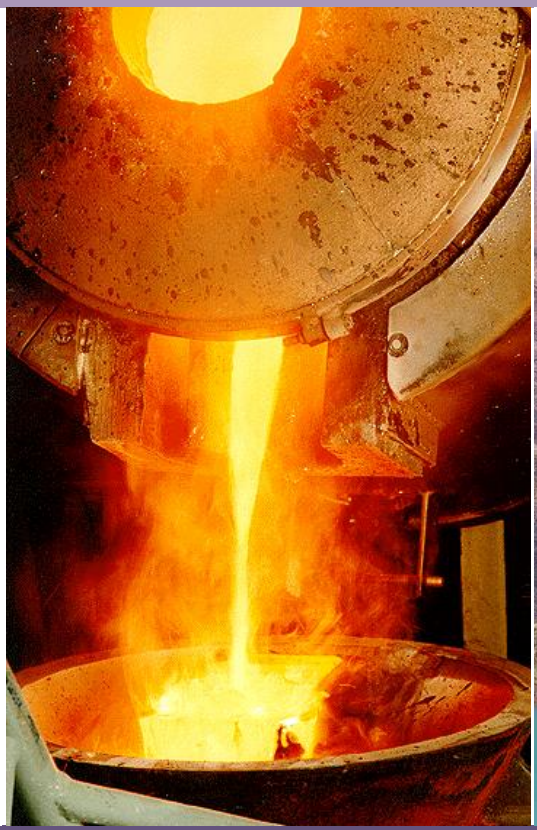
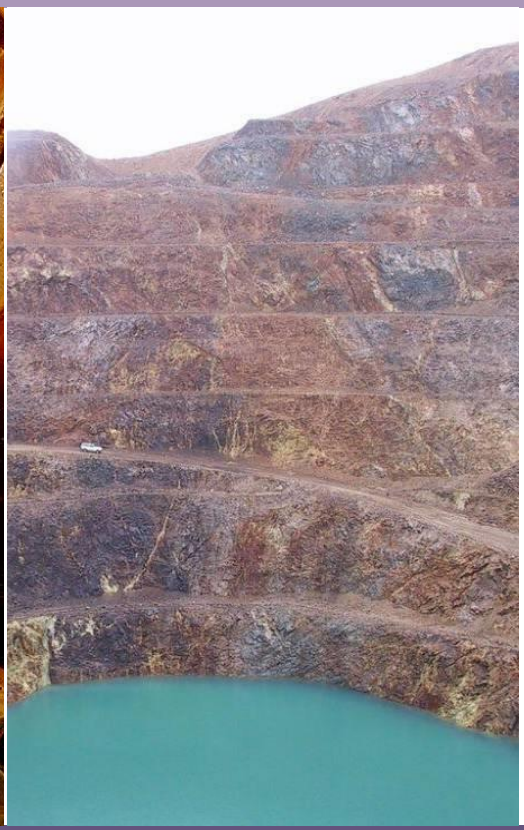
Community Health, Safety and Security Management Plan Framework
Dundee Precious Metals Krumovgrad
Krumovgrad Gold Project, Bulgaria


Submitted to

Dundee Precious Metals Krumovgrad EAD

Submitted By

AMEC Earth & Environmental UK Ltd.

REPORT ISSUE FORM

Client Name	**Dundee Precious Metals Krumovgrad EAD**		
Project Name	**Krumovgrad Gold Project**		
Report Title	**Community Health, Safety and Security Management Plan Framework**		
Document Status	**FINAL**	Issue No.	**3**
Issue Date	**November 2014**		
Document Reference	**7879140150**	**A150-14-R2257**	
Author	**C. Craxton**		
Reviewer	**R. Tanta / M. Diaz**		
Project Manager Approval	**M. Diaz**		

DISCLAIMER

CONTENTS

TABLES

APPENDICES

1.0 INTRODUCTION

Dundee Precious Metals (DPM) has negotiated an amended financial package with a consortium of banks for which the European Bank for Reconstruction and Development (EBRD) acts as environmental agent. According to the EBRD's Environmental and Social Policy (2008), and it's associated Performance Requirements (PRs), a project of this type and scale requires a full Environmental and Social Impact Assessment (ESIA). The Investment proposal "Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of Khan Krum Gold Deposit, Krumovgrad" (Krumovgrad Gold Project) undertook a national environmental impact assessment (EIA) in 2010 and an environmental permit No. 18-8, 11/2011 was issue. Following an independent review of the local EIA report, the EBRD required a number of supplementary environmental and social studies and documents to meet the EBRD PRs and international good practice. In addition to the EBRD PRs, some of the consortium banks refer to the Equator Principles and therefore the Project also references the IFC's Performances Standards (2012). The package of supplementary environmental and social documents as well as the local EIA reports together form the Project ESIA. The Project ESIA is summarised in a Non-Technical Summary.

