

SHALKIYA MINE EXPANSION PROJECT
(KYZYLORDA REGION, KAZAKHSTAN)
Environmental and Social Management Plan
(ESMP)
Version: 1st Draft

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Prepared for:

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INTRODUCTION

JSC ShalkiyaZinc LTD ('the Owner', 'the Company' or 'the Mine') is proposing an expansion of the Shalkiya Mine as part of the Shalkiya Lead-Zinc Expansion Project ('the Project'). The Project is located in Kyzylorda Region (Oblast), in the south of Kazakhstan (Figure 1). The Project entails an expansion of operations of the existing Shalkiya Mine and the construction and operation of a new Processing Plant and supporting surface infrastructure. The development of the Shalkiya lead and zinc mine expansion is at the stage of detailed design and Environmental Impact Assessment per Kazakhstani legislative requirements (OVOS) preparation. A bankable FS is being developed simultaneously to obtain funding from the IFIs. Pursuant to national practice the approved project is divided into two parts: (1) mine expansion (mining works) and (2) construction of the processing plant with a capacity of 4 million metric tonnes per annum (Mtpa).

Purpose of this ESMP

This document serves to provide an Environmental and Social Management Plan (ESMP) for implementation of the Shalkiya Zinc project.

The purpose of the ESMP is to ensure that:

- a. All potential impacts on the environment as a result of the construction and operation of Shalkiya Zinc are recognised and understood and provision made for the effective management of such impacts. Management implies preventing or minimising negative impacts while maximising the positive impacts (benefits) of the activity;
- b. All relevant environmental legal requirements are recognised, planned for and met during the design and construction of Shalkiya Zinc;
- c. Best practice is promoted in implementing the required environmental management functions; and,
- d. A basis is established for continual improvement of environmental management into the future.

To achieve the above the ESMP has been based on the ISO14001 (2004, taking into account the requirements of 2015 version), Environmental Management Systems standard. The adoption of the standard is not necessarily to pursue certification, but rather to ensure that the approach that is used in managing the potential impacts of the project is robust and effective and perhaps most importantly, adaptable. The ESMP presented here is thus based on the policy, planning, implementation and operation, checking and corrective action and management review requirements of the management systems standard. Before describing that approach in more detail a broad description of the project is presented in the following section.

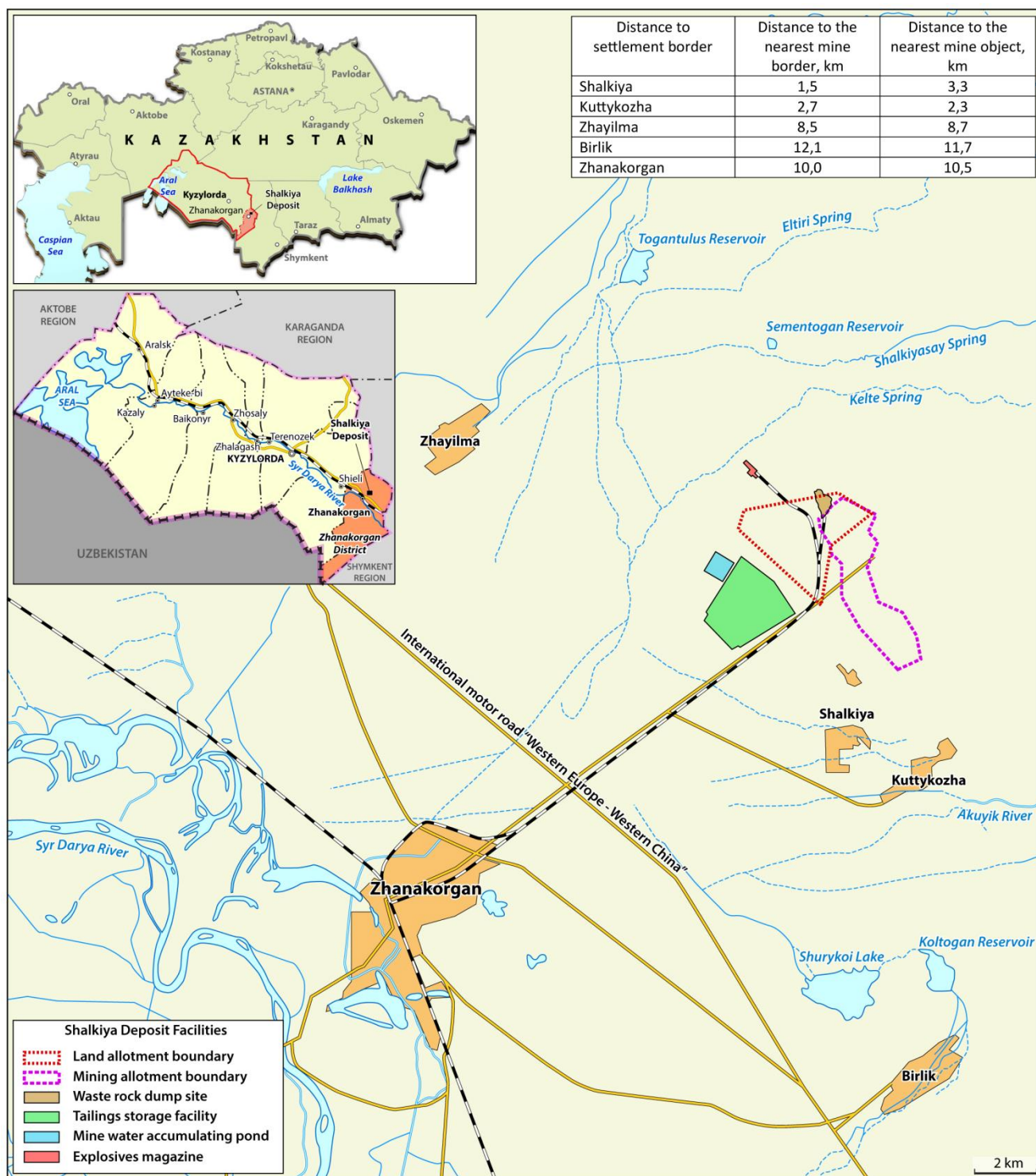


Figure 1. Map, showing the location of Shalkiya Mine in the southern Kazakhstan, neighboring villages and other objects

(Source: map, belonging to EAC Ecoline)

1. THE SHALKIYA ZINC PROJECT

1.1 The Shalkiya Mine

1.1.1 Historical Context

The Shalkiya Mine has operated intermittently since mining commenced in 1982. Mine infrastructure was established including shafts, underground mine workings, railway and highways, a power transmission line and a 220 kW substation and a residential village. The mine operated for a total of 12 years before being closed in 1994 for economic reasons but mining was started again in 2004 and operated until 2008 when the mining works were suspended with the competent authority approval. Access to the underground mine was through a decline from the surface via a portal and various shafts. Additionally, ventilation raises have been excavated that connect to the underground workings. The initial development of the mine infrastructure consisted of two vertical shafts, a mine settling pond for retaining and potentially treating pumped mine water, administration buildings and several other buildings that were never completed, such as the partially completed sewage treatment plant that is located to the southwest of the main mine operation.

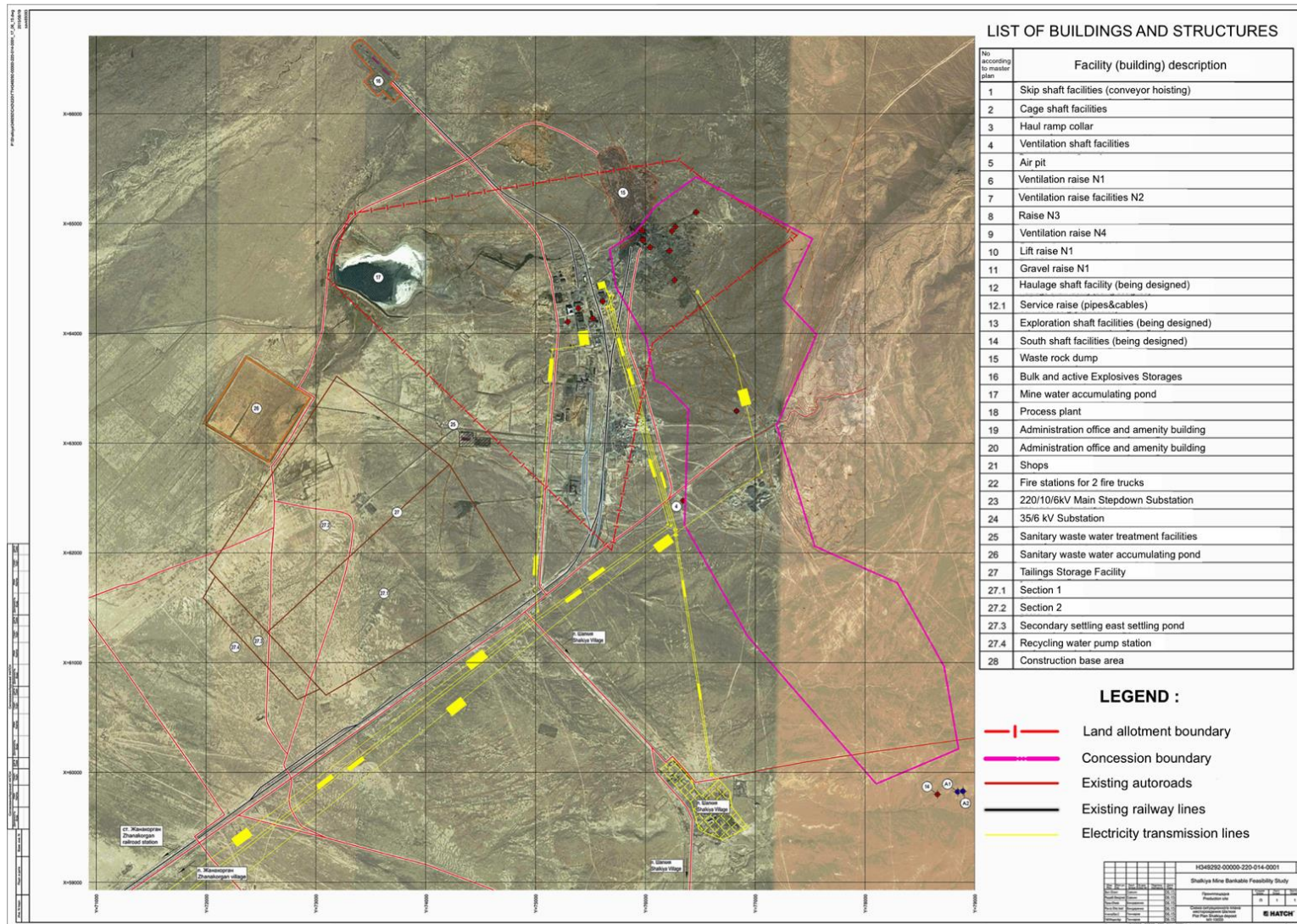
During the periods when the mine was operating, the entire run-of-mine ore was transported by rail from the mine to the Kentau Processing Plant located in Kentau town of South-Kazakhstan Region (Oblast), 165 km away from the Shalkiya Mine. No ore processing was carried out at the site and there are accordingly no tailings facilities. The overburden and waste rock dumps that existed previously were eliminated through processing of rocks for building materials. The exception is a small existing waste rock stockpile north east of the site, near the services shaft. When the mine ceased operations in 2008, a care-and-maintenance programme was initiated to maintain the facilities. Some of the existing infrastructure is shown in Figure 2.

1.1.2 Mining Operations

The mine is planned to continue as a conventional hard rock underground mining operation. Traditional mining methods would be used to develop and extract the ore, utilizing the standard drill-blast-haul-hoist cycle. The planned mine activities include development of mine infrastructure, production area access and ore production. The underground operations would be accessed via the existing ramp and vertical shafts. The mining rate is currently planned at 4.0 Mtpa, with an estimated 105 million tonnes of zinc-lead ore to be mined during the life-of-mine (LOM). Specific (LOM) tonnages would be determined as the mine design progresses. The mining would progress in a south-easterly direction becoming progressively deeper to follow the ore body.

