptions available to communities and other stakeholders?				

Q9.3.2 - Dialogue - Question 9.3.2				
Has the operation disseminated information on cyanide in verbal form where a significant percentage of the local population is illiterate?				
S9.3.3 - Dialogue - Question 9.3.3				
Q9.3.3.1 - Dialogue - Question 9.3.3a				
Does the operation make information publicly available on the following confirmed cyanide release or exposure incidents?				
a) Cyanide exposure resulting in hospitalization or fatality.				
Q9.3.3.2 - Dialogue - Question 9.3.3b				
b) Cyanide releases off the mine site requiring response or remediation.				
Q9.3.3.3 - Dialogue - Question 9.3.3c				
c) Cyanide releases on or off the mine site resulting in significant adverse effects to health or the environment.				
Q9.3.3.4 - Dialogue - Question 9.3.3d				
d) Cyanide releases on or off the mine site requiring reporting under applicable regulations.				
Q9.3.3.5 - Dialogue - Question 9.3.3e				
e) Releases that are or that cause applicable limits for cyanide to be exceeded.				
Average				

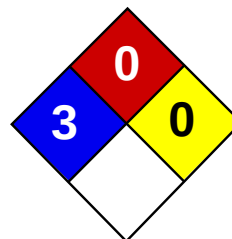
Notes:

0-None Compliance

1-Partial Compliance

2-Substantial Compliance

3-Full Compliance



Health	3
Fire	1
Reactivity	0
Personal Protection	J

Material Safety Data Sheet

Sodium Cyanide MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium Cyanide

Catalog Codes: SLS2314, SLS3736

CAS#: 143-33-9

RTECS: VZ7525000

TSCA: TSCA 8(b) inventory: Sodium Cyanide

CI#: Not available.

Synonym:

Chemical Name: Sodium Cyanide

Chemical Formula: NaCN

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium Cyanide	143-33-9	100

Toxicological Data on Ingredients: Sodium Cyanide: ORAL (LD50): Acute: 6.44 mg/kg [Rat]. DERMAL (LD50): Acute: 10.4 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (permeator). Corrosive to eyes and skin. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to skin, eyes, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Slightly flammable to flammable in presence of acids, of moisture.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder. **LARGE FIRE:** Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:

Dangerous on contact with acids, acid fumes, water or steam. It will produce toxic and flammable vapors of CN-H and sodium oxide. Contact with acids and acid salts causes immediate formation of toxic and flammable hydrogen cyanide gas. When heated to decomposition it emits toxic fumes hydrogen cyanide and oxides of nitrogen

Special Remarks on Explosion Hazards: Fusion mixtures of metal cyanides with metal chlorates, perchlorated or nitrates causes a violent explosion

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Corrosive solid. Poisonous solid. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep container dry. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 24°C (75.2°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

STEL: 5 (mg/m3) from ACGIH (TLV) [United States] SKIN CEIL: 4.7 from NIOSH CEIL: 5 (mg/m3) from NIOSH Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Granular solid. Flakes solid.)

Odor:

Faint almond-like odor. Odorless when perfectly dry. Emits odor of hydrogen cyanide when damp.

Taste: Not available.

Molecular Weight: 49.01 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: 1496°C (2724.8°F)

Melting Point: 563°C (1045.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.595 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Vapor Density of Hydrogen Cyanide gas: 0.941

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:

Soluble in cold water. Slightly soluble in Ethanol

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, moisture, incompatibles.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity:

Corrosive in presence of aluminum. Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Violent reaction with fluorine gas, magnesium, nitrates, nitric acid. Dangerous on contact with acids, acid fumes, water or steam. It will produce toxic and flammable vapors of CN-H and sodium oxide. Cyanide may react with CO₂ in ordinary air to form toxic hydrogen cyanide gas. Strong oxidizers such as acids, acid salts, chlorates, and nitrates. Contact with acids and acid salts causes immediate formation of toxic and flammable hydrogen cyanide gas.

Special Remarks on Corrosivity: Corrosive to aluminum

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

Acute oral toxicity (LD₅₀): 6.44 mg/kg [Rat]. Acute dermal toxicity (LD₅₀): 10.4 mg/kg [Rabbit].

Chronic Effects on Humans: May cause damage to the following organs: skin, eyes, central nervous system (CNS).