The Krumovgrad Gold Project ("Khan Krum") mining licence area is located in the East Rhodope, approximately 320 km (by road) southeast of Sofia, in the Kardzhali District immediately south of the regional township of Krumovgrad (25° 39' 15"E and 41° 26' 15"N). Krumovgrad is located approximately 12.5 km (direct line) north of the border with Greece.

The Project has a rural setting, is located 3 km south of Krumovgrad town and trends in a north south direction. The deposit area comprises of hilly topography abutting a major regional river system. Infrastructure in the area is good, with paved roads, power and water resources available within close proximity to the Project.

Small villages are dispersed widely throughout the licence area with their inhabitants involved in subsistence farming, particularly livestock and the growing of tobacco and vegetables on the poorly developed soils characteristic of the Region. Many of the hamlet dwellings are occupied with more population in some seasons.

The Krumovgrad Project is a proposed open pit gold mine to extract 850,000 tonnes of gold ore per year over an 8 year life. The ore will be processed using physical separation techniques to produce a gold ore concentrate that will be transported off-site for further treatment and refinement in a remote facility already permitted for that purpose. Waste rock and mineral process wastes will be deposited on-site in an Integrated Mine Waste Facility designed to minimise footprint and maximise stability and acceptability, after closure as a permanent landscape feature.

The process facilities and mine will be developed, constructed, and operated by DPMK. The size of the Project footprint (the area it physically will occupy) has been minimised through several stages of design and re-design in order to limit the total operational area,

including a perimeter buffer zone. This footprint covers approximately 85 ha of State-owned land. Overall area with buffer zone is 134 ha.

The project scope for the Krumovgrad gold deposit involves a:

- Significantly reduced operating footprint from previous project proposal;
- One major landowner;
- One single integrated tailings and mine waste facility;
- A simplified processing route;
- Small quantity of fresh water used;
- Almost full water recycling;
- No water dam and tailings dam;
- No blasting magazine on site.

The changes that have led to this new scope are based on community feedback on the earlier project proposal.

1.1 Purpose

The purpose of this Management Plan is to:

- Identify the relevant regulatory requirements at the National, and International level;
- Identify the relevant DPM Krumovgrad commitments and Programs;
- Define the scope of the Management Plan including roles, responsibilities and timeframe;
- Prepare a list of potential community health, safety and security risks associated with the proposed Project;
- Discuss Project commitments, programs, operational procedures and guidance that respond to and mitigate the identified risks;
- Suggest monitoring and reporting procedures and identify Key Performance Indicators to measure the achievements of the proposed Project Commitments and Programs;
- Anticipate training requirements; and
- Discuss the audit program.

1.2 Application and commencement

The requirements set out in this Management Plan apply to all Krumovgrad operations including contractors. The Community Health, Safety and Security Plan (CHSSP) will be implemented at the beginning of the construction phase and continue to the end of the Project life.

1.3 Authority and Management

Executive Director of DPM Krumovgrad has the authority to approve this Plan.

DPM Krumovgrad Operations Director is the custodian of this Management Plan. Any requests for changes to this Management Plan must be addressed to this person and will be subjected to the appropriate review and approval processes as outlined in DPM procedures (insert reference to relevant procedure).

2.0 REGULATORY REQUIREMENTS

Applicable Standards must be complied with for all Project activities (the "Project Standards"). Project Standards comprise:

- Applicable Bulgarian National Standards;
- Other commitments to and requirements of Bulgarian Government authorities;
- Applicable lender standards and guidelines;
- Applicable Dundee Precious Metals Standards; and
- Other industry guidelines with which Krumovgrad has committed to comply.

2.1 Applicable Bulgarian National Legislation

2.1.1 Health and Safety at Work Act

This act shall set out the rights and obligations of the state, the employers, the working persons, the representatives of the working persons responsible for the safety and health at work, of the persons working at their own expense alone or in partnership, and of other organisations and legal entities responsible for securing safety and health at work.

2.1.2 Road Traffic Act

This Act regulates the rules of road traffic on public roads, the requirements for the vehicles to be used in traffic on these roads, the licensing requirements for the vehicle drivers, the rights and the obligations of the traffic participants and the corresponding authorities and officials, as well as the measures of compulsion, which shall be applied, the penalties for violating the regulations of this Act, and the statutory instruments, issued pursuant to it.