1.1.3 Underground Infrastructure and Facilities

In support of the mining activities described above it would be necessary to upgrade existing underground facilities (Figure 2) as well as developing a variety of additional underground facilities to support the mining activities. Underground facilities include primary crushing, water management systems, power distribution systems, ventilation, equipment maintenance, storage and support, and other underground utilities as necessary. The selected underground facilities would require new underground excavations.



2. THE ENVIRONMENTAL MANAGEMENT APPROACH

2.1 Overview

The environmental management approach is illustrated schematically in Figure 1. The approach consists of five broad components namely:

- An overarching environmental policy;
- Planning;
- Implementation and operation;
- Checking and corrective action; and,
- Management review.

Each of these components is described below in more detail in terms of what will be done to meet the requirement during implementation of the Shalkiya Zinc project.

2.2 Environmental Policy

The Environmental Policy defines the broad intent of how environmental issues will be managed during the design and construction of the Shalkiya Zinc project. As such the policy provides the decision-making context for any future environmental management decisions as well as a platform for sustained improvements over time.

2.3 Planning

2.3.1 Objectives-based planning

Planning involves identifying and defining the various environmental aspects and related potential impacts that can result from the project and ensuring that appropriate management and mitigation measures are identified and effectively planned. The approach that has been used here is based on the principle of 'objective-based' planning. Objective-based planning involves identifying the slew of environmental requirements that need to be effected during implementation of the project, and:

- For each environmental an **objective** is specified. The objective serves to translate the requirement into a statement of achievement so that if the objective is met then the requirement will have been met. Note that several different requirements could be satisfied by a single objective and a single requirement could have several objectives – there is not necessarily a one-to-one relationship between requirements and objectives; and,
- For each objective specified an indicator is defined that will provide an indication of whether the objective is being met or not. To provide a metric for the indicator, targets are set which serve to reflect the performance aspirations of each objective.

The combination of objectives, indicators and targets provide an explicit set of measures that can be used at any stage to assess the effectiveness of the environmental management function.

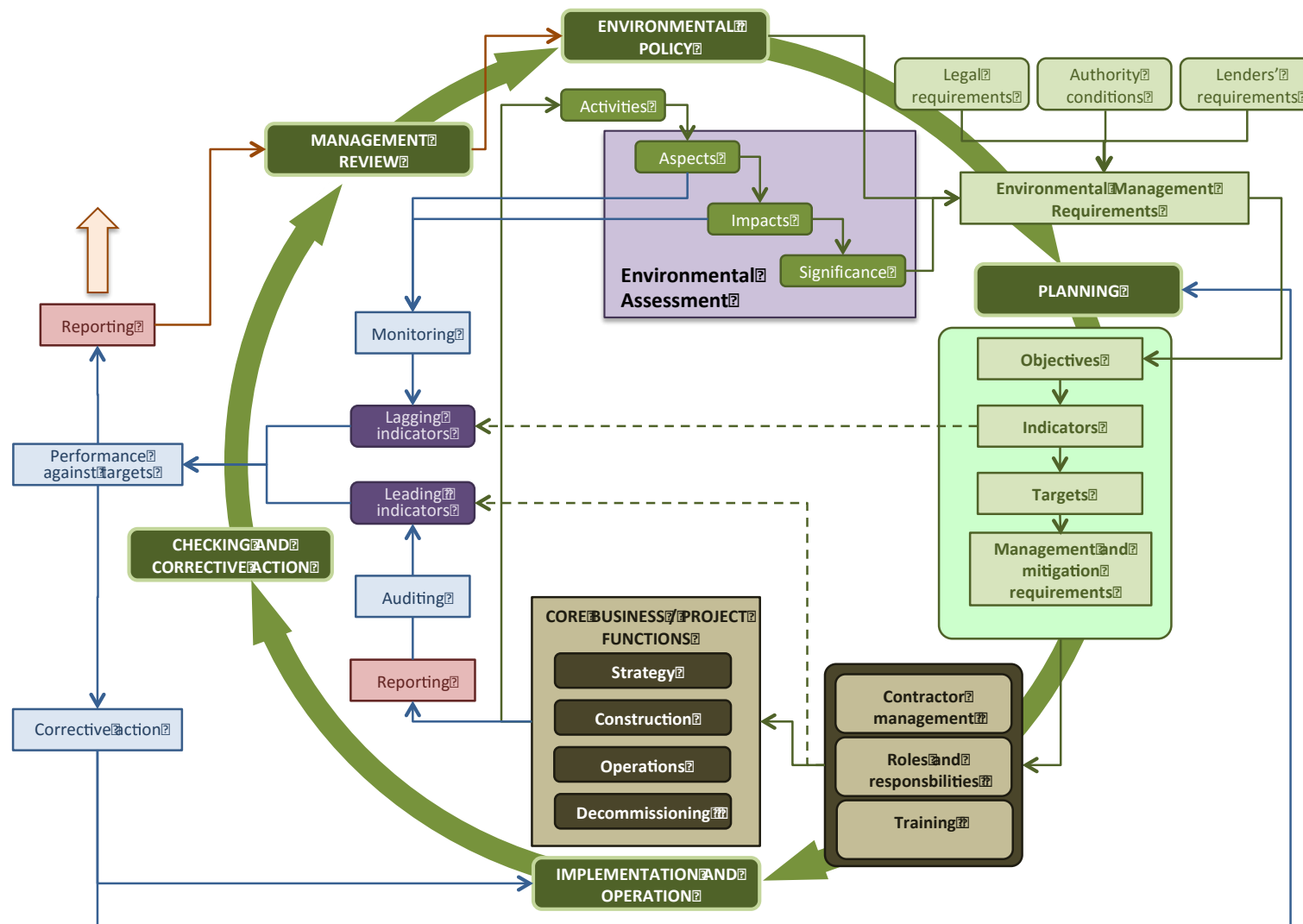


Figure 3: Schematic illustration of the environmental management philosophy for Shalkiya Zinc. The various components of the approach are described in more detail in the text).

2.3.2 Management plans

For each objective it is then necessary to determine what needs to be done (in terms of management and mitigation) to meet the targets. For the various management plans it is necessary to define who is responsible for the implementation of the same, where they must be implemented and when they must be implemented. Collectively the management plans and the design requirements and criteria provide the key linkages in terms of ensuring effective implementation of the environmental management requirements. The mechanism whereby implementation is effected is described in the following section on implementation and operation.

2.4 Implementation and operation

Implementation and operation serves to define how the management plans and environmental design criteria will be implemented. The following plays an important role in ensuring implementation.

2.4.1 Roles and responsibilities

The first and most important mechanism for implementing the environmental management requirements lies in clearly articulating the roles and responsibilities in respect of the various environmental management requirements. It is important to note that roles and responsibilities include dedicated environmental management roles as well as the establishing roles and responsibilities for all company personnel.

2.4.2 Training

Together with defining the roles and responsibilities it is necessary to develop an overarching training programme that will serve to equip project personnel to fulfil their roles and responsibilities, whilst both sustaining (and refreshing) and then advancing the overall levels of capability. Training may and should extend across awareness building, dedicated task specific training, 'out of the box' training that serves to find new and innovative ways of improving performance and training that ensures that personnel who are required to fulfil an environmental management function understand the requirement, believe in the importance of the requirement and have the necessary skills and capacity to fulfil that function.

2.4.3 Activities

The various activities that are required in implementing a large-scale project must be defined to ensure that the associated potential impacts are properly understood and that mitigation for the significant aspects can be both identified and effectively implemented. A mechanism must be established that links the environmental management requirements to the activities that will be undertaken so as to ensure that the requirements are met in implementing the activities.

2.4.4 Contractor management

A key element of any large scale construction project is ensuring that Contractors on site understand and properly implement the environmental management requirements as part of their contracted activities. It must be remembered that only contractors conduct any physical activities on site during construction and this means that this is where the risk of impact occurs and

where mitigation must be applied to ensure that the risks are effectively managed.

2.4.5 Facilities

The various facilities (infrastructure components) that make up a project such as Shalkiya Zinc are important from an environmental management point of view for the following reasons:

- They provide a complementary way of identifying the various activities that must be identified in order to determine which activities must be controlled and how; and,
- In some instances they provide a direct form of managing the environmental aspects of the operation.

As such it is essential to understand the role played by the various facilities that will be established as part of the project and the way in which these effect (can be modified to effect) the required environmental management function. The environmental design requirements and criteria serves to detail what must be included in the design of such facilities to ensure that the environmental management function is achieved.

2.4.6 Permits and licenses

All permits and licenses must be in place timeously so that no activities take place without being governed by the necessary authorizations. In addition permit conditions must be documented and associated as appropriate with the managerial structures to which they apply.

2.5 Checking and Corrective Action

2.5.1 Leading and lagging indicators

Checking and corrective action forms the fourth component of the ESMP and serves to ensure that the:

- Required environmental management activities are being implemented; and,
- Objectives are being achieved as indicated by meeting the stated targets.

A key underpinning principle for checking and corrective action is the concept of *leading* and *lagging* indicators. Leading indicators serve to pre-emptively indicate whether the required management actions are in fact being implemented, while lagging indicators present a measure of performance. It is simply inadequate to track only lagging indicators because they will always reflect only what has been achieved (or not).

As such checking and corrective action includes four key lagging indicators. These are:

- Incident recording and review;
- Monitoring selected environmental quality variables as defined in the objectives and targets;
- Monitoring and review of complaints and complaints management; and,

-
- Ongoing inspections of the facilities and activities to identify potential non-compliances.

Leading indicators derive from direct reporting from the implementers on what has and has not been implemented supplemented by an auditing regime that serves to verify the validity of that reporting.

2.5.2 Reporting

The findings of all of the above need to be structured into instructive reporting that provides information to all required parties on environmental management performance, together with clearly defined corrective action, where this is seen to be required. All of the above must be conducted systematically and continuously and preferably independently of the activity or facility in question. Records of the information must be maintained and protected but the information itself must be readily and easily accessible on an ongoing basis. Within the reporting structure it is necessary to create a review function that continuously assesses the reporting and prescribes the necessary corrective action. Reporting will also include the provision of information on the environmental performance to external stakeholders and surrounding communities.

2.6 Management review

The final component of the ESMP is a formal management review that takes place at defined intervals (such as twice a year). The purpose of the management review is for senior management to review the environmental management performance during the preceding period and to propose measures for improving that performance in the spirit of the requirement of continual improvement. An essential part of the management review process is ensuring that senior managers appreciate their responsibilities and obligations in ensuring that the environmental management performance is commensurate with the nature of the business and that the spirit of continual improvement is both supported and promoted.

3. ENVIRONMENTAL MANAGEMENT FOR SHALKIYA ZINC

3.1 Shalkiya's Environmental Policy

Environmental policy contains the necessary elements, such as the principles, intentions and commitments of the organization in relation to the environment. This policy declares the compliance of the company's activities to the legislation of Kazakhstan, the allocation of the necessary resources, openness and dialogue with the public, minimization of risks and environmental impacts, monitoring, etc. Framework of the revision policy has been set. The absolute importance of adopting environmental policies should be noted. It is a serious step towards development of the ecological management system.

In further work it is recommended to consider the possibility of the HSE integrated management system development. As an integration element, it is advisable to consider the development of an Integrated HSE policy. It is also important to clarify mandatory elements in the Policy such as principle of continuous improvement¹ and critical Policy analysis (and system overall) by management.

These comments do not detract the importance of this policy, they are an option to improvement. In the future, perhaps ,they will form a separate integrated HSE policy.

¹ JSC Shalkiya Zinc environmental policy contains a statement of the technological constant improvement. However, the principle of continuous improvement involves the constant improvement not only in technology, but also (and primarily) in management.

3.2 Planning

3.2.1 Facilities

The following constitute the major facilities for Shalkiya Zinc:

- The underground mine works;
- The minerals processing plant;
- The main administrative block;
- Accommodation facilities;
- The mine water dam;
- The tailings storage facility; and,
- The magazine.
- Water, electricity and gas supply infrastructure
- Repair and storage facilities

3.2.2 Activities and aspects

The major activities associated with the implementation of Shalkiya Zinc are listed in Table 3 together with the associated significant environmental aspects. Please note that the social aspects of job creation and spending apply to the project as a whole and have therefore not been listed separately per activity.