Other Toxic Effects on Humans:

Very hazardous in case of skin contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May cause adverse reproductive effects (maternal and paternal fertility) based on animal data.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health effects: Skin: May cause itching and irritation. May be fatal if absorbed through injured skin with symptoms similar to those noted for inhalation and ingestion. Eyes: May cause eye irritation and eye damage. Inhalation: May cause respiratory tract irritation. May be fatal if inhaled. The substance inhibits cellular respiration causing metabolic asphyxiation. May cause headache, weakness, dizziness, labored breathing, nausea, vomiting. May be followed by cardiovascular effects, unconsciousness, convulsions, coma, and death Ingestion: May be fatal if swallowed. May cause

gastrointestinal tract irritation with nausea, vomiting. May affect behavior and nervous systems (seizures, convulsions, change in motor activity, headache, dizziness, confusion, weakness stupor, anxiety, agitation, tremors), cardiovascular system, respiration (hyperventilation, pulmonary edema, breathing difficulty, respiratory failure), cardiovascular system (palpitations, rapid heart beat, hypertension, hypotension). Massive doses by produce sudden loss of consciousness and prompt death from respiratory arrest. Smaller but still lethal doses on the breath or vomitus. Chronic Potential Health Effects: Central Nervous system effects (headaches, vertigo, insomnia, memory loss, tremors, fatigue), fatigue, metabolic effects (poor appetite), cardiovascular effects (chest discomfort, palpitations), nerve damage to the eyes, or dermatitis, respiratory tract irritation, eye irritation, or death can occur. may prolong the illness for 1 or more hours. A bitter almond odor may be noted

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Sodium cyanide UNNA: 1689 PG: I

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut carcinogen reporting list.: Sodium Cyanide Illinois chemical safety act: Sodium Cyanide New York release reporting list: Sodium Cyanide Rhode Island RTK hazardous substances: Sodium Cyanide Pennsylvania RTK: Sodium Cyanide Minnesota: Sodium Cyanide Massachusetts RTK: Sodium Cyanide Massachusetts spill list: Sodium Cyanide New Jersey: Sodium Cyanide New Jersey spill list: Sodium Cyanide Louisiana RTK reporting list: Sodium Cyanide Louisiana spill reporting: Sodium Cyanide California Director's List of Hazardous Substances: Sodium Cyanide TSCA 8(b) inventory: Sodium Cyanide TSCA 4(a) final test rules: Sodium Cyanide TSCA 8(a) PAIR: Sodium Cyanide TSCA 8(d) H and S data reporting: Sodium Cyanide TSCA 12(b) one time export: Sodium Cyanide SARA 302/304/311/312 extremely hazardous substances: Sodium Cyanide CERCLA: Hazardous substances.: Sodium Cyanide: 10 lbs. (4.536 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-6: Reactive and very flammable material. CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS E: Corrosive solid.

DSCL (EEC):

R27/28- Very toxic in contact with skin and if swallowed. R41- Risk of serious damage to eyes. S1/2- Keep locked up and out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S28- After contact with skin, wash immediately with plenty of water S36/37- Wear suitable protective clothing and gloves. S39- Wear eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Last Updated: 05/21/2013 12:00 PM

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FEASIBILITY DESIGN DRAWINGS

SITE 28 HEAP LEACH FACILITY

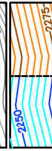
AMULSAR GOLD PROJECT

CENTRAL ARMENIA

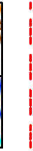
PREPARED FOR: LYDIAN INTERNATIONAL LTD.

GENERAL LEGEND

EXISTING GROUND TOPOGRAPHY
CONTOURS



SITE GRADING CUT AND FILL
SURFACES, RESPECTIVELY



EXISTING OVERHEAD POWERLINE



EXISTING FENCE



EXISTING UNPAVED ROAD



EXISTING DRAINAGE



EXISTING SEEP



CENTERLINE



DIA.



EL.



ID



MAX.



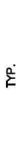
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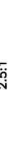
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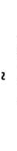
TYP.