The purpose of this Act is to protect the life and health of the road traffic participants, to facilitate their movement, to protect the property of the legal entities and the natural persons, as well to protect the environment from vehicle generated pollution.

2.1.3 Environmental Protection Act

This Act shall regulate the social relations with regard to:

- protection of the environment for the present and future generations and protection of human health;
- conservation of biological diversity in conformity with the natural bio-geographic characteristics of Bulgaria;
- the conservation and use of environmental media;
- the control and management of factors damaging the environment;

- the exercise of control over the state of the environment and over the sources of pollution;
- the prevention and limitation of pollution;
- the establishment and management of the National Environmental Monitoring System;
- environmental strategies, programmes and plans;
- collection of, and access to, environmental information;
- the economic organization of environmental protection activities;
- The rights and the obligations of the State, the municipalities, the juristic and natural persons in respect of environmental protection.

2.1.4 Waste Management Act

This Act lays down measures and control mechanisms to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use.

This Act establishes the requirements to products which, in the process of production thereof or after final use thereof, generate hazardous and/or ordinary waste, as well as the requirements for extended producer responsibility relating to such products so as to promote the re-use, prevention, recycling and other recovery of waste.

Waste management shall aim to prevent or reduce the adverse impacts of waste on human health and the environment and shall be carried out in accordance with the requirements of legislation regarding:

- protection of water, air, soil, plants and animals;
- noise and odours, and
- protection of the environment and of places subject to special protection.

2.1.5 Water Act

This Act regulates the ownership and management of waters within the territory of the Republic of Bulgaria as a national indivisible natural resource and the ownership of the water development systems and facilities.

The objective of this Act is to ensure integrated water management in the interest of society and for protection of public health, as well as to create conditions to:

- ensure a sufficient supply and good quality of surface waters and groundwater's for sustainable, balanced and equitable water use;
- reduce the pollution of waters;
- protect surface waters and groundwaters and the waters of the Black Sea;

- eliminate the pollution of the marine environment with natural or synthetic substances;
- reduce the discharges, emissions and losses of priority substances;
- eliminate the discharges, emissions and losses of priority hazardous substances;
- prevent or reduce the harmful consequences for human life and health, the environment, cultural heritage and economic activity associated with water-related damage and loss.

2.1.6 Clean Ambient Air Act

The goal of this Act shall be to protect the people's and their generation's health, the animals and the plants, their communities and habitats, the natural and cultural values from harmful effects, as well as to prevent the occurrence of dangers and damages to society in case of changes in the ambient air quality resulting from various activities.

This Act shall regulate:

- the specification of indices and standards of ambient air quality;
- the limitation of emissions;
- the rights and obligations of the state and municipal authorities, of the legal and natural persons as regards the control, management and maintenance of the ambient air quality.
- The requirements for the quality of liquid fuels, including the control of compliance with the requirements for liquid fuel quality at the time of their placing on the market and their distribution, transportation and use.
- the limitations on the emissions of sulphur dioxide from the use of liquid fuels, the limitations on the sulphur content of oil derivatives and the method of their combustion by vessels staying in the ports of the Republic of Bulgaria, the Bulgarian section of the Danube river, the inland sea waters, the territorial sea and the exclusive economic zone.

2.1.7 Other commitments to and requirements of Bulgarian Government authorities, including relevant International Agreements that the Government of Bulgaria is a signatory of:

As of January 1, 2007 Bulgaria is a full member of the European Union. In this capacity, the BG Government is must follow all of EU regulations and requirements related to the Health and Safety of the BG community and the BG citizens.

2.2 International Standards

The international standards which Krumovgrad will implement are those set by the European Bank for Reconstruction and Development (EBRD) and the International Finance Corporation (IFC).

2.2.1 European Bank for Reconstruction and Development

EBRD Performance Requirement 4: Community Health, Safety and Security sets out requirements with regard to community health, safety and security. DPM will comply with the requirements of EBRD Performance Requirement 4 when implementing its policies.