3.2.3 Impacts

The potential impacts the Shalkiya Zinc project are summarised in Table 4. Please note that the impacts have been derived directly from the EIA that was conducted on the project as part of the decision-making process. In addition the conditions of authorisation as reflected in the Record of Decision have also been included.

3.2.4 Legal requirements

The following legal requirements must be recognised and upheld during the implementation of Shalkiya Zinc:

- The mining facility operation license.
- The mineral resource use contract for the extraction of polymetallic ores.
- The mineral resource use contract for the extraction of polymetallic ores at the Shalkiya Mine with the RK Ministry of Energy and Mineral Resources issued on 31 May 2002, valid till 31 May 2046.
- The mineral resource use contract for the extraction of groundwater to meet the technical water demand of the processing plant.
- The mineral resource use contract for the abstraction of groundwater at the Shalkiya Mine site No. 3483, issued on 14 December 2009 (Addendum 2). Valid till 14 December 2034.
- Special water use permit to meet the domestic and drinking water demand of the Shalkiya mine.

-
- Special water use permit No. 6-17/1052 Seriesя APA/SyrDar of 09 July 2013 issued to enable the groundwater abstraction at the Kuttykozha groundwater intake for the domestic and drinking needs of the Shalkiya mine. Valid till 2 June 2032.
 - Special water use permit to pump out mine water and decrease the groundwater level.
 - Special water use permit YuTU No. 400128 of 07 June 2002 issued to pump out mine water for decreasing groundwater levels during the polymetallic ore mining operations at the Shalkiya Mine. The permit is valid for 25 years.
 - Land and mining allotment for all surface and underground mine infrastructure
 - The land allotment boundaries are now being formalized for all acquired sites.

The list of environmental permits and consents required to conduct planned operations includes:

- Environmental emission permit
- Environmental emission permit No. KZ10VCZ00025140 issued on 05.03.2015 by the RK Ministry of Energy and valid till 31.07.2017.
- Emission limit guidelines (maximum admissible emission (MAE) values)
- The MAE guidelines were developed as part of the EIA for the expansion of the underground mining operations at the Shalkiya Mine. The MAE guidelines are reflected in the State Environmental Review (SER) Conclusion No. 10-02-16/3305 of 02.08.2012. The air emission permit is part of the Environmental Emission Permit issued on 05.03.2015.
- Waste management programme
- The Shalkiya Mine waste management programme for 2014-2020 approved on 11.12.2014 by the Kyzylorda Oblast Department of Environment.
- Environmental protection action plan
- The Shalkiya Mine environmental protection action plan for 2015-2017 was endorsed by the RK Committee on Environmental Regulation, Control and Inspection in Oil and Gas Sector in 2015.
- Environmental Impact Assessments of the Shalkiya Mine Expansion Projects. The final version is to be released in 2016. The preparation of the Terms of Reference for the Processing Plant design and environmental impact assessment is currently underway.

3.2.5 Objectives, indicators and targets

The various requirements detailed above have been reviewed to identify all the environmental management requirements that need to be met during the implementation of Shalkiya Zinc. These requirements have then been

expressed as overriding objectives for the ESMP. These objectives together are listed in Table 5, together with the indicators that can be used to ascertain the degree to which the objectives are being met, and the associated targets in respect of the indicators.

3.2.6 Management plans

As a function of the planning process the following management plans have been identified:

- Cultural Heritage Management Plan
- Emergency Response Plan
- Stakeholder Engagement Plan
- Environmental and Social Action Plan
- Air quality management
- Water Management
- Waste Management (covering mineral and non mineral)
- Worker health and safety
- Emergency response
- Community Health Safety and Security

Table 1. Summary listing of activities and associated significant environmental aspects for implementation of Shalkiya Zinc.

	Resource use						Pollution and waste																Socia I				
	Energy		Water	Land			Hazardous solid waste	Low hazard solid waste	General waste				Spoil	Hazardous liquid waste	Waste water	Stormwater	Air emissio ns				Noise	Vibration	Spillage	Jobs	Spending	Skills	
	Electricity	Liquid fuels		Vegetation	Fauna	Soil			Rubble	waste concrete	Waste rock	Office waste					Dust	PM ₁₀	PM ₂₅	SO ₂							NO _x
Site clearing		x		x	x	x			x				x			x	x	x	x	x	x	x	x	x	x	x	x
Lay down areas and stores	x																			x			x	x	x		
Batching plant	x		x					x		x				x	x	x	x	x	x	x	x	x	x	x	x	x	
Construction and operation of access roads		x	x	x	x	x			x		x		x			x	x	x	x	x	x	x	x	x	x	x	
Stripping and stockpiling		x		x	x	x			x				x			x	x	x	x	x	x	x	x	x	x	x	
Minerals plant establishment and operation	x	x	x					x	x		x		x				x			x	x			x	x	x	
Mining	x	x	x	x	x	x			x		x		x			x	x	x	x	x	x	x	x	x	x	x	
Hauling to locations		x															x	x	x	x	x	x	x	x	x	x	
Maintenace/repair of vehicles and machines		x					x							x									x	x	x	x	

	Resource use					Pollution and waste																Social					
	Energy		Water	Land			Hazardous solid waste	Low hazard solid waste	General waste					Spoil	Hazardous liquid waste	Waste water	Stormwater	Air emissions				Noise	Vibration	Spillage	Jobs	Spending	Skills
	Electricity	Liquid fuels		Vegetation	Fauna	Soil			Rubble	Waste concrete	Waste rock	Office waste	Dust					PM ₁₀	PM ₂₅	SO ₂	NO _x						
Drilling and blasting		x	x										x					x	x		x	x			x	x	x
Dewatering	x	x	x												x	x											
Selected backfilling		x											x					x	x	x	x	x	x		x	x	x
Spoil of excess material		x		x	x	x							x			x	x	x	x	x				x	x	x	x
Construction and operation of the TSF	x	x	x	x	x	x		x					x	x	x	x	x	x	x	x				x	x	x	x
Spoil heaps																											

Table 2. Summary listing of objectives, indicators (and their units) and targets for each indicator which serves to define whether an objective is being met or not.

Category	Objective	Indicator	Units	Target
Emergency Response Plan	Emergency conditions on the mine do not result in fatalities, injuries or environmental or community damage	Fatalities		0
		Injuries		0
		Environmental damage		None
		Community damage		None
Cultural Heritage Management	The knowledge and <i>value</i> of heritage resources at the mine site are retained and promoted (awareness created around their existence and value) for future generations.	Heritage resources		All heritage resources are identified
				No damage to chance finds
				Heritage resources are documented and preserved
Air pollution emissions and ambient concentrations	Air pollution emissions from the Shalkiya Zinc project do result in adverse human health effects, environmental damage or nuisance.	Dust fallout	mg/m ² /month	650
		PM ₁₀	24 hr µg/Nm ³	100 60 (RK)
			Annual µg/Nm ³	50
		Visible emissions from activities resulting in dust on-site.		None
		Complaints from surrounding communities		None

Category	Objective	Indicator	Units	Target
Ground and surface water	Water use is minimized, the maximum possible utility is derived from the water that is used and impacts on water resource quality are prevented or minimised by discharge water quality remaining within prescribed limits to prevent off-site reductions in water quality and associated potential impacts.	Water use (including pumped groundwater)	MI	tbd
		pH	pH	6-9
		BOD	mg/l	30
		COD	mg/l	125
		Total nitrogen	mg/l	10
		Total phosphorous	mg/l	2
		Oil and grease	mg/l	10
		Total suspended solids	mg/l	50
		Total coliform bacteria	mg/l	400
Mine worker health and safety	Operations of the mine do not result in worker fatalities, injuries nor adverse health effects	Lost time injury frequency ratio	LTIFR	<5
		Fatalities	No.	0
		Disabling injuries	No.	0
		Lost time injuries	No.	0
		First aid cases	No.	0
		Near misses	No.	0
Community health, safety and security	Operations of the mine do not result in adverse health effects, fatality or injury, human rights abuses or nuisance in the communities	Community complaints	No.	0
		Community injury (including fatalities)	No.	0
		Adverse human health	No.	0

Category	Objective	Indicator	Units	Target
	potentially affected by the mine.	effects		
		Human rights abuses	No.	0
Water management	Stormwater does not result in erosion in and around the construction area and stormwater is not contaminated by oil or other hazardous mater spills.	Visible signs of erosion (slides or slumps)		None
		Oil and grease concentrations	mg/l	250
	All waste that can be recycled is recycled	Waste recycled	%	15
Waste management	Waste is properly classified, accurate records kept and intermediate storage, transport and final disposal is done safely and in compliance with local regulatory requirements and good practise.	Quantities of waste per waste class generated per month	tonnes	Comprehensive information
		Quantities of waste per waste class disposed per month together with the disposal mechanism	tonnes	Comprehensive information
Stakeholder Engagement Plan	Stakeholders who are potentially affected by or have an interest in Shalkiya Zinc are consulted and informed of mine activities on an ongoing basis.	Number of public meetings	No.	tbd
		Number of communiqués to stakeholders	No.	tbd
		Number of complaints	No.	0

3.3 Implementation and operation

The operational controls described earlier have been developed at two levels. The first of these is for general implementation of the ESMP while the second is for the implementation of a specific management plan. In the section that follows the former category viz. general operational controls are detailed. The operational controls that lie in the individual management plans are detailed in the plans themselves.

3.3.1 Roles and responsibilities

There are three primary role players on the Shalkiya Zinc project and these together with their respective roles are detailed in the section that follows.

Managing company

The managing company will be responsible for interactions with IFIs including the formulation and financing of the requirements of the Environmental and Social Action Plan (ESAP), the Stakeholder Engagement Plan (SEP) and this ESMP. The managing company will be the ultimate custodian of the environmental and social management requirements and be regularly informed of the status of the same. Should these requirements be found wanting the managing company will launch interventions to ensure the effective implementation of the management requirements.

Shalkiya Zinc

The role of Shalkiya is to ensure that all the environmental and social management requirements are effectively operationalized. By this is meant that the environmental and social management requirements are implemented and that there is regular (monthly) checking and corrective action to ensure implementation. Shalkiya shall regularly assess performance against the targets set and where the performance is not resulting in the required performance, developing and implementing the corrective action required to meet the required performance. Shalkiya Zinc established an Environmental and Occupational Health and Safety Division when operations at the Shalkiya Mine resumed in 2014 with the Head of the Division reporting to the Mining Operations Managing Director. It is thus required of the operations managing director that they are familiar with the performance objectives and targets that are detailed in this ESMP and have performance reported to them on a regular basis (preferably monthly) to ascertain performance.

In order to fulfil the requirements detailed above, Shalkiya will need:

- The Division has to be staffed with at least five EHS personnel including two environmental specialists (this staff complement needs to be in place for the construction stage of the mine development);
- Key staff must receive training on current principles and approach underpinning the development of environmental and social management systems (including the environmental, occupational health and safety, and social management).

Contractors

Contractors shall be contractually bound to Shalkiya's environmental policy and environmental and social management requirements. Ensuring that contractors are bound to these requirements will require references to these obligations in the contracts established between Shalkiya and the contractors and the development of

an environmental and social specification that outlines in detail the contractual obligations of the contractors. Contractors will be expected to maintain their own environmental and social management programmes and will be expected to have at least one full time EHS accountable person (for smaller contracts a full time role may not be necessary). The principle must be one of obliging the contractors to take full accountability for the environmental and social risks that derive from their on-site activities and to manage those risks accordingly but with a strong oversight role from Shalkiya.

3.3.2 General training

Formal environmental and social management training

As part of the implementation of the ESMP, specific training needs will need to be identified together with the mechanisms needed to respond to those training needs (in-house training, external training courses and so forth). The purpose of the training is to ensure that all personnel performing activities related to environmental and social management are trained, qualified and competent. Several in-house training programmes must also be developed for especially non-environmental specific personnel (particularly management) and these will need to be rolled out widely during the early part of project operations. This training must include

- Modern environmental and social management principles and obligations to lenders,
- Integrated environmental and social management systems,
- The structure and function of the ESMP;
- Objectives, indicators and targets and the actions needed to meet the targets;
- Environmental and social performance benchmarking; and,
- The environmental and social legal context within which the project operates.