DIMENSION IN METERS



2.5 HORIZONTAL TO 1 VERTICAL SLOPE



DEGREE



APPROXIMATELY



DETAIL CALL-OUT



CROSS-SECTION CALL-OUT

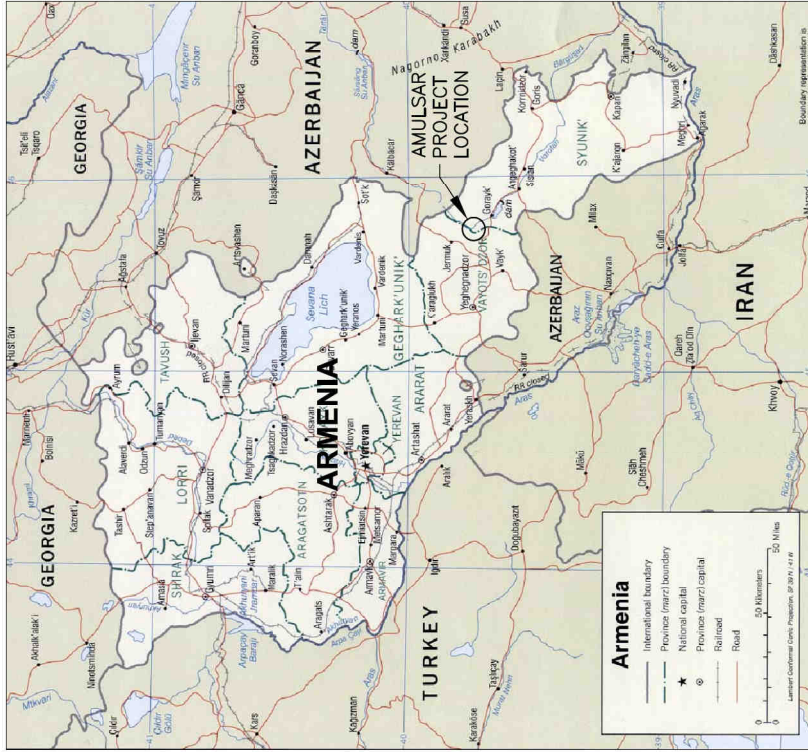
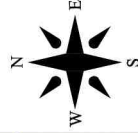


LINE WHERE SECTION IS CUT



LIST OF DRAWINGS

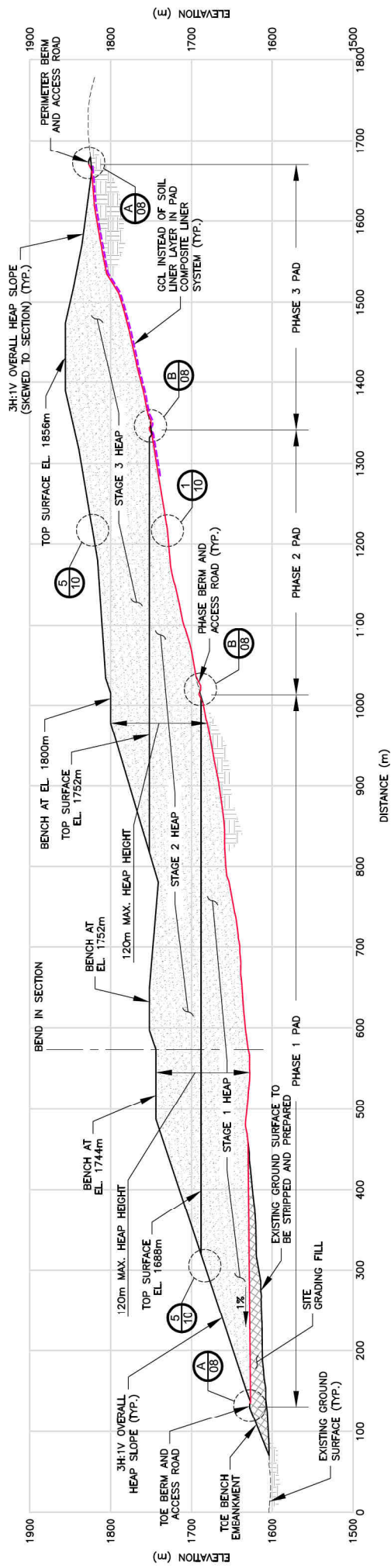
- 01 - TITLE, INDEX, GENERAL LEGEND AND PROJECT LOCATION MAP
- 02 - PROJECT FACILITIES GENERAL ARRANGEMENT PLAN
- 03 - PHASES 1-3 HEAP LEACH FACILITY LAYOUT AND GRADING PLAN
- 04 - PHASE 1 LEACH PAD LAYOUT AND ORE HEAP PLAN
- 05 - PHASES 1-2 LEACH PAD LAYOUT AND ORE HEAP PLAN
- 06 - PHASES 1-3 LEACH PAD LAYOUT AND ORE HEAP PLAN
- 07 - PHASES 1-3 LEACH PAD AND ORE HEAP SECTIONS
- 08 - LEACH PAD AND DIVERSION CHANNEL SECTIONS
- 09 - LEACH PAD SECTIONS AND DETAILS
- 10 - LEACH PAD DETAILS
- 11 - UNDERDRAIN SECTIONS AND DETAILS
- 12 - PHASES 1-3 LEACH PAD DRAIN PIPEWORK PLAN
- 13 - DRAIN PIPEWORK DETAILS AND SECTIONS
- 14 - COLLECTION PONDS LAYOUT AND GRADING PLAN
- 15 - COLLECTION PONDS SECTIONS
- 16 - COLLECTION PONDS DETAILS
- 17 - COLLECTION PONDS DETAILS AND SECTIONS
- 18 - NORTH EMBANKMENT DETAILS AND SECTIONS