Key requirements include:

- to identify and evaluate the risks and potential impacts to the health, safety and security of the affected community during the design, construction, operation, and decommissioning of the Project and to establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts. These measures will favour the prevention or avoidance of risks and impacts over minimisation and reduction;
- where the Project or stage of the Project poses material risks to or potential adverse impacts on the health, safety and security of affected communities, to disclose applicable Project-related information to enable the affected communities and relevant government agencies to understand these risks and potential impacts, as well as the proposed prevention, mitigation and emergency response measures, as appropriate;
- to review the measures regularly, and engage the affected communities and agencies on an ongoing basis, informing them on the status of implementation of plans and commitments, results, and discussing with them any material changes needed to the plans, in advance of changes;
- to report on the risks, potential impacts and benefits of the Project and implementation of any action plans on a regular basis (for example, annually) to the EBRD and, as part of reporting to stakeholders in accordance with Performance Requirement 10, to the affected community(ies);
- to design, construct, operate and decommission the structural elements or components of the Project in accordance with good international industry practice, and to give particular consideration to potential exposure to natural hazards, especially where the structural elements are accessible to members of the affected community or where their failure could result in direct or indirect injury to the community;
- to seek to prevent the occurrence of incidents and accidents associated with the operation of vehicles on public roads;

- to exercise commercially reasonable efforts to control the safety of transporting raw materials and of transportation and disposal of wastes, and implement measures to avoid or control community exposure. Information on risk, exposure of population, mitigation measures and monitoring will be provided to the relevant authorities and communicated to the public;
- to avoid or minimise adverse impacts due to Project activities on air, soil, water, vegetation and fauna and other natural resources in use by the affected communities;
- to identify those communicable diseases that can be transmitted by the Project components or its workforce (including contractors). Action plans will be developed, where appropriate, to prevent or minimise the potential for worker and community exposure to vector-borne and other communicable diseases that could result from Project activities;
- to be prepared to respond to process upset, accidental, and emergency situations in a manner appropriate to the operational risks and the need to prevent their potential negative consequences;
- to identify major-accident hazards, and take all measures necessary to prevent major accidents and limit their consequences for humans and the environment, with a view to ensuring high levels of protection to humans and the environment in a consistent and effective manner;
- to assist and collaborate with the community and the local government agencies in their preparations to respond effectively to emergency situations, especially when their participation and collaboration are necessary to respond to such emergency situations;
- to assess risks to those within and outside the Project site or facilities posed by Project security arrangements; and
- to investigate any allegations of unlawful or abusive acts of security personnel, take action (or urge appropriate parties to take action) to prevent recurrence, and report unlawful and abusive acts to public authorities when appropriate.

2.2.2 International Finance Corporation

IFC Performance Standards for Social and Environmental Sustainability set out a range of recommendations with regard to community health, safety and security (*Performance Standard 4*).[1] DPM will comply with IFC Performance Standard 4.

Key requirements include:

- evaluation of the risks and impacts of the affected community during the design, construction, operation and decommissioning of the Project;

[1] International Finance Corporation. Performance Standards for Social and Environmental Sustainability; Performance Standard 4: Community Health, Safety and Security. 30 April 2006.

- where the Project poses risks to the health, safety and security of communities, an Action Plan will be disclosed on an ongoing basis to enable the community to understand the risks and adverse impacts;
- the design, construction, operation and decommissioning of the Project will be in accordance with good international industry practice. Particular consideration will be given to potential exposure to natural hazards;
- adverse impacts on soil and groundwater as a result of the Project will also be avoided;
- the transmission of communicable diseases from temporary or permanent labour will be minimised;
- risks and impacts from Project activities will be assessed and communicated in a culturally appropriate manner. Emergency community situations shall be addressed; and
- where employees or contractors are retained to provide security, the risks to those inside and outside the Project site will be assessed.

The IFC *Environmental, Health, and Safety Guidelines* include community health, safety and security aspects.[2] The Guidelines address aspects related to:

- water quality and availability – preventing adverse impacts to the quality and availability of groundwater and surface water resources, and protecting drinking water sources, whether public or private, at all times;
- structural safety of Project infrastructure – reducing potential hazards posed to the public while accessing Project facilities, and undertaking hazard analysis to identify opportunities to reduce the consequences of a failure or accident;
- life and fire safety – design, construction and operation of all new buildings accessible to the public in accordance with building codes, fire regulations, legal/insurance requirements, and an internationally accepted Life and Fire Safety (L&FS) standard. Fire prevention, means of egress (design measures that facilitate safe evacuation in case of an emergency), detection and alarm systems, and an emergency response plan are important elements of the life and fire safety provisions;
- traffic safety – preventing traffic accidents and promoting traffic safety by all Project personnel;
- transport of hazardous materials – establishing procedures to ensure compliance with local laws and international requirements applicable to the transportation of hazardous materials, as well as measures presented for preventing or minimising the consequences of catastrophic releases of hazardous materials;

[2] Source URL: http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS_3/$FILE/3+Commun ity+Health+and+Safety.pdf

- disease prevention – preventing the occurrence and spread of communicable diseases, including surveillance, active screening and treatment of workers, undertaking health awareness and education initiatives in local communities, and providing health services; and
- emergency preparedness and response – preparing Emergency Preparedness and Response plans commensurate with the risks of the facility, including provisions for communication systems, community notification, media and agency relations, medical services, etc.