General environmental and social awareness training

Broad level environmental and social awareness courses must also be developed for all workers on the project. Environmental and social awareness training will focus on the following topics:

- What is environmental and social management ?
- Why do these items need to be managed/conserved/protected?
- What are the environmental and social aspects of the Shalkiya Zinc Project;
- What can individuals do?
- Environmental and social management principles.

Induction

Over and above the training described earlier it is essential that an environmental and social management induction module be developed. The induction should serve to both alert staff, visitors and contractors to the environmental and social management functions at the mine and to advise them on elements to be aware of while visiting the mine while at the same time building the identity of the mine as being committed to upholding world class environmental management functions.

4. CHECKING AND CORRECTIVE ACTION

4.1 Monitoring

A series of environmental variables that are to be monitored during project operations are presented below. Data from the environmental baseline studies prior to the construction and commissioning of the Shalkiya Zinc project are to be considered as the reference data for air; surface water, noise and the terrestrial environment.

4.1.1 Data quality

The monitoring programmes detailed here must apply approved methods for sample collection, preservation and analysis. Sampling must be conducted by or under the supervision of trained individuals. Analysis should be conducted by entities permitted or certified for this purpose. Sampling and Analysis Quality Assurance/Quality Control (QA/QC) plans should be prepared and, implemented. QA/QC documentation should be included in monitoring reports.

4.1.2 Quantitative monitoring variables

1. Dust fallout
2. PM₁₀ (in the case the dust fallout monitoring indicates a potential problem)
3. Lost time injury frequency ratio
4. Worker Fatalities
5. Worker Disabling injuries
6. Worker Lost time injuries
7. Worker First aid cases
8. Worker Near misses
9. Community injury (including fatalities)
10. Waste recycled
11. Quantities of waste per waste class generated per month
12. Quantities of waste per waste class disposed per month together with the disposal mechanism
13. Number of public meetings
14. Number of communiqués to stakeholders
15. Number of complaints

4.1.3 Qualitative monitoring variables

1. Environmental damage
2. Community damage
3. Heritage resources
4. Visible vehicle emissions
5. Community injury (including fatalities)
6. Adverse human health effects
7. Human rights abuses

4.2 Inspections

Regular and systematic visual inspection provides an important source of information on environmental and social management performance. Most notably inspection serves to assess activities and the degree to which these reflect the project's environmental and social management requirements. At the same time some potential impacts are difficult to monitor quantitatively, such as soil erosion and waste management. For this reason inspections are a key component of checking and corrective action and indeed of the ESMP as a whole. Inspections will be scheduled in such a way that all activities across the project are inspected consistently and regularly.

4.3 Audits

Audits are systemised and formalised methods of assessing the degree to which the requirements of the ESMP have been implemented. Audits are thus used to ensure that procedures, monitoring, reporting and other management functions are operating as they are intended to as components of the overall management philosophy. Audits must be scheduled regularly to ensure that the components of the ESMP that allow it to work as a system, are being regularly checked for effectiveness.

4.4 Implementation

As part of the overall checking and corrective action regime it is important to maintain an index of the implementation of required management actions. In order to do so it is necessary to track the various activities that must be implemented as well as their implementation status. The implementation status can be derived from audits and inspections and the submission of progress reports that detail the specific implementation status of given actions.

4.5 Corrective Action

The management component of the ESMP derives from evaluating all the information that becomes available on a weekly/monthly/quarterly and annual basis. It is important to note that the ESMP is based on two types of indicators namely leading and lagging indicators. Leading indicators are more proactive and serve to highlight whether or not 'the right things are being done' whereas lagging indicators reflect on historical events but indicate whether or not 'things are being done right'. The environmental management function is then effected by reviewing the lagging indicators to see the overall performance (assessing performance against targets) and then using the leading indicators to develop an understanding of why a target was missed. Information availability is thus critical to the success of the ESMP and a key implementation discipline is to ensure that reporting is timing, effective and accurate.

Where a non-conformance is identified it is necessary to evaluate the reason for the non-conformance and to define the necessary corrective action. It is important to recognise that corrective action can take many different forms but it is fundamentally about changing a component of the overall management approach. For example it may be that implementation has been ineffectual, or the defined management actions have been fully implemented but they are simply not working. Whatever the cause, it must be identified and action taken to rectify the cause. Whatever corrective action is defined, it must be recorded and formalised and implementation of the corrective action tracked. In this manner a record of corrective action can be established that serves as a reference for future corrective action. Where corrective action is seen to result in the desired effect, the ESMP must be updated accordingly to reflect that corrective action and ensure that is adopted as practise into the future.

ANNEXES. MANAGEMENT PLANS

ANNEX 1. EMERGENCY RESPONSE PLAN

A1-1. Overview

For any large-scale mining activity such as Shalkiya there are multiple potential causes of emergency conditions. In order to ensure that there are no on- nor off-site fatalities or injuries, nor environmental or property damage it is necessary to anticipate the type of emergency conditions that could occur and develop plans that would reduce the probability of the emergency conditions occurring and that if the conditions do occur, that the associated negative consequences are prevented or minimised.

A1-2. Activities that may result in emergency conditions

All mining and minerals processing plant and associated activities can potentially translate into emergency conditions. Particular concerns are:

- Underground rock falls;
- Fire;
- Explosion;
- Dam failure or collapse; and,
- Motor vehicle accident.

A1-3. Risks

This management plan serves to mitigate or prevent the following risks:

- Risk of death or injury to mine workers and contractors;
- Risk of death or injury to 3rd parties;
- Risk of property damage or financial loss; and,
- Risk of environmental damage as a result of uncontrolled discharges of contaminated material.

A1-4. Objective

Given the risks stated above the following objective prefaces the emergency response plan for Shalkiya:

Emergency conditions on the mine do not result in fatalities, injuries or environmental or community damage.

A1-5. Indicators and targets

Indicators	Targets
Fatalities	0
Injuries	0
Environmental damage	None
Community damage	None

A1-6. Legal requirements

- On industrial safety of hazardous production facilities. RK Law of April 3, 2002 No. 314-II. (amended and augmented) - http://online.zakon.kz/document/?doc_id=1030549
- On the Civil Protection. RK Law of 11 April 2014 No. 188-V 3RK
- On the Approval of the Occupational Safety Provision Rules for Hazardous Industrial Facilities Conducting Mining and Geological Exploration Operations. Order by the RK Minister of Investment and Development of 30 December 2014 No. 352. Registered with the RK Ministry of Justice on 13 February 2015 No. 10247

The Kazakhstan legislation requires that enterprises, which have dangerous industrial objects, should develop emergency response Plan. JSC Shalkiya Zinc currently have the following emergency response Plans (Emergency Response Plans):

- Plan of possible accidents liquidation: this Plan is developed for each semester, taking into account changes in the ventilation capacity of the mine workings, installation of new fans, etc. PLA consists of two main parts: the operational area, which includes measures for elimination of possible accidents in the initial stage of occurrence, and
- PLA base-consumable explosives warehouse.

A1-7. Management and mitigation requirements

A1-7.1 Training

- Ensure that all personnel that use or handle hazardous materials are trained in the use and potential dangers of the materials;
- Employees must be trained on emergency response procedures required to counter the nature and hazards of an accidental release;
- Employees must be familiar with and have received the appropriate training regarding the handling and storage practices, for all containers with which they will come into contact.
- Train vehicle drivers to be aware of the loads they are carrying, spill prevention in respect of the loads and the possible spillages of materials that could arise in the event of a vehicle accident or collision with infrastructure such as a pipe that could be ruptured by the collision;
- Only trained employees must be entitled to refuel equipment. The training of employees for refuelling must include spillage prevention, containment and cleanup and the necessary reporting of spills that do occur;
- Train operators in the safe transfer and filling of the hazardous material, and in spill prevention and response;
- Conduct employee training on inspection and maintenance procedures.

A1-7.2 Material types

- None of the following hazardous substances are to be allowed on site:
 - CFCs,
 - PCBs, or
 - Persistent organic pollutants (POPs) (in pesticides)

-
- Ozone depleting substances (ODSs); and,
 - Asbestos.
 - Reduce materials containing volatile organic compounds and formaldehyde;
 - Avoid xylene and toluene solvents in paints, glues and carpets as well as polyurethane
 - Use water based paint;
 - Maximise the use of recycled and recyclable materials.

A1-7.3 Control planning for hazardous materials on site

- Document the types and amounts of hazardous materials present on the project site including the following information:
 - Name and description (e.g. composition of a mixture) of the hazardous material;
 - Classification (e.g. code, class or division) of the hazardous material;
 - Regulatory reporting threshold quantity of the hazardous material;
 - Quantity of hazardous material used per month;
 - Characteristic(s) that make(s) the hazardous material hazardous (e.g. flammability, toxicity);
 - Analysis of potential spill and release scenarios using available industry statistics on spills and accidents where available;
 - Analysis of the potential for uncontrolled reactions such as fire and explosions;
 - Analysis of potential consequences based on the physical geographical characteristics of the site, including aspects such as its distance to settlements, water resources, and other environmentally sensitive areas.
- Identify locations of hazardous materials and associated activities on an emergency plan site map;
- Detail the availability of specific personal protective equipment and training needed to respond to an emergency; and,
- Detail availability of spill response equipment sufficient to handle at least initial stages of a spill and a list of external resources for equipment and personnel, if necessary, to supplement internal resources.

A1-7.4 Uncontrolled releases

- Implement all measures detailed in the spill prevention management plan;
- Prevent uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion using engineering controls (containment, automatic alarms, and shut-off systems) commensurate with the nature of hazard;
- Implement management controls (procedures, inspections, communications, training, and drills) to address residual risks that have not been prevented or controlled through engineering measures;

-
- Store all hazardous (reactive, flammable, corrosive and toxic) materials in clearly identified, fit-for-purpose containers or vessels;
 - Describe response activities in the event of a spill, release, or other chemical emergency including:
 - Internal and external notification procedures;
 - Specific responsibilities of individuals or groups;
 - Decision process for assessing severity of the release, and determining appropriate actions;
 - Facility evacuation routes, and,
 - Post-event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment.

A1-7.5 Reaction, fire, and explosion prevention

- Reactive, flammable, and explosive materials must be managed to avoid uncontrolled reactions or conditions resulting in fire or explosion. Such prevention practices include:
 - Storage of incompatible materials (acids, bases, flammables, oxidizers, reactive chemicals) in separate areas, and with containment facilities separating material storage areas;
 - Provision of material-specific storage for extremely hazardous or reactive materials;
 - Use of flame arresting devices on vents from flammable storage containers;
 - Provision of grounding and lightning protection; and,
 - Storage of hazardous materials in an area of the facility separated from the main construction activities.

A1-7.6 Mechanical integrity

- Inspection and maintenance procedures must be developed and documented to ensure mechanical integrity of equipment, piping, and instrumentation and to prevent uncontrolled releases of hazardous materials;
- The specific process components of major interest include pressure vessels and storage tanks, piping systems, relief and vent systems and devices, emergency shutdown systems, controls, and pumps. Recommended aspects of the inspection and maintenance program include:
 - Developing inspection and maintenance procedures;
 - Establishing a quality assurance plan for equipment, maintenance materials, and spare parts;
 - Conducting equipment, piping, and instrumentation inspections and maintenance;
 - Identifying and correcting identified deficiencies;
 - Evaluating the inspection and maintenance results and, if necessary, updating the inspection and maintenance procedures; and,

-
- Reporting the results.

A1-7.7 Planning coordination

- Procedures should be prepared for:
 - Informing the public and emergency response agencies,
 - Documenting first aid and emergency medical treatment,
 - Taking emergency response actions,
 - Reviewing and updating the emergency response plan to reflect changes, and ensuring that employees are informed of such changes;
 - Using, inspecting, testing, and maintaining the emergency response equipment.