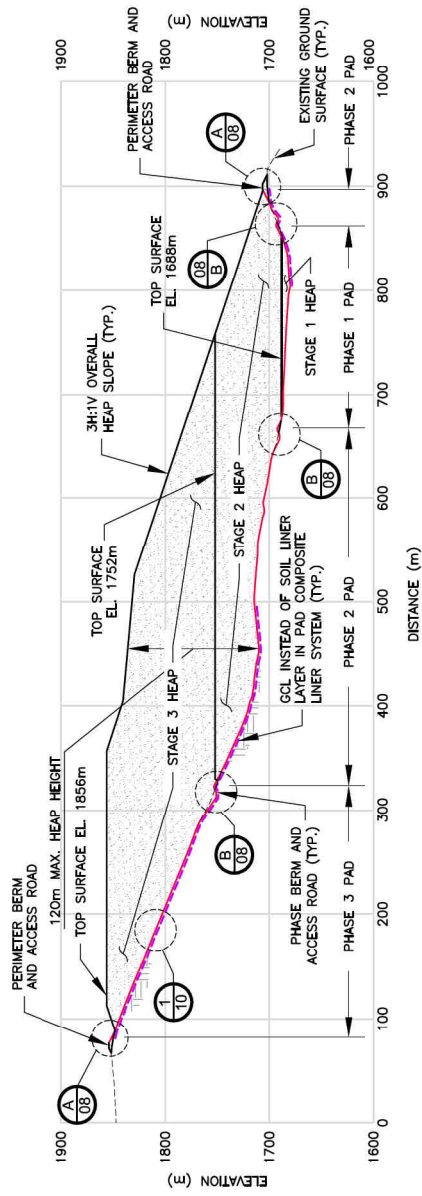
PROJECT LOCATION

DRAFT

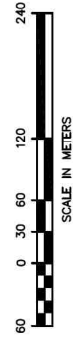
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A PAD AND ORE HEAP SECTION

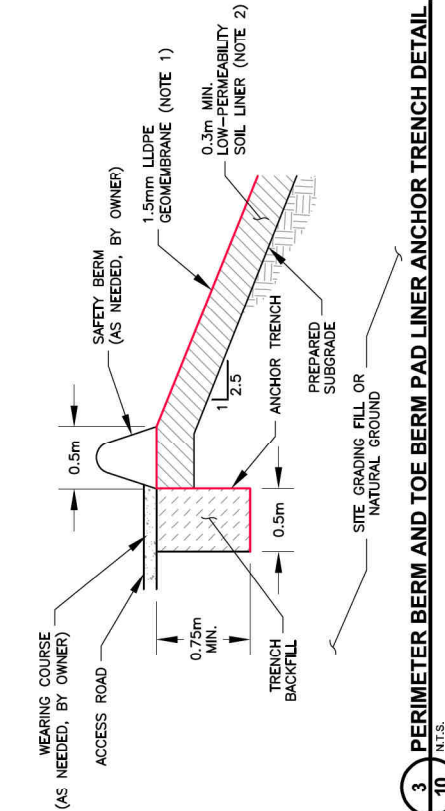


B PAD AND ORE HEAP SECTION



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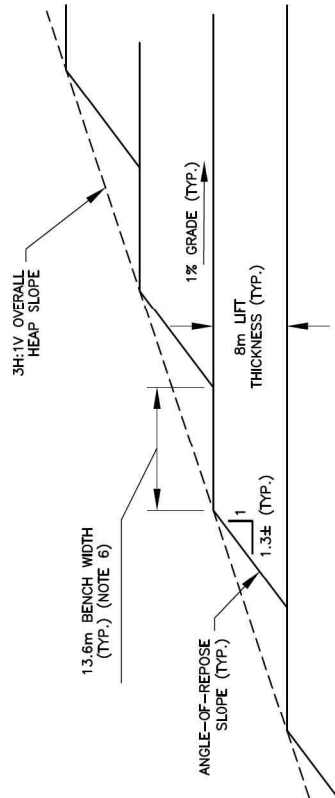
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SITE GRADING FILL OR
NATURAL GROUND