2.3 Applicable Dundee Precious Metals Standards

- Health and Safety Policy
- Environment and Sustainable Development Policy
- Community Investment Policy
- Policies can be found on the Dundee Precious Metals website.

2.4 Other industry guidelines with which Krumovgrad has committed to comply

United Nations Safety Guidelines and Good Practice for Tailings Management. The UN Safety Guidelines constitute a minimum set of requirements to ensure a basic level of Safety for TMF's. DPM will comply with the guidelines listed in Section C below:

- All TMFs should have an operation and management plan (operating manual) that is available to all personnel, local community, government inspectors and other relevant stakeholders. All documents relating to planning, design and construction should be maintained in an accessible way, with records kept permanently for future reference.
- TMF operators should monitor the TMF in accordance with the operation and management plan and the sampling plan as approved by the competent authorities.
- TMF operators should draw up and implement internal emergency plans and apply them on-site whenever a tangible risk for major accidents to occur has been identified or an uncontrolled event occurs that could lead to a major accident or a major accident has occurred.
- TMF operators should review, test, revise and update the internal emergency plans periodically, and always when there has been a change in the mine operation and management.
- The TMF operator should notify competent authorities in the event of emergencies that have occurred on the site.
- TMF operators should cooperate with competent authorities and local communities in preparing external emergency plans.

- TMF operators should train their personnel and reinforce and revise personnel's knowledge on safety, in particular on how to identify potentially harmful events and/or circumstances.
- TMF operators should implement safety audits for their facilities and promote the use of environmental management systems based on international standards.

2.4.1 Best Available Techniques Reference Document (BREFs) Management of Tailings and Waste-rock in Mining Activities and International Best Practice

Golder Associates took into consideration the following guidelines in the design of the Integrated Mine Waste Facility (IMWF):

- The Canadian Dam Association (CDA) Dam safety Guidelines (CDA, 2007)
- BC MWRPRC, 2001. British Columbia Mine Waste Rock Pile Research Committee. Mined Rock and Overburden Piles Investigation and Design Manual Interim Guidelines,
- EU Mine Waste Directive , (2006/21/EC)
- Best Available Techniques Reference Document (BREF) on Management of Tailings and Waste Rock in Mining Activities, and
- Natura 2000 Constraints, which consists of fencing around the whole project area and the use of native species during the closure stage of the project.

3.0 SCOPE OF THE MANAGEMENT PLAN

The scope of the Community Health, Safety and Security Plan (CHSSP) addresses DPM's commitment to:

- Mitigate potential impacts of Project related activities that may affect the health, safety and security of communities within the Project area and along the transportation route;
- Maintain a healthy workforce and labour pool in the community; and
- Contribute to the improved health and wellbeing of the local community in the Project area.

The CHSSP will be implemented at the beginning of the construction phase and continue to the end of the Project life.

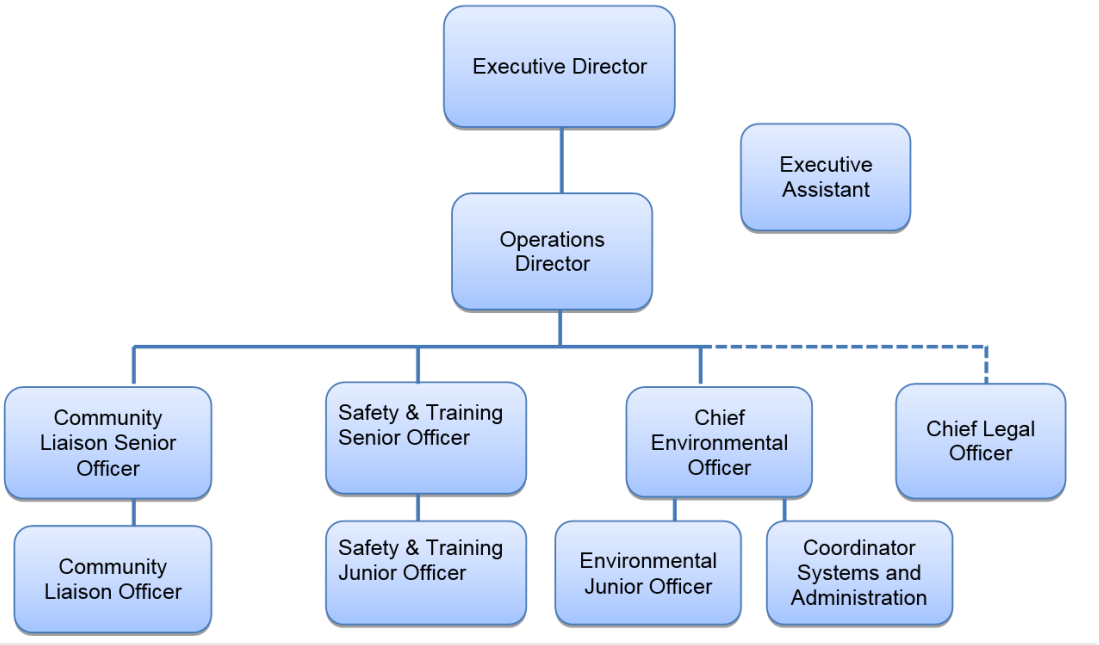
In accordance with the current state of Project development, this Management Plan provides a framework which is conceptual in nature and will be updated as and when necessary, when more information becomes available.