A1-7.8 Storage of hazardous materials

- Locate chemicals stored in drums in areas with a secondary containment capacity of at least 25% of the maximum stored quantity of chemicals;
- Drum stack heights must not exceed two drum heights on pallets. All defective pallets shall be replaced immediately. A minimum space of 80 cm shall be left open between stacks and 100 cm between stacks and a wall.
- Secure chemical products must be secured when not needed to prevent tampering and vandalism;
- Provide warning notices, fire-fighting facilities and protection from weather damage;
- Each shift supervisor or safety officer is to report on the integrity of the hazardous materials storage;
- Keep products in their original container unless they are not re-sealable; with all stored products and containers being labelled, and original labels and MSDS retained.
- Store acetylene, propane, and oxygen cylinders in dedicated areas where they will be protected from collision or ignition sources; and;
- Label containers so that the hazard nature of the material is clear.

A1-7.9 Handling of hazardous materials

- Obtain Material Safety Data Sheets (MSDS) for all chemical formulations before use and all materials must be handled according to the instructions;
- In response to and in addition to the information contained on the MSDS the following must also be determined:
 - Location, or where the material is to be moved;
 - The weight of the container so that proper personnel and/or equipment will be utilized during handling;
 - Access and egress routes;
 - What personal protective equipment (PPE) is required;
 - What emergency actions may be needed (i.e., first aid, fire fighting media, etc.); and

-
- Containers holding flammable materials to be grounded during any transfers of contents

A1-7.10 Transport of hazardous materials

- Transporters of hazardous materials must ensure that:
 - The vehicle is suitable and registered for the purpose it is being used;
 - The vehicle displays clear markings in English, Russian and Kazakh indicating the nature of the materials being carried, what to do in the event of an emergency, and an emergency telephone number (24 hour) of a responsible person who can provide advice in the event of an emergency.

A1-7.11 Flammable liquids

- No combustible material (e.g. wood, rags, carton boxes, etc.) are to be kept in the presence of flammable liquids;
- 'No Open Flames' and 'No Smoking' symbolic signs are to be displayed in the vicinity of the flammable liquid storage areas;
- Flammable liquids are to be issued only on a need-to-use-basis and strict control is to be exercised to ensure that persons do not draw more than what is needed for the specific job;
- All cables are to be grounded as appropriate.
- An adequate number and type of fire fighting equipment is to be available in the close vicinity of the flammable liquid store.
- Flammable liquid stores are to be equipped with approved flameproof electrical equipment;
- Flammable liquid stores are to be well ventilated and free of explosive vapours;
- Flammable liquid containers in the flammable liquid stores are to be clearly marked / labelled as to their contents. They are to be provided with earthed drip trays;
- Locations are to support MSDS information and handling/storage instructions. MSDSs are to be available for all flammable/hazardous products at the location where such substances are present.
- The number of 200 liter drums containing flammable liquids is to be kept to a minimum and the position is to be strictly controlled. The necessary signs should be visible at these storage areas.
- Flammable liquid tanks are to be properly earthed in order to prevent static electricity accumulating.
- Drainage points on flammable liquid tanks are to be provided with threaded caps or blanking plates.
- Bund walls are to surround storage tanks containing flammable liquids and these must be able to contain the entire volume of the contents plus 10% in case of spillage.
- Earthing is to be tested regularly; and,

-
- Adequate precautions must be taken, such as wearing relevant protective equipment when handling substances.

A1-7.12 Spill prevention

- Implement inspection programs to maintain the mechanical integrity and operability of pressure vessels, tanks, piping systems, relief and vent valve systems, containment infrastructure, emergency shutdown systems, controls and pumps, and associated process equipment;
- Prepare written Standard Operating Procedures (SOPs) for filling storage tanks or other containers or equipment as well as for transfer operations by personnel and for the management of secondary containment structures, specifically the removal of any accumulated fluid, such as rainfall, to ensure that the intent of the system is not accidentally or willfully defeated
- Monitor containment areas, valves, tanks, and pipelines for potential ruptures, failures or overfilling;
- Each shift supervisor is to report on the status of spillage prevention infrastructure in the area of their jurisdiction confirming that it is in a serviceable state or requesting that maintenance be effected;
- Bund above ground chemical and fuel storage tanks to contain at least 110% of the largest tank; and,
- Bund drums storing chemicals to contain at least 25% of the maximum stored quantity of chemicals.

A1-7.13 Refuelling

- Fuel dispensing hoses shall be of approved non-electrically conductive types with automatic shut off nozzles;
- Nozzles used for vehicle and equipment fuelling should be equipped with an automatic shutoff to control drips;
- All fuelling equipment is to be inspected regularly and all leaks must be repaired immediately.
- Absorbent spill cleanup materials should be available at fuelling areas and should be disposed of properly after use;
- Fuelling operations should not be left unattended; and,
- Fuelling stations and trucks must be equipped with fire extinguishers

A1-7.14 Overfill protection

- Overfilling of vessels and tanks must be prevented as this is one of the most common causes of spills resulting in soil and water contamination, and among the easiest to prevent.
- Overfill protection measures must include:
 - Written procedures for transfer operations that includes a checklist of measures to follow during filling;
 - Operations and the use of filling operators trained in these procedures;
 - Installation of gauges on tanks to measure volume inside; and,

-
- Use of dripless hose connections for vehicle tank and fixed connections with storage tanks.

A1-7.15 Spill containment and countermeasures

- Spill response procedures must be prepared and suitable spill response equipment available when and where required – locate spill response equipment at various strategic locations across the project site;
- In the case of a spill, immediate action must be taken to stop and contain the spill;
- Any observed spills / leakage must be removed and the cause remedied.
- Spill reporting procedures to be posted at all storage facilities so that the appropriate emergency response can be mobilised.
- Spills into a containment area are to be removed/pumped out of the containment area. The water release valve is not to be used to drain the spill; and,
- The recovery of all spills to be treated as hazardous waste – this includes all contaminated materials such as sand, soil, gravel and stones - and appropriate temporary storage, transport and final disposal to meet the requirements for hazardous waste.

A1-7.16 Underground emergencies

It is not within the remit of the ESMP to prepare a detailed underground emergency response plan but that will need to happen to comply with Kazakh law. That said, the broad principles of an underground emergency response plan would need to address and include²:

- Establishing a planning team;
- Conducting a capability and hazard assessment including a detailed risk assessment;
- Developing the plan including emergency management, emergency response procedures and recovery actions;
- Test the plan by conducting drills and refine the plan as needed; and,
- Implement the plan.

A1-8. Monitoring

There are no specific environmental monitoring requirements other than the ongoing inspection and audits detailed above.

² Modified after *Developing a Comprehensive Emergency Preparedness Planning Manual for Underground Mining Operations*, West Virginia Office of Miners' Health, Safety and Training and West Virginia University – Mining Extension Service, 2008.

ANNEX 2. CULTURAL HERITAGE MANAGEMENT PLAN

A2-1 Overview

For the beginning of ESIA (August, the 1-st, 2015) no information on tangible cultural heritage on the Shalkiya Mine area existed. / No investigations have been conducted within the framework of the previous development..In November, 2015-June, 2016 the archaeological studies have been conducted according to recommendation of ESIA Consultant and direct prescription of competent authorities. The sites of the planned facilities were investigated. The works were conducted by licenced organization «Archeo-service» LTD.

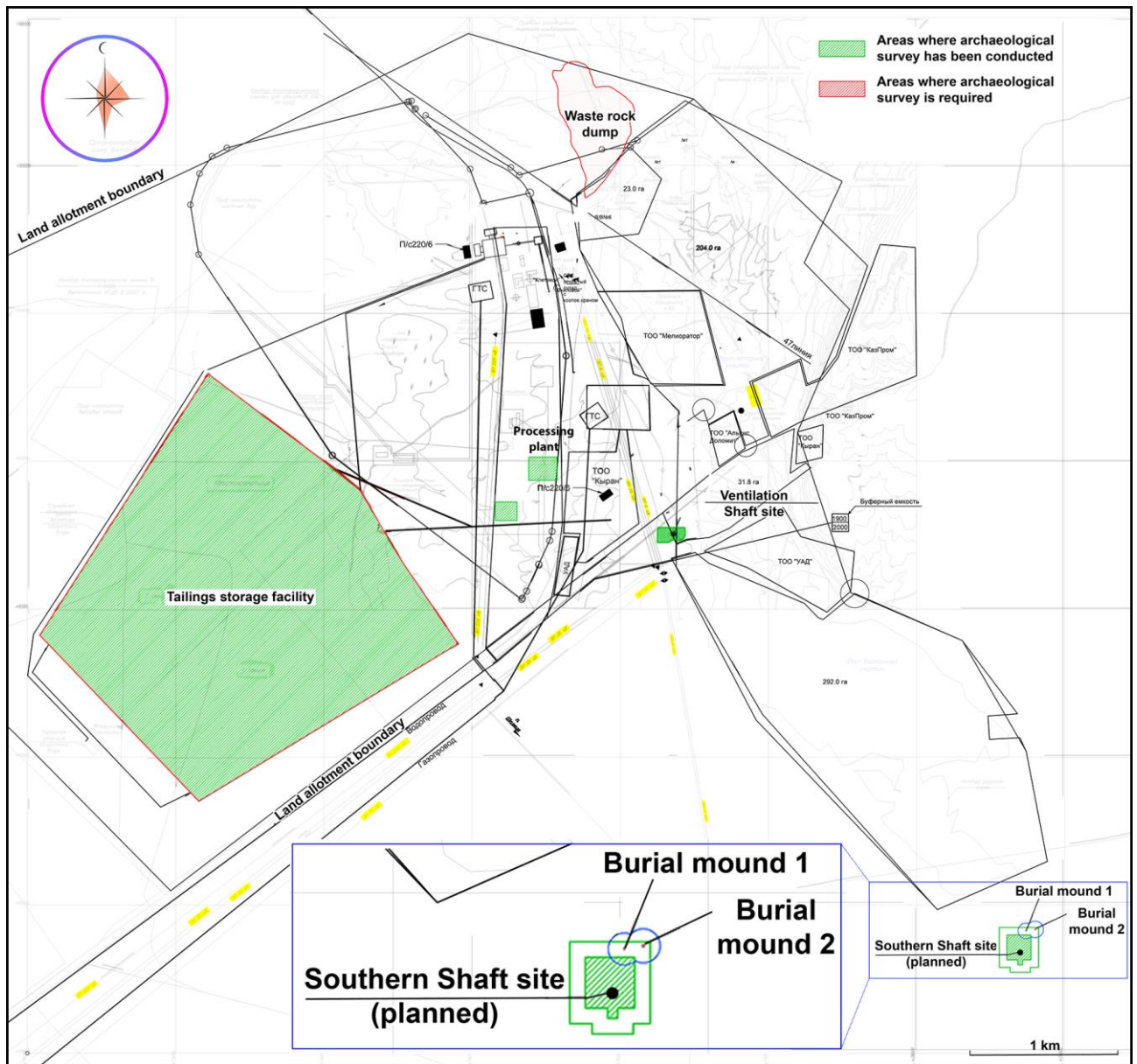


Figure 4. Areas Covered by a Detailed Archaeological Investigation

The following sites where key Mine facilities are planned to be located have been investigated:

- The planned Yuzhny (Southern) and Ventilation shaft sites occupying a total area of 11.2 ha.
- The planned Processing Plant, Conveyor Belt, CCGT-TPP sites occupying 9.7 ha.
- The planned Tailings Storage Facility site occupying 180 ha.

The map of archaeological investigations conducted in the Project area as of June 2016 is presented in Figure 4. As can be seen from this map, sites planned to be occupied by key process facilities of the Mine have been investigated. Areas remaining to be surveyed include planned locations of infrastructure/utilities and generally those parts of the Mine's land allotment area which are not currently planned to be used for construction purposes and/or those already occupied by facilities/activities that leave little or no chance of discovering unidentified archaeological assets.

Key results of the investigations:

1. During the survey of the proposed Southern shaft site, the review team has discovered and examined a burial site comprising two burial mounds, which has been classified as a site of historical and cultural value. The identified and examined site is located within the buffer zone of the Project area.
2. During the survey of the proposed Ventilation shaft site, the review team has observed existing mine haul roads and an overhead power line that have affected the integrity of local landscape. No sites of historical and cultural value have been discovered.
3. No indication of any cultural and historical resources was found during the survey of other sites (TSF, PP, conveyor belt, and CCGT).