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10

PAD LINER TRANSITION FROM SOIL LINER LAYER TO GCL DETAIL

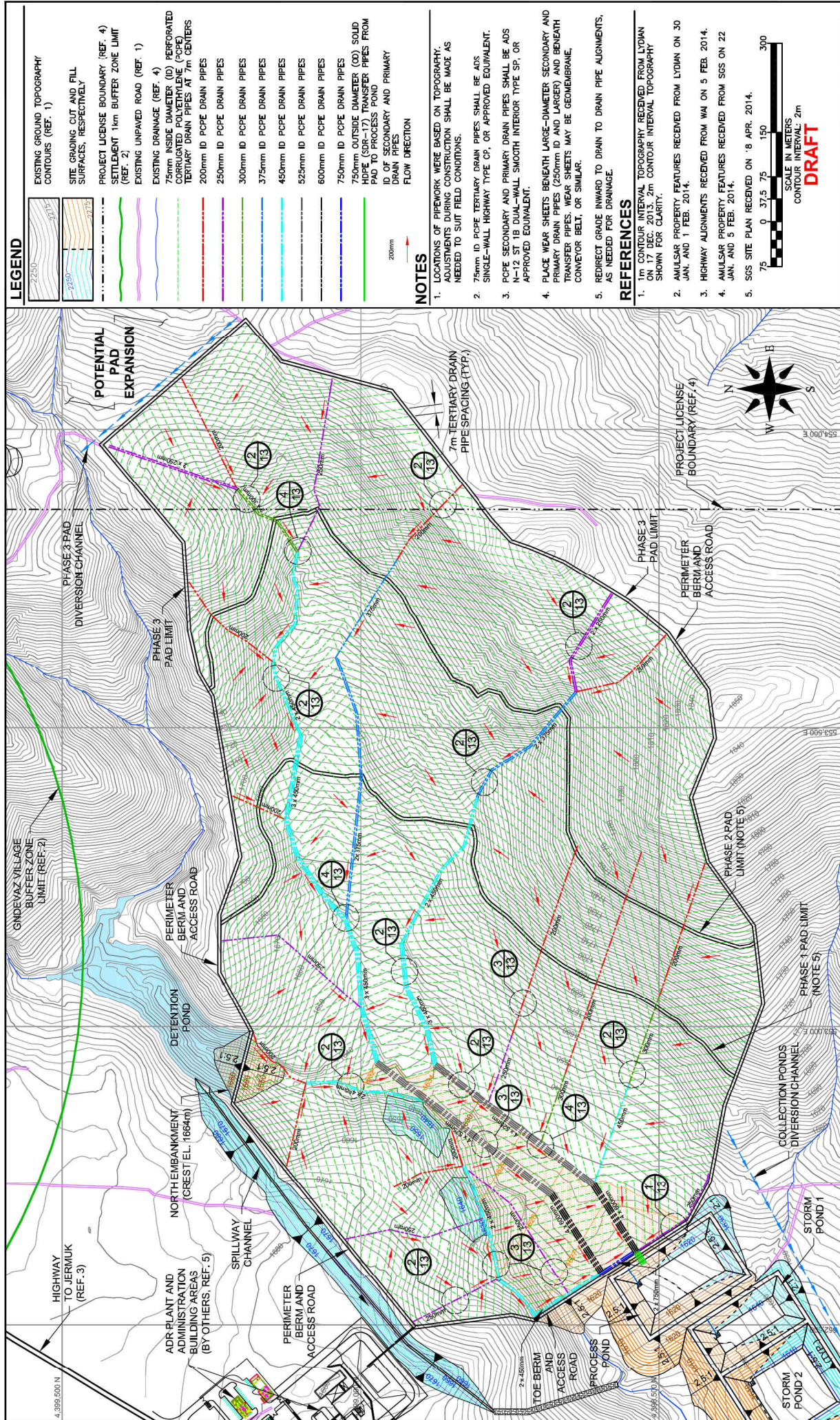
10 N.T.S.



5 ORE HEAP SLOPE DETAIL
10 N.T.S.

1. GEOMEMBRANE SHALL BE SINGLE-SIDE TEXTURED WITH TEXTURING AT BOTTOM IN STABILITY-CRITICAL AREA AT PAD DOWNGRADE TOE (SEE DRAWING 03), AND SMOOTH ELSEWHERE.
2. USE GCL INSTEAD OF SOIL LINER LAYER IN PAD AREAS STEEPER THAN 2.5H:1V (SEE DRAWING 03).
3. GCL SHALL CONSIST OF A LAYER OF SODIUM BENTONITE BETWEEN TWO 200- gr/m^2 NONWOVEN GEOTEXTILES, WHICH ARE NEEDLE-PUNCHED TOGETHER.
4. USE 1.5mm THICK GEOMEMBRANE IN PAD AREAS WHERE THE ULTIMATE ORE HEAP HEIGHT IS 60 m OR LESS. USE 2mm THICK GEOMEMBRANE ELSEWHERE (SEE DRAWING 03).
5. ORE HEAP SHALL BE STACKED TO A MIN. THICKNESS OF 2m ALONG THE LEFT'S UPHILL EDGE TO PREVENT DAMAGING THE PAD LINER WHEN RIPPING THE LIFT IN ADVANCE OF STACKING THE SUBSEQUENT LIFT.
5. GRADE BENCHES INWARD TO PREVENT SLOPE EROSION FROM RUNOFF. RETENTION BERMS MAY BE CONSTRUCTED ALONG BENCH EDGES, AS NEEDED.