4.0 ROLES AND RESPONSIBILITIES

Roles and responsibilities are outlined in the organogram in Figure 4-1.The role of Executive Director is to ensure compliance with legislation and company standards and other requirements set out in this Plan. His responsibilities are to approve this Plan and to ensure resources required for implementation.

Role of Operations Director is overall responsibility for the Plan scope and implementation, development, monitoring and revision of this Plan, timely implementation of this Plan, including coordination with implementing organisations and other stakeholders.

Figure 4-1: Organogram of roles and responsibilities



5.0 MITIGATION MEASURES: PROJECT COMMITMENTS AND PROGRAMMS

5.1 Summary

In terms of community health and safety, DPM's strategy is to implement programs that contribute to the maintenance of a healthy workforce and local community. This document outlines DPM's commitment and approach to mitigating community health, safety and security risks that may arise as a direct or indirect result of the Project.

DPM undertook an Environmental Impact Assessment including a *Community Health, Safety and Security assessment*, to identify potential negative risks related to the different phases of the Project. These measures are presented in Table 5-2. Some of the significant risks to be considered include:

- Possible pressure and/or additional demand on community health services associated with the influx of workers from outside the Study Area;
- Possible pressure and/or additional demand on utility services including water and wastewater treatment plant associated with the influx of workers from outside the Study Area;
- Possible pressure and/or additional demand for social services as a result of an increased family stress and violence;
- Possible change in community wellness as a result of alcohol, and substance abuse associated with the influx of workers from outside the Study Area;
- Possible Change in Community Health as a result of sudden spread of communicable and non communicable diseases including sexually transmitted diseases (STDs) associated with the influx of workers from outside the Study Area;
- Possible pressure on traffic and transportation network associated with construction and operations activities; and
- Possible change in water and air quality associated with construction and operations activities.
- In addition to the potential negative impacts which would require mitigation, the operation of the mine also has the potential to improve community health safety and security through the following means[3]:
- Improved access to medical facilities for communities due to rehabilitated and widened roads;
- Improved healthcare infrastructure;
- Improved workforce health awareness;

[3] Social Impact Assessment Report

- Improved standards of living of direct and indirect employees due to better income in the employees households; and
- Improved standards of living of vulnerable groups and their households, including support to the elderly within the respective households.

The necessary control measures and Community Health, Safety and Security Plan (CHSSP) will be informed and adapted in response to the risks identified through the Social Impact Assessment.

5.2 Key Communities and Stakeholders

Key communities and other stakeholders of relevance to this management plan are listed in Table 5-1.

Table 5-1: Relevant Stakeholders identified

Stakeholder	Area of interest/interaction
Ministry of Economy, Energy and Tourism;	Concessioner –grant the Concessioner a mining concession with the right to extract underground natural resources
Ministry of Environment and Water / Executive Environment Agency;	Issued EIA decision, transbondary impact and communication with Republic of Greece for environmental issues with realization of the project
Ministry of Agriculture and Food / Executive Forest Agency;	Owner of state forestry fund which is the territory of project area – 134ha
Regional Inspectorate of Environment and Water (REI) Haskovo;	Environmental control, environmental impact assessment procedures, compatibility assessment
Basin Directorate for Water Management in the East region - Plovdiv;	Water management - ground water and surface water, issuing of water consumption and waste water discharge permit
South Central state enterprise – Smolyan/ Territorial Division - State Forestry Krumovgrad;	Execution of Forestry Management Plans, responsible for management of state forestry land on Ada tepe area
Regional health inspectorate - Kardzhali;	Provides methodological, consultative and expert assistance in the protection of public health; Participates in the development and implementation of regional programs and projects to protect and improve public health.
Regional Road Infrastructure Agency – Kardzhali	Responsible for road infrastructure maintenance
Krumovgrad Municipality;	Owner of the Krumovgrad hospital
Municipal council - Krumovgrad	Local parliament: adopt, amend and exercise control the budget of the municipality, over its implementation and approve the relevant report; make decisions on the acquisition, management, and disposal of municipal property, and define the Mayor's powers.