As a function of what gets identified on the mine site suitable preventative and control measures must be developed and implemented. At the same time there is always the possibility of stumbling upon chance finds and as such provision must be made for the same

A2-2 Activities that may result in cultural heritage risks

The following activities are potential sources of risk to cultural heritage:

- Ground clearing;
- Excavations;
- Top soil recovery;
- General earthworks;

A2-3 Risks

This management plan serves to mitigate or prevent the following risks:

- Damage to cultural heritage; and,
- Opportunity cost in respect of documenting the cultural heritage.

A2-4 Objective

Given the risks stated above the following objective prefaces cultural heritage management at Shalkiya:

The knowledge and value of heritage resources at the mine site is retained and promoted (awareness created around their existence and value) for future generations.

A2-5 Indicators and targets

Indicators		Targets
Heritage resources identified		All
Damage to chance finds		None
Heritage resources documented and preserved		All

A2-6 Legal requirements

The Republic of Kazakhstan has a Law on the Conservation and Management of Historical and Cultural Heritage (2 July 1992 No. 1488-XII) which is generally consistent with the IFC and EBRD requirements pertaining to the conservation of tangible heritage.

Though the Republic of Kazakhstan ratified the 2003 Convention for the Safeguarding Intangible Cultural Heritage in 2011, the application of this law is yet to become an established practice. Furthermore, little or no consultation with local communities on the conservation of intangible heritage takes place in practice.

The issue of encouraging fair distribution of revenues from the use of cultural heritage for business purposes is not addressed in the national legislation.

The national legislation specifies the following requirements:

1. Conduct an investigation to identify any historical and cultural resources and obtain the Historical and Cultural Review Conclusion. This activity is undertaken by legal entities and individuals on the basis of license issued by the RK Ministry of Culture and Sports and governed by the Rules for Conducting the Historical and Cultural Review³.
2. If an item perceived to have a historical, scientific, art and cultural value is identified or exposed, all activities should be ceased and a relevant authority notified appropriately.
3. If an area of land where a cultural heritage site has been identified is required for the development of a planned activity, the relevant authority (or RK Government) issues a decision to conduct a detailed investigation (excavations) at the site with all items and materials found to be properly recorded, preserved and handed over to any of the national museums. The historical and cultural review conclusion should include a recommendation on whether the item/site identified could be removed as one that has been fully examined through scientific investigation. The conclusion is to receive

³ Order by the RK Minister of Culture and Information of 20 August 2007 No. 219 "Rules for Conducting the Historical and Cultural Review"

endorsement from the relevant authority and, subject to such endorsement, the site in question could be restored.

A2-7 Management and mitigation requirements

- Identify all heritage resources as defined the Kazakh regulatory requirements before construction is initiated;
- Document in detail all identified heritage resources;
- A heritage design constraints memorandum listing all identified heritage resources and providing a description of the status, exact co-ordinates to be drawn up for all heritage resources in the project area;
- Identified heritage resources not directly affected by the construction activities should be demarcated with the use of fences and danger tape;
- All construction staff working close to such a site should be properly briefed to ensure the safeguarding of the heritage resource; and,
- Demarcation fencing to be maintained for the duration of construction in the area;

Next Steps Required

Step 1. As the urgent step to be done shortly (June, 2016):

- Establish a 50 m buffer zone around the external boundaries of the historical and cultural heritage sites and ensure a visibility of 200 m from the centre of the site;
- The buffer zone boundaries are marked with warning signs, or a ploughed strip, or a fence, or a line of shrubs. Protection status signs showing the name and size of protected area should be established on four sides of the site.

Step 2. In short-term perspective (2016) it is necessary to conduct:

- Detailed study of the area of infrastructure facilities;
- Archaeological screening survey of these areas to identify most likely locations where archaeological resources might be present. This survey could be conducted using only visual methods without having to finance costly research activities.

Step 3. In mid-term perspective (project design, up to beginning of the construction) it's necessary to make a decision regarding possibility of construction works of Southern Shaft. As far as planned site touch the buffer area of the burial found, and the construction works in buffer zone are prohibited, two principal options exist:

- Option 1. To correct the project and precise the coordinates of the Southern shaft, removing it from the buffer zone of the burial identified; in this case, the Company has to provide the preservation of the burial during the constructional and operational stages supporting the protection regime prescribed by the legislation;
- Option 2. Leave the project design as it is and up to the beginning of the construction carry out the investigation/excavation works on the burial. All findings and artifacts should be carefully fixed/treated and passed to the state museums of RK. The competent authority will make the further decision on

the basis of the investigation (exclusion the burial from the heritage site or reducing of the buffer zone) and provide the permission for the construction.

It is recommended to analyze these two options in the nearest time, make the decision and specify this plan.

Chance heritage finds

- Chance finds of archaeological and/or historical materials or sites must be immediately reported;
- Work should be stopped in the immediate area of the chance find for up to 72 hours to allow for a more detailed assessment of the significance of the find;
- The Chance Finding Procedure is attached (Annex 2.1)

A2-8. Monitoring

Regular inspections of identified heritage sites must be maintained to ensure that the restrictions pertaining to the site(s) are upheld and that possible damage to the sites is prevented.

Annex 2.1 Chance-find procedure (draft for further discussion)

Approved by
AO ShalkiyaZinc Chairman of the Board

B.M. Ramazanov

The present Procedure is binding upon all ShalkiyaZinc employees, contractors and subcontractors operating at the ShalkiyaZinc site.

In the event that previously unidentified cultural heritage resources (bones, shells, various man-made articles) are identified by a staff member of the Company or contractor/subcontractor ('worker'), all activities should be ceased in the immediate vicinity of the site.

The worker must cover the identified/exposed articles with a suitable material and immediately notify his/her supervisor.

The supervisor should then inform an authorized officer responsible for maintaining this Chance Find Procedure.

The authorized officer should inform a senior management representative (to be specified), Archeo-service LTD and Kyzylorda Oblast Department of Culture, Archives and Records (names and contact details) within one day.

Archaeologists visit and survey the site for inspection. Based on the survey results, a written decision is issued by the Heritage Conservation Service to specify the next steps to be taken.

The authorized officer should inform the structural units involved in the execution of earthworks (including the contractor/subcontractor staff) about the need to adhere to the procedure. The Chance Find Procedure is an inherent part of contracts with contractors/subcontractors engaged to conduct earthworks.

An officer appointed to implement the Procedure: _____
(name, contact details).

An officer supervising the implementation of the Procedure _____
(name, contact details)

ANNEX 3. AIR QUALITY MANAGEMENT PLAN

A3-1 Overview

Mining activities can result in a number of different air emissions. For Shalkiya, which is an underground mine, it is only dust that is considered to be a significant potential emission. Dust is a common occurrence during mining activities, being generated mechanically during any form of excavation, vehicle movement, materials crushing or grinding and transport but may also be generated by wind (Aeolian action). In respect of Aeolian action the TSF is a key concern due to the size of the surface area of the dam. Other sources of dust are overburden stockpiles and vehicle movements on unpaved roads. In addition dust may also be generated by combustion processes as particulate matter in the size fractions of 10 (PM10) and 2.5 (PM2.5) micron respectively. The only combustion processes that will be used at the mine are motor vehicles and these have been assessed to be insignificant given the relatively small scale of the sources.

A3-2 Activities that may result in dust generation

The following activities are potential sources of dust and as such the conducting of any of these activities must invoke the dust control measures (as appropriate) that are presented later in this plan):

- Ground clearing;
- Excavations;
- Top soil recovery;
- General earthworks;
- Transport on unpaved roads
- Transport of soil and or spoil;
- Batch plant operations;
- Rock crushing and grinding;
- Operations of the tailings storage facility (TSF); and,
- Final product handling (lead particularly)

A3-3 Risks

This management plan serves to mitigate or prevent the following risks:

1. Risk of adverse human health effects with a particular concern being the possible exposure of especially workers to the final lead product;
2. Risk of silicosis among the mine workers due to elevated levels of silicates in ores and rocks
3. Risk of nuisance as a result of dust soiling;
4. Risk of nuisance as a result of dust soiling;
5. Risk of accidents as a result of visibility reduction;
6. Risk of stakeholder discontent due to nuisance introduced by the project; and
7. Reputational risk (possible perceptions of poor environmental management commitment/ performance).

A3-4 Objective

Given the risks stated above the following objective prefaces air quality management at Shalkiya:

Air pollution emissions from the Shalkiya Zinc project do not result in adverse human health effects, environmental damage or nuisance.

A3-5 Indicators and targets

Indicators		Targets
Dust fallout	mg/m ² /month	650
PM ₁₀	24 hr (µg/Nm ³)	100
	Annual (µg/Nm ³)	50
Visible emissions from activities resulting in dust on-site		None
Complaints from surrounding communities		None

A3-6 Legal requirements

1. Environmental Code of the Republic of Kazakhstan (No. 212-II, 2007), Chapter 14. Industrial Environmental Control.
2. Maximum admissible concentrations of pollutants in the ambient air in the residential areas (Annex 1 to the Order of the RK Minister of National Economy "On the Approval of the Health-Based Ambient Air Quality Guidelines in the Urban and Rural Residential Areas" of 28 February 2015 No. 168)
3. On the Approval of the Industrial Environmental Control Reporting Requirements. Order by the RK Minister of Environment of 14 February 2013 No. 16-Ө.

A3-7 Management and mitigation requirements

A3-7.1 General dust

1. Re-vegetate disturbed areas not occupied by plant infrastructure as soon as possible;
2. Exposed soils and other erodible materials should be re-vegetated or covered promptly;
3. New areas should be cleared and opened-up only when absolutely necessary;
4. Use a motorized sweeper on surfaced roads to reduce the presence of soil and/or other dust generating materials;
5. Areas that are to have the topsoil stripped for construction purposes must be limited and only stripped when work is about to take place; and,
6. Batch plants are to have covers on the batching areas to control dust generation when sand and stone is being tipped into the transit mixers; and,
7. Loading, transfer, and discharge of materials should take place with a minimum height of fall, be shielded against the wind, and consider use of dust suppression spray systems.

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8. Lead and zinc concentrates should be packed in strong big bags and transported in boxcars

A3-7.2 Vehicle generated dust

9. Pave all mine roads. Where this proves impractical use a dust palliative to control dust emissions from unpaved roads (note the area is a water scarce area and as such dust control cannot be based on unlimited water spraying);
10. Limit vehicle-entrained dust from unpaved roads through traffic control measures such as limiting vehicle speeds and restricting traffic volumes. The maximum allowable speed on any mine road will be 30km/h;
11. Cover vehicles transporting spoil, topsoil or other dust generating materials.

A3-7.3 Dust control on the tailings storage facility

12. Maintain adequate moisture in the TSF surface to reduce wind blown dust;
13. For dried beaches investigate the use of chemical stabilisers; and,
14. Should dust exceed the stated targets then investigate the use of wind nets to reduce the amount of dust leaving the TSF and to slow the rate of evaporation.

A3-7.4 Motor vehicle emissions

15. Motor vehicles and plant are to be maintained and serviced according to manufacturer's specifications; and,
16. Any vehicles or plant emitting visible emissions from their exhausts are to be immediately tuned, serviced and/or repaired to prevent further emissions.

A3-7.5 Dust control on the lead final product

17. Storage of lead must be enclosed or operated with efficient dust suppressing measures;
18. Conveyor systems for lead should be covered and equipped with measures for cleaning return belts.
19. Final lead product to be bagged and rail carriages to be enclosed to ensure no loss of lead during handling or transport;
20. Occupational exposure to lead dust to be estimated prior to start of operations and additional controls to reduce lead dusting incorporated in the detailed design of the tailings processing facility;
21. If control measures at source do not prove adequate to ensure safe exposure of workers to the final lead product, suitable personal protective equipment (PPE), most notably dust masks, is to be issued to workers and use of the same made obligatory.
22. Exposure to lead dust is to be measured periodically to confirm that workers are not exposed to unsafe airborne concentrations of lead.