Scale as Shown Designed by: CUK Drawn by: AMIL Reviewed by: CUK Approved by: AIB Prepared by: GLOBAL RESOURCE ENGINEERING	LYDIAN INTERNATIONAL		Prepared for:		LEACH PAD DETAILS DRAWING 10	REVISION											
	<table border="1"> <thead> <tr> <th>Rev</th> <th>DESCRIPTION</th> <th>DATE</th> <th>BY</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>ISSUED IN DRAFT FEASIBILITY DESIGN REPORT</td> <td>08MAY14</td> <td>GRE</td> </tr> </tbody> </table>	Rev	DESCRIPTION	DATE			BY	1	ISSUED IN DRAFT FEASIBILITY DESIGN REPORT	08MAY14	GRE	<table border="1"> <thead> <tr> <th>Project</th> <th>Location</th> <th>Project No.:</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>AMU/SAR</td> <td>CENTRAL</td> <td>13-1064</td> <td>2014</td> </tr> </tbody> </table>	Project	Location	Project No.:	Date	AMU/SAR
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Project	Location	Project No.:	Date														
AMU/SAR	CENTRAL	13-1064	2014														



PHASES 1-3 LEACH PAD DRAIN PIPEWORK PLAN		Project: AMULSAR	Project No.: T3-1064	DRAWING
		Location: CENTRAL ARMENIA	Date: MAY 2014	12
		REVISION		
		A		

Scale as Shown		Designed by: CLK	Drawn by: AMM	Reviewed by: CLK	Approved by: AUB
		ISSUED IN DRAFT FEASIBILITY DESIGN REPORT			
		Rev	Description	By	Date
		1	14MAY14	GRE	14MAY14
		REVISIONS			
		REFERENCE			

Prepared for:

Prepared by:

Scale as Shown

Designed by: CLK

Drawn by: AMM

Reviewed by: CLK

Approved by: AUB

ISSUED IN DRAFT FEASIBILITY DESIGN REPORT

Rev

Description

By

Date

14MAY14

GRE

14MAY14

REVISIONS

REFERENCE

PHASES 1-3 LEACH PAD
DRAIN PIPEWORK PLAN

Project: AMULSAR

Project No.: T3-1064

Location: CENTRAL ARMENIA

Date: MAY 2014

DRAWING

12

Prepared for:

Prepared by:

Scale as Shown

Designed by: CLK

Drawn by: AMM

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Date

14MAY14

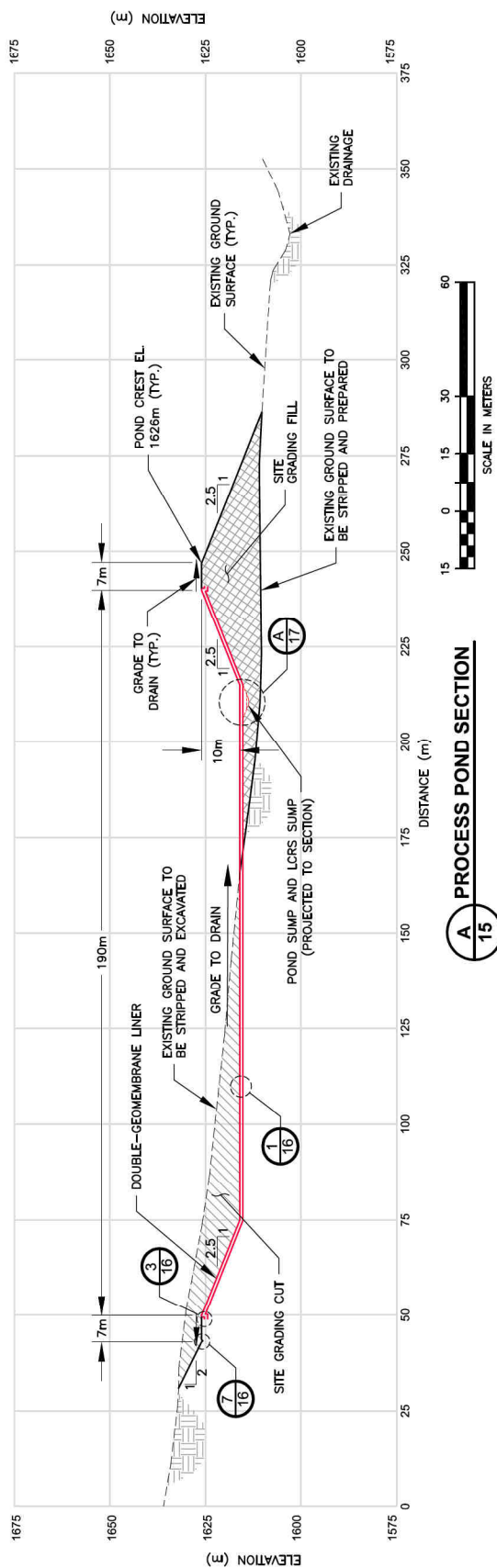
GRE

14MAY14

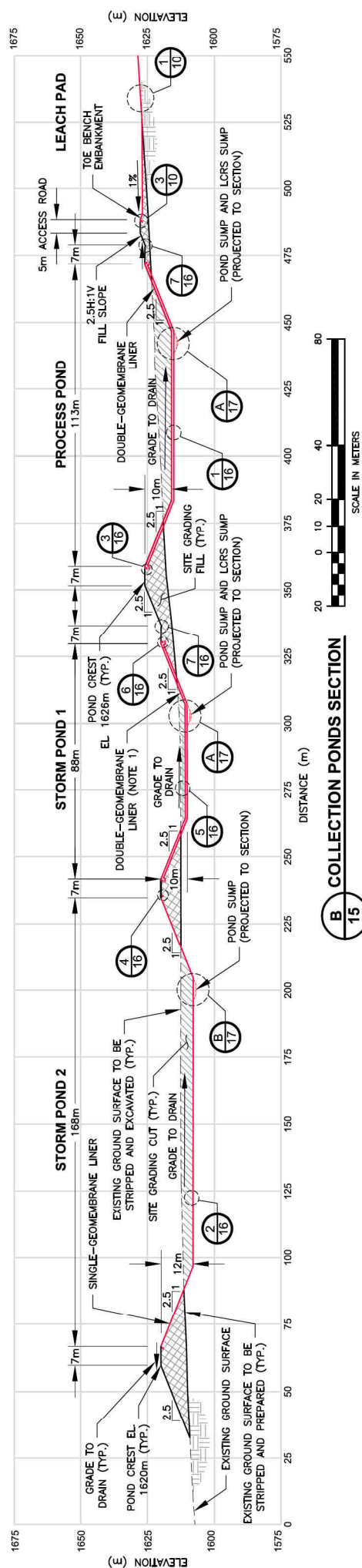
REVISIONS

REFERENCE

[illegible]



PROCESS POND SECTION

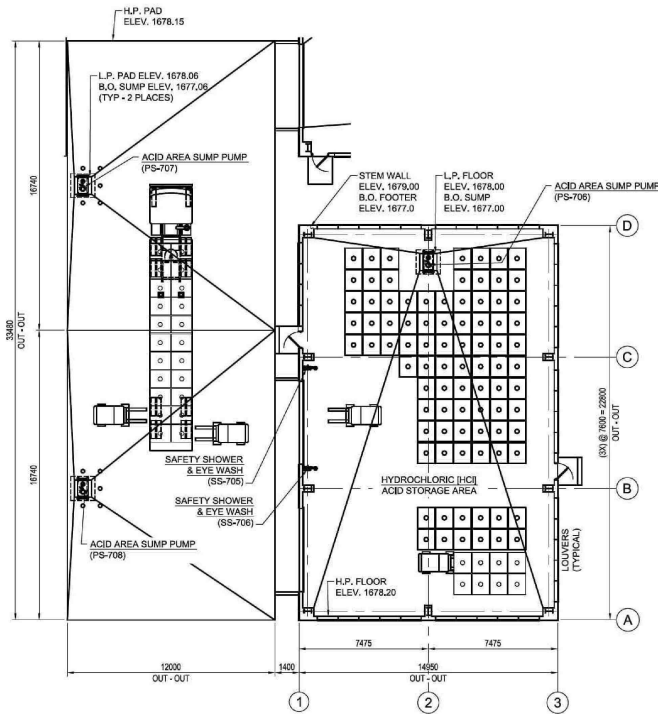
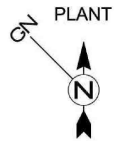