Stakeholder	Area of interest/interaction
Secondary, elementary and primary schools, kindergartens, Municipal Children Complex, care center for children and adolescents.	Educational institutions
NGOs;	Euro Generation – this is considered the only proper NGO in the area. Should any other NGO's be identified or established that have an interest in the project, they will be added to the list
Bulgarian Red Cross - Kardzhali	A humanitarian volunteer organization, working according to its Statutes and the principles of the International Red Cross Movement, committed to providing support to vulnerable people victims of crisis and disasters in order to improve their life and dignity and relieve their suffering.
Settlements - Pobeda, Belagush, Kemenik, Koprivnik, Skalak, Synap, Shtarbina, Kokoshar, Ladovo, Soyka, Bitovo, Chobanka 1 and 2, Kupel and Zvanarka.	No leaders or representatives have been identified at this time. Some of villages are not populated or have minor population. Zvanarka Mayor is Tahsin Ibryam. Deputy-Mayor of Ovchari (Soyka) is Zulbie Ahmed.

Table 5-2: Summary of the CHSSP

Potential Risk	Area of impact	Mitigation Measures (DPM Commitments and Programs)	Responsible Parties
Pre-Construction			
No actual information for morbidity on closest settlements near mine site	Settlements around project area	• Update Health Status Information on nearest settlements around Ada tepe	Community Liaison Senior Officer
Agriculture crops and soils status	Settlements around project area	• Baseline study on soils and agriculture crops. • Meetings with local farmers to present the results of study and proposed measures for remediation of soils (if needed).	Community Liaison Senior Officer
Stability and cracks in the houses around the mine site settlements	Settlements around project area	• Issuing of Stability Assessment Report and popularization of results.	Chief Environmental Officer
Confusion of social benefits of the project	Municipality Krumovgrad and villages close to mine site	• Revision and negotiation with municipality and communicating the social package; • Popularization of social benefits of the project in the zone of socio-economic influence.	Community Liaison Senior Officer
Lack of information for dust and noise level on the nearest settlements around mine site	Settlements around project area	• Installation of measurement tools with online system for transferring information; • Website publication of the collected environmental data; • Data displays screens monitors in the closest settlements.	Community Liaison Officer.
Construction, Operation and Closure Phase			
Increased pressure on health services and infrastructure. The influx of new workers from outside areas to the project area will increase demand on existing health services	Settlements around project area	• DPM will assist with the improvement of healthcare infrastructure.	Safety & Training Senior Officer

Potential Risk	Area of impact	Mitigation Measures (DPM Commitments and Programs)	Responsible Parties
Spread of Communicable diseases. The influx of new workers to the area could bring with it an increase of communicable diseases.	Settlements around project area	• Awareness campaigns on hygiene and sanitation and how these diseases spread.	Community Liaison Officer
Increase of non-communicable diseases. Possible exposure to materials which are known to cause non-communicable diseases.	Settlements around project area	• Information will be obtained on all hazardous materials and means of their control on site and in the vehicles which will transport them. • All efforts will be taken to avoid possible community exposure, and if it does occur, staff will be trained to control and mitigate the situation.	Chief Environmental Officer and Safety & Training Senior Officer
Illness and harm of employees/community members exposed to hazardous wastes through the incorrect disposal of hazardous wastes, badly controlled transportation of wastes to disposal sites and mismanaged waste disposal sites	Onsite and Settlements around project area	• Controlling the transport and disposal of all waste of and off site. • Ensuring that only registered disposal sites are used and records are maintained of all waste leaving site. • Training of staff on matters pertaining to hazardous materials that could be encountered on site and measures to be taken in case of a spill or road accident during waste transportation.	Safety & Training Senior Officer and Chief Environmental Officer
Emissions from equipment and vehicles	On Site all areas and off sites roads, impacting on the site and the surrounding areas	• Haul trucking limited to daylight hours; • Attention to haul vehicle design, avoid downward pointing exhausts; • Maintenance checks of all vehicles and equipment; • Use of modern well designed vehicles and equipment; and • Regular monitoring.	Chief Environmental Officer