A3-8. Ambient air quality monitoring

Ambient air quality monitoring shall be implemented as follows:

- Continuous airborne dust monitoring is not considered to be required due to the remoteness of the mine;

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- Dust fallout monitoring to be conducted between the mine and Shalkiya and Shalkiya North villages at the mine perimeter.
 - Dust fallout monitoring must be conducted so as to determine a fallout rate per mg/m²/month.
 - Should the dust fallout exceed the targeted levels then campaign measurements of airborne dust are to be conducted to ensure that there is no potential adverse off-site risk.

ANNEX 4. GROUND AND SURFACE WATER MANAGEMENT PLAN

A4-1 Overview

The Shalkiya mine occurs in an area that is arid and where water has a high premium. At the same time the mine is required to pump groundwater in order to keep the mine workings dry which has the potential to impact negatively on water supply to communities and other economic activities in the area. The mine also requires water for operation of the mineral processing plant and will conduct several activities that have the potential to impact negatively on ground- and surface water.

To reduce water consumption, it is required to establish a system of drains conveying storm water to storage reservoirs. After treatment, this water can be used for plant watering and industrial purposes.

A4-2 Activities that may result in impacts on ground and surface water

The following activities may result in impacts on ground and surface water:

- Mine dewatering;
- Excavations;
- General earthworks;
- Batch plant operations; and,
- Operations of the tailings storage facility (TSF).

A4-3 Risks

This management plan serves to mitigate or prevent the following risks:

- Water shortages in the broader area and amongst communities; and,
- Contamination of ground and surface water and possible adverse human health or environmental risks as a consequence.
- Impact on the Kuttykozha water intake used to meet the domestic and drinking water needs of the mine and adjacent communities.

A4-4 Objective

Given the risks stated above the following objective prefaces water management at Shalkiya:

Water use is minimized, the maximum possible utility is derived from the water that is used and impacts on water resource quality are prevented or minimised by discharge water quality remaining within prescribed limits to prevent off-site reductions in water quality and associated potential impacts.

A4-5 Indicators and targets

Indicators		Targets
Water use (including pumped groundwater)	MI	tbd
pH	pH	6-9
BOD	mg/l	30
COD	mg/l	125
Total nitrogen	mg/l	10

Indicators		Targets
Total phosphorous	mg/l	2
Oil and grease	mg/l	10
Total suspended solids	mg/l	50
Total coliform bacteria	mg/l	400

A4-6 Legal requirements

1. Environmental Code of the Republic of Kazakhstan (No. 212-II, 2007), Chapter 14. Industrial Environmental Control.
2. Technique for Setting Environmental Emission Guidelines (Annex to the Order by RK Minister of Environment of 16 April 2013 No. 110-I)
3. Sanitary Rules "Sanitary and Epidemiological Requirements to Water Sources, Domestic and Drinking Water Intakes, Domestic and Drinking Water Supply Systems, Recreational Water Bodies and Water Resource Safety" (approved by the Order of the RK Minister of National Economy of 16 March 2015 No. 209)
4. On the Approval of the Industrial Environmental Control Reporting Requirements. Order by the RK Minister of Environment of 14 February 2013 No. 16-Θ.

A4-7 Management and mitigation requirements

A4-7.1 General dust

A4-7.2 Waste water management

- Cement-laden water may only be discharged at the batch plant facility which provides for the settlement of silt in the waste water and the reuse of the same for washing of cement/concrete vehicles;
- This wash water must be recycled as often as possible;
- Water from washing large concrete-mixing equipment (mixers and the like) shall not be discharged overland;
- All washing operations shall take place at the dedicated wash bay that will be established for that purpose;
- No detergents may be used;
- Workshops, refuelling depots and washing areas shall be bunded.
- Oils collected in grease traps shall be collected by an appointed waste disposal contractor; and,
- Any wastewater or spilled fuel collected within bunded areas around the refuelling area shall be disposed of as hazardous waste;

A4-7.3 Erosion prevention

- Silt laden water may be discharged over land allowing the water to percolate into the ground, provided that this water does not discharge into an existing surface water system;
- Such overland discharge may not cause erosion;

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- Natural run off shall be diverted away from any camps (i.e. office area used by contractors on site);
 - Special care must be taken in areas susceptible to erosion, e.g. embankments and soil stockpiles;
 - Sand, silt and silt-laden water must be prevented from entering any surface watercourse;
 - Erosion and sedimentation control measures will include:
 - Minimising removal of vegetation;
 - Clearly demarcating boundaries in order to limit construction activities;
 - Permanent or temporary fences shall be erected and maintained to ensure that activities are conducted within the demarcated area, and thus limit impact on the environment;
 - Suppliers/contractors shall ensure that all vehicles utilize dedicated routes for construction vehicles.
 - Where erosion and/or sedimentation occurs such areas require immediate recovery and implementation of further preventative measures.

A4-7.4 Prevention of stormwater contamination

- All sensitive material storage areas shall be designed to reduce risk of spillages;
- All materials shall be covered during transport to prevent them from spilling. If there is a risk of contamination of stormwater, all stockpiles shall be covered to be kept out of the rain;
- Contaminated stormwater and other run-off from the construction site shall be contained;
- In the event of a spill, which may contaminate stormwater, the spill management procedures shall be implemented immediately.

A4-7.5 Water conservation

- Establishing a water balance (including probable climatic events) for the mine and related process plant circuit and use this to inform infrastructure design;
- Minimize impact to natural systems by managing water use, avoiding depletion of aquifers, and minimizing impacts to water users;
- Assess and implement as appropriate reuse, recycling, and treatment of process water where feasible (e.g. return of supernatant from tailings pond to process plant);
- Consider the potential impact to the water balance prior to commencing any dewatering activities;
- Consult with key stakeholders (e.g. government, civil society, and potentially affected communities) to understand any conflicting water use demands and the communities' dependency on water resources and/or conservation requirements that may exist in the area.
- Create awareness of water conservation across the mine operation through toolbox talks, posters and other available media;

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- Highlight simple water savings tips like keeping taps properly closed, fixing leaks on pipes and others; and,
 - Include observations of unnecessary water use during site inspections to highlight wasteful water use.

A4-7.6 Water quality

- The quality and quantity of mine effluent streams discharged to the environment, including stormwater, process effluents, and overall mine works drainage should be managed and treated to meet the target effluent discharge values shown above;
- Oil and grease traps or sumps must be installed and maintained at refuelling facilities, workshops, fuel storage depots, and containment areas, and spill kits should be available with instructions for use;
- Water quality in open storage systems (e.g. minewater dam and TSF) should have appropriate control measures put in place to meet the target water quality values detailed above;
- Sanitary wastewater should be managed via reuse or routing into septic or surface treatment to ensure that there is no discharge that does not meet the target water quality values detailed above.
- Infiltration of toxic leach solutions should be prevented through the provision of appropriate liners and sub-drainage systems to collect or recycle solution for treatment, and minimize ground infiltration;
- Pipeline systems carrying pregnant solutions should be designed with secondary bunded containment;
- Leak detection equipment should be installed for pipeline and plant systems with appropriate leak response systems in place; and,
- Impoundments designed to hold non-fresh water should be lined, and be equipped with sufficient wells to enable monitoring of water levels and quality.

A4-7.7 Metals leaching potential

- Although it has been accepted that there is a low risk of acid generation it must still be confirmed that metal leaching potential is insignificant;
- In the event that metal leaching potential is significant, Shalkiya will need to develop and implement mitigation measures commensurate with the risk.

A4-7.8 Sealing of exploratory boreholes

- The exploratory boreholes that are identified in the ESIA as posing a risk to the groundwater quality must be effectively sealed so as not to allow transmissivity of ground water across the natural obstacle that exists that serves to otherwise prevent this risk.

A4-7.9 Surface and ground water monitoring

Surface and groundwater monitoring must be implemented as follows:

A4-7.10 Monitoring of pumped groundwater

The following parameters must be monitored in line with the RK legislation:

1. Water use (including pumped groundwater);
2. pH

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3. Suspended substances
 4. Dry residue
 5. COD (chemical oxygen demand)
 6. BOD (biological oxygen demand)
 7. Ammonium nitrogen
 8. Nitrite nitrogen
 9. Nitrate nitrogen
 10. Total iron
 11. Hardness (meq/l)
 12. Chlorides
 13. Sulphates
 14. Calcium
 15. Magnesium
 16. Petroleum products
 17. Lead
 18. Zinc
 19. Copper
 20. Chromium 6+
 21. Surfactants
 22. Cadmium
 23. Arsenic
 24. Mercury
 25. Mineralisation

Monitoring locations to be established at :

- Mine water discharge
- The point of discharge into the surface water channel
- Monitoring well near the mine water pond

A4-8. Groundwater monitoring

Groundwater monitoring should be conducted for the following groundwater sources:

1. Kuttykozha groundwater intake
2. Zhanakorgan groundwater intake
3. Hydrogeological monitoring network (26 wells) established to monitor the impacts of mining operations and mine water (measuring groundwater levels and groundwater quality parameters)

The following parameters must be monitored in line with the RK legislation:

1. pH
2. Suspended substances
3. Dry residue
4. COD (chemical oxygen demand)
5. BOD (biological oxygen demand)
6. Ammonium nitrogen

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7. Nitrite nitrogen
 8. Nitrate nitrogen
 9. Total iron
 10. Hardness (meq/l)
 11. Mineralisation
 12. Chlorides
 13. Sulphates
 14. Calcium
 15. Magnesium
 16. Petroleum products
 17. Lead
 18. Zinc
 19. Copper
 20. Chromium 6+
 21. Surfactants
 22. Cadmium
 23. Arsenic
 24. Mercury

ANNEX 5. MINEWORKER HEALTH AND SAFETY MANAGEMENT PLAN

A5-1 Overview

Mining is by its nature a hazardous operation and this is especially true of underground mining where rockfalls could result in direct death or injury but also serve to trap workers underground. There are also numerous other underground and surface hazards that need to be considered when managing mineworker health and safety. This plan should be read in conjunction with Emergency Response (Plan 1).

A5-2 Activities that may result in mine worker health and safety risks

All mine related activities present potential hazards that can result in death, injury or adverse health effects. The following serves to define the key occupational hazards:

- General workplace health and safety;
- Hazardous substances;
- Use of explosives;
- Electrical safety and isolation;
- Working at heights;
- Physical hazards;
- Ionizing radiation;
- Fitness for work;
- Thermal stress;
- Noise and vibration; and
- Specific hazards in underground mining (Fires, explosions, confined spaces and oxygen deficient atmospheres).

A5-3 Risks

This management plan serves to mitigate or prevent the following risks:

1. Death, injury or increased morbidity to mineworkers;

A5-4 Objective

Given the risks stated above the following objective prefaces air quality management at Shalkiya:

Operations of the mine do not result in worker fatalities, injuries or adverse health effects

A5-5 Indicators and targets

Indicators		Targets
Lost time injury frequency ratio	LTIFR	<5
Fatalities	No.	0
Disabling injuries	No.	0
Lost time injuries	No.	0

Indicators		Targets
First aid cases	No.	0
Near misses	No.	0

A5-6 Legal requirements

The Mine's OHS performance is governed by the following requirements of the RK legislation:

- On the Civil Protection. RK Law of 11 April 2014 No. 188-V 3RK
- On the Approval of the Occupational Safety Provision Rules for Hazardous Industrial Facilities Conducting Mining and Geological Exploration Operations. Order by the RK Minister of Investment and Development of 30 December 2014 No. 352. Registered with the RK Ministry of Justice on 13 February 2015 No. 10247

A5-7 Management and mitigation requirements

A5-7.1 General health and safety⁴

- Mining exploration and development activities should manage occupational health and safety hazards as part of a comprehensive health and safety management plan incorporating the following aspects:
- Preparation of emergency response plans specifically applicable to exploration and production activities (considering the often geographically isolated nature of mining sites) and including the provision and maintenance of necessary emergency response and rescue equipment;
- Sufficient number of first aid trained employees to respond to emergencies;
- Implementation of specific personnel training on worksite health and safety management including a communication program with a clear message about corporate management's commitment to health and safety. The communication program should also include regular meetings such as daily talks prior to initiation of work shifts;
- Integration of behavioral considerations into health and safety management, including on- the-job behavioral observation processes;
- Training of employees on the recognition and prevention of occupational hazards specifically applicable to work in remote areas such as safety with respect to wildlife; protection against the elements; thermal stress; acclimatization; disease exposure; and navigational aids to avoid becoming lost;
- Illumination systems should be adequate and safe 14 for the planned working conditions in travel paths, mine working areas, and within and around surface facilities and dumpsites of mines (see the illumination guideline values

⁴ These requirements have been take directly from the IFC's EHS Guidelines for Mining. The requirements provide no more than an overarching framework and should not be seen to comprehensively address mineworker health and safety risks. It is expected that Shalkiya will further develop this plan to address all mineworker health and safety risks comprehensively.

presented in Section 2.0). Additional illumination guidance includes adherence to local standard requirements for illumination for mobile equipment operating above ground and on public roads;

- Signage in hazardous and risky areas, installations, materials, safety measures, emergency exits, and other such areas should be in accordance with international standards (including standards of cleanliness, visibility and
- Considering the need to avoid such things as glare or potential sources of ignition.
- As a general rule, mobile equipment should produce an illumination level of 50 Lux across the passage at a distance of 1.5 times the stopping distance reflectance in areas of potentially poor illumination or sources of dust and pollution), be known and easily understood by workers, visitors, and as appropriate the general public;
- To the extent that alternative technologies, work plans or procedures cannot eliminate or sufficiently reduce a hazard or exposure, the mine operators should provide workers and visitors with the necessary personal protective equipment (PPE), and provide instruction and monitoring in their appropriate maintenance and use. Applicable PPE include, at a minimum, safety helmets and footwear, in addition to ear, eye, and hand protection devices.
- Occupational health assessments should be conducted for employees on a regular basis, based on exposure to risk. Medical records should be retained for at least 20 years.