B COLLECTION PONDS SECTION

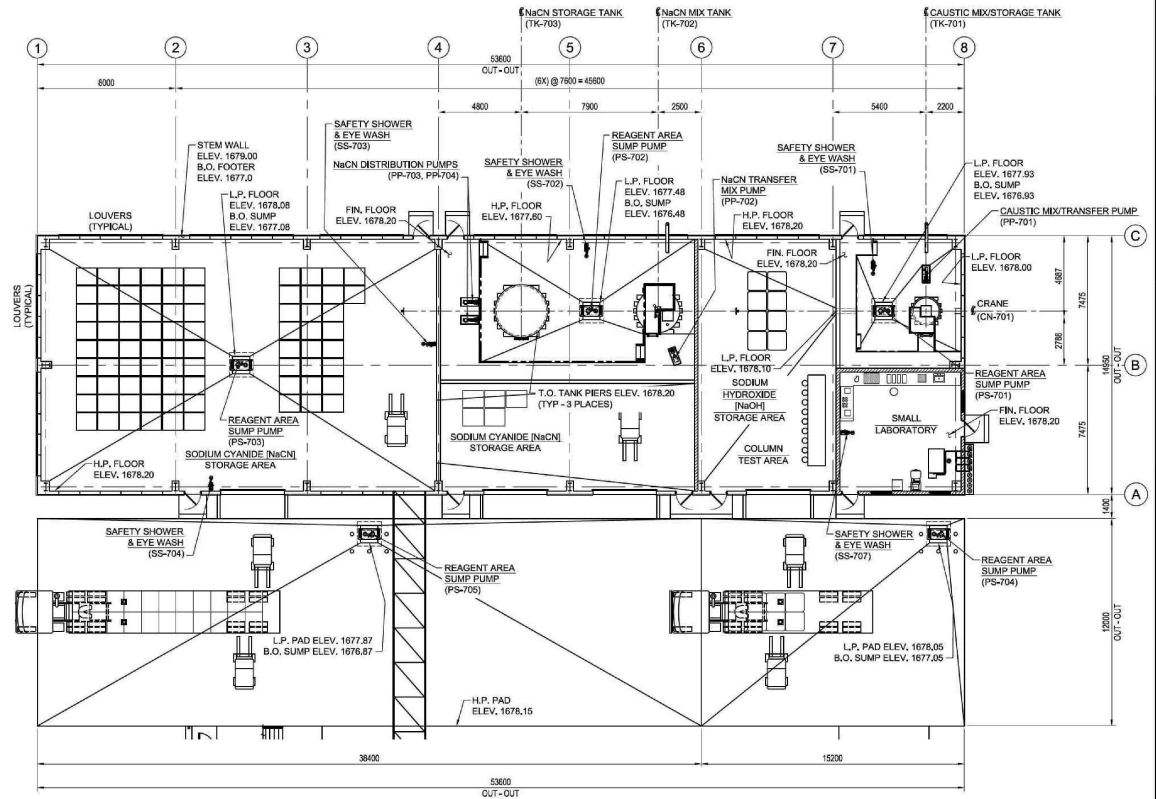
NOTES

1. CONSTRUCT SINGLE-LINED STORM POND 1 DURING PHASE 1 PAD CONSTRUCTION, DOUBLE-LINE POND DURING PHASE 2 PAD CONSTRUCTION.
2. LOW-LEVEL BERM AND ADDITIONAL SUMP MAY BE ADDED TO PROCESS POND BOTTOM AS NEEDED FOR POND MAINTENANCE, TO BE DETERMINED IN DETAILED DESIGN.

[illegible]



REAGENTS - ACID
BUILDING
FIN. GRADE ELEV. 1678.00
SCALE: 1:125



REAGENTS - SODIUM
CYANIDE & SODIUM
HYDROXIDE BUILDINGS
FIN. GRADE ELEV. 1678.00
SCALE: 1:125



FOR APPROVAL
NOT FOR CONSTRUCTION

W:\CAD\KED-07 Amulsar 2014\14-0000\14-0000-01\14-0000-01.dwg, 8/1/2014 11:22:59 AM

DRAWING NO.		REFERENCE		REVISION		DATE		DESCRIPTION		DRAWN		CHECKED		DATE		CLIENT		PROJECT		DATE		SCALE		PROJECT NO.		SHEET NO.		TITLED			
23-GA-001		GA, ADR PLANT OVERALL PLAN		A1		EYE22JUL14		SP22JUL14		ISSUED FOR APPROVAL		E. Y. KEDA		S. PATR		22JUL14		LYDIAN INTERNATIONAL LTD.		AMULSAR FEASIBILITY STUDY - 2014		22JUL14		1:125		439-07		19		23-GA-013	
												J. HOLLEY		J. HOLLEY		22JUL14															