A5-8 Health and safety monitoring

The following parameters shall be monitored:

- Lost time injury frequency ratio;
- Fatalities;
- Disabling injuries;
- Lost time injuries;
- First aid cases; and,
- Near misses.

ANNEX 6. COMMUNITY HEALTH, SAFETY AND SECURITY MANAGEMENT PLAN

A6-1 Overview

Shalkiya is a remote mine with only two settlements in relatively close proximity these being Shalkiya and Shalkiya North. Shalkiya North is some 3 kms away from the centre of the mine works and as such it is considered unlikely that the mine could have any direct effects on these communities in terms of health and safety. That notwithstanding, it is still important to ensure that no such adverse effects occur and that is the purpose of this plan.

A6-2 Activities that could result in health, safety or security risk

The following activities could result in community health, safety or security risk

- All dust generating activities
- All noise generating facilities
- Transport to and from the mine
- All security activities.

A6-3 Risks

This management plan serves to mitigate or prevent the following risks:

- Death, injury, adverse health and nuisance effects on the adjacent communities; and,
- Potential human rights abuses.

A6-4 Objective

Given the risks stated above the following objective prefaces air quality management at Shalkiya:

Operations of the mine do not result in adverse health effects, fatality or injury, human rights abuses or nuisance in the communities potentially affected by the mine.

A6-5 Indicators and targets

Indicators		Targets
Community complaints	No.	0
Community injury (including fatalities)	No.	0
Adverse human health effects	No.	0
Human rights abuses	No.	0

A7-6 Legal requirements

Законодательные требования РК, в части безопасности населения, проживающего вблизи опасных промышленных объектов (включая требования к охране объектов) изложены в следующих законодательных актах:

- On the Civil Protection. RK Law of 11 April 2014 No. 188-V 3RK

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- .On the Security Activities. RK Law of 19 October 2000 No.85-II «Об охранной деятельности (amended and augmented)

A6-7 Management and mitigation requirements

A6-7.1 Water Quality

Drinking water sources should at all times be protected so that they meet or exceed applicable national acceptability standards.

A6-7.2 Water Availability

The potential effect of groundwater or surface water abstraction for project activities should be properly assessed through a combination of field testing and modelling techniques, accounting for seasonal variability and projected changes in demand.

A6-7.3 Transport safety

- Adoption of best transport safety practices across all aspects of project operations with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public. Measures should include:
 - Emphasizing safety aspects among drivers
 - Improving driving skills and requiring licensing of drivers
 - Adopting limits for trip duration and arranging driver rosters to avoid fatigue
 - Avoiding dangerous routes and times of day to reduce the risk of accidents
 - Use of speed control devices (governors) on trucks, and remote monitoring of driver actions
- Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.

A6-7.4 Transportation of hazardous materials

- Shalkiya must conduct a Hazard Assessment to identify potential hazards in transporting hazardous materials by reviewing:
 - The hazard characteristics of the substances identified during the screening stage
 - The history of accidents, both by the company and its contractors, involving hazardous materials transportation
 - The existing criteria for the safe transportation of hazardous materials, including environmental management systems used by the company and its contractors
- This review should cover the management actions, preventive measures and emergency response procedures described below.
- The hazard assessment helps to determine what additional measures may be required to complete the plan.

A6-7.5 Security

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- Shalkiya should consider signing up to the Voluntary Principles of Security and Human Rights; and,
 - All security officers are to be trained in established Rule of Engagement and the Minimum Use of Force.

A6-8 Environmental monitoring

Records are to be kept of:

- Community complaints;
- Community injury (including fatalities);
- Adverse human health effects; and,
- Human rights abuses.

ANNEX 7. WASTE MANAGEMENT PLAN

A7-1 Overview

For Shalkiya a distinction is made between waste (the typical waste types that would be produced by many industrial activities) and mineral wastes, which are the wastes specifically associated with mining. In general terms Shalkiya does not generate the waste types that could be generated in minerals processing and as such the mine is not considered to be a significant source. Good waste management is still required for both waste types and the management requirements are accordingly detailed in this plan.

A7-2 Activities that may result in dust generation

The following activities are potential sources of waste and as such the conducting of any of these activities must invoke the waste management measures (as appropriate) that are presented in this plan:

- Excavations;
- General earthworks;
- Underground mining;
- Vehicle, equipment and machinery maintenance;
- Accommodation and admiration; and,
- Operations of the tailings storage facility (TSF);

A7-3 Risks

This management plan serves to mitigate or prevent the following risks:

- Contamination of soil;
- Contamination of surface water; and,
- Contamination of ground water.

A7-4 Objective

Given the risks stated above the following objective prefaces waste management at Shalkiya:

Waste is properly classified, accurate records kept and intermediate storage, transport and final disposal is done safely and in compliance with local regulatory requirements and good practise, and all waste that can be recycled is recycled.

A7-5 Indicators and targets

Indicators		Targets
Waste recycled	%	15
Quantities of waste per waste class generated per month	tonnes	Comprehensive information
Quantities of waste per waste class disposed per month together with the disposal mechanism	tonnes	Comprehensive information

A7-6 Legal requirements

1. Environmental code of the Republic of Kazakhstan, article 17 (No. 212-II, 2007)
2. About approval of Rules of development of waste management programmes. The order of the Minister of energy of the Republic of Kazakhstan from November 25, 2014 No. 146.
3. About modification and additions to the RK Law. On environmental protection on wastes of production and consumption RK Law of 9 December 2004 No. 8.
4. Approval of the Program of modernization of the system of solid waste management in 2014 - 2050. Resolution of the RK government from June 9, 2014 No. 634

A7-7 Management and mitigation requirements

A7-7.1 Waste characterisation and recording

- Characterise and quantify all waste streams across the project in terms of quantity, hazard, generation frequency and recyclability and define and implement disposal options;
- For each waste type create a MSDS that is always available to accompany the waste;
- As part of the characterisation define opportunities for source reduction, as well as reuse and recycling;
- Ensure segregation of hazardous wastes from non-hazardous wastes;
- Enforce appropriate occupational health and safety requirements, with all relevant regulations, guidelines and codes of practice for waste management/handling facilities;
- In case of transporting waste, Shalkiya Zinc must comply with the codes of practice and guidelines for licensing of waste transport vehicles and the regulation and monitoring of transport operations;
- Complete delivery and transport of wastes as per the approved regulations and guidelines.
- See the hazardous materials management plan for safe handling, storage and use of hazardous substances, to protect employees and the environment from related risks; and,
- Maintain a waste register for materials removed from the site, indicating type, quantity, date, haulage contractor, delivery point, and so forth.

A7-7.2 Waste segregation

- Waste must be properly segregated into different types, so that opportunities for reuse and recycling are not compromised by, for example, mixing hazardous and non-hazardous wastes
- Flammable substances must be kept away from sources of ignition and from oxidizing agents
- Acids must be segregated from alkalis, and from other substances with which they could react dangerously;

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- Waste from different sources must not be mixed;
 - The maximum retention time for temporary storage of a waste generated shall be 30 days (provided the waste does not present a health hazard or risk of odour).

A7-7.3 Waste transport

- Conduct on-site and off-site transportation of waste so as to prevent or minimize spills, releases, and exposures to employees and the public.
- All waste containers designated for off-site transport should be secured and labelled with the contents and associated hazards, be properly loaded on the transport vehicles before leaving the site, and be accompanied by a shipping paper (i.e., manifest) that describes the load and its associated hazards; and,
- Upon delivery of the waste consignment at the final waste disposal facility, the facility operator must source a suitable disposal certificate.

A7-7.4 Waste disposal

- Contractors handling, treating and disposing of hazardous waste must be reputable and legitimate enterprises, licensed by the relevant regulatory agencies and following good international industry practice for waste handling and disposal ensuring compliance with applicable regulations;

A7-7.5 Waste rock⁵

- Recommendations for management of waste rock dumps include the following:
- Dumps should be planned with appropriate terrace and lift height specifications based on the nature of the material and local geotechnical considerations to minimize erosion and reduce safety risks.

A7-7.6 Tailings management

- Design, operation, and maintenance of structures according to specifications of ICOLD3 and ANCOLD4, or other internationally recognized standards based on a risk assessment strategy. Appropriate independent review should be undertaken at design and construction stages with ongoing monitoring of both the physical structure and water quality, during operation and decommissioning;
- Where structures are located in areas where there is a risk of high seismic loadings, the independent review should include a check on the maximum design earthquake assumptions and the stability of the structure to ensure that the design is such that during seismic events there will be no uncontrolled release of tailings;
- Design of tailings storage facilities should take into account the specific risks / hazards associated with geotechnical stability or hydraulic failure and the associated risks to downstream economic assets, ecosystems and human health and safety. Environmental considerations should thus also consider emergency preparedness and response planning and containment /

⁵ See also the Ground and Surface Water Management Plan

mitigation measures in case of catastrophic release of tailings or supernatant waters;

- Any diversion drains, ditches, and stream channels to divert water from surrounding catchment areas away from the tailings structure should be built to a 24 hour/100 year flood event recurrence interval;
- Seepage management and related stability analysis must be considered in the design and operation of the TSF. This is likely to require a specific piezometer based monitoring system for seepage water levels within the structure wall and downstream of it, which should be maintained throughout its life cycle;
- Consideration of use of natural or synthetic liners to minimize risks;
- Design specification should take into consideration the probable maximum flood event and the required freeboard to safely contain it (depending on site specific risks) across the planned life of the tailings dam, including its decommissioned phase;
- On- land disposal alternatives should be designed, constructed and operated according to internationally recognized geotechnical safety standards;
- Thickening or formation of paste for backfilling of underground workings during mine progression should be investigated and implemented if feasible.

A7-8 Monitoring

- Monitoring activities associated with the management of hazardous and non-hazardous waste must include:
- Regular visual inspection of all waste storage collection and storage areas for evidence of accidental releases and to verify that wastes are properly labelled and stored.
- Monitoring records for hazardous waste collected stored, or shipped should include:
 - Name and identification number of the material(s) composing the hazardous waste;
 - Physical state (i.e., solid, liquid, gaseous or a combination of one, or more, of these);
 - Quantity (e.g., kilograms or litres, number of containers);
 - Waste shipment tracking documentation to include, quantity and type, date dispatched, date transported and date received, record of the originator, the receiver and the transporter;
 - Method and date of storing, repacking, treating, or disposing at the facility, cross-referenced to specific manifest document numbers applicable to the hazardous waste; and,
 - Location of each hazardous waste within the facility, and the quantity at each location