Potential Risk	Area of impact	Mitigation Measures (DPM Commitments and Programs)	Responsible Parties
Dust from transport and vehicles on roads	On Site all areas and off sites roads, impacting on the site and the surrounding areas	• Control speed limits; • Haul trucking limited untill 22:00pm; • Ensure haul trucks are not overloaded and are covered where necessary; • Control of moisture content on haul road via sprinkling; and • Monitoring to ensure all dust emission are within international best practice limits.	Chief Environmental Officer
Road accidents	On Site all areas and off sites roads	• Control speed limits; • Ensure haul trucks are not overloaded and are covered where necessary; • Investigate reasons and implement more strict or new measures if need it. • Erect speed control signs • Community awareness • All measures are written in separate Traffic Management Plan	Safety & Training Senior Officer and Chief Environmental Officer
Diffuse run-off from roads, construction areas, IMWF and other disturbed areas may contain elevated concentrations of suspended solids or pollutants. Potential to impact water quality in the River Krumovista.	On Site impacting the site and the surrounding areas	• Ditches will channel surface water runoff to the IMWF sumps to be pumped to the water reservoir; • Maximum recycle of process waste water; • Construction of IMWF to avoid releases of decant and drainage water (both recycled back into process); • Runoff water from process site will be diverted to the IMWF sumps to be pumped to the water reservoir. Regular inspection and maintenance of sumps etc; and • Water monitoring will be conducted.	Chief Environmental Officer
Impact to surface water during flood.	On Site impacting the site and the surrounding areas	• A Flood Risk Assessment will be conducted.	Safety & Training Senior Officer

Potential Risk	Area of impact	Mitigation Measures (DPM Commitments and Programs)	Responsible Parties
Failure of Water Reservoirs could cause flooding and also pollution of surface water	On Site impacting the site and the surrounding areas	• Designed to base on current standard of engineering practice for dams.	Operations Director
Noise will be significant during construction.	On Site impacting the site and the surrounding areas	• Monitoring will be conducted; • Operating hours of the open pit activities only during the daily hours; • Speed restrictions on Site traffic; and • Workers provided with PPE.	Chief Environmental Officer
Potential Economic impact on household livelihoods	On Site and the surrounding areas	• Locals will be hired where possible; and • Implementation of a Livelihood Restoration Framework (LRF)	Community Liaison Officer
Loss of public amenities, hut and bungalows near the top of Ada Tepe		• Negotiation of a compensatory deal for the loss of public amenities with local authorities to ensure the provision of mutually beneficial compensation as an integral part of Company Social Package.	Community Liaison Senior Officer
Operations Phase			
Gas emissions from operating plant and operations (e.g. blasting) (projected quantities indicate it will not be significant and will be below maximum admissible concentrations)	On Site impacting the site and the surrounding areas	• Constant preventative emission control; • Use appropriate efficient blasting method and use explosives which generate lower level of toxic gas emissions; • Good design of plant and use of modern plant; and • Air quality monitoring.	Chief Environmental Officer
Dust from mining operations – drilling, blasting, ore crushing, stockpiling	On Site impacting the site and the surrounding areas	• Open pit engineering design to ensure less dust escapes and is captured in the void; • Consider the meteorological conditions; • Dust extraction system to be used on blasthole drill rig; • Water sprays on excavators etc; and • Workers provided with appropriate PPE.	Chief Environmental Officer

Potential Risk	Area of impact	Mitigation Measures (DPM Commitments and Programs)	Responsible Parties
Noise will be audible during the operation, mostly during the initial excavation until depth is reached, this is not expected to exceeded admissible limit values.	On Site impacting the site and the surrounding areas	• All mining equipment will be well maintained and comply with EU regulations; • Mining activities (excavation and haul trucking) and blasting only in daily hours; • Noise and vibration monitoring will be conducted in the neighbours and residential areas; • Open pit engineered to minimise noise and vibration; • Fit and maintain as much as possible silencing equipment to all plant and equipment ; • Install noise attenuation panels if needed; • Adopt best practice for blasting, avoid secondary blasting, assess monitoring data and adjust blast design if required; and • Maintain liaison with community.	Chief Environmental Officer and Project Manager
Closure Phase			
Potential economic contraction upon closure	Surrounding areas	• Plans will be established prior to closure to ensure that economic contraction does not occur.	Community Liaison Senior Officer

6.0 IMPLEMENTATION SCHEDULE

6.1 Review and Revision of this Management Plan

This Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of the Project. Revision of this Management Plan will be the responsibility of Operations Director, who is custodian of this Plan.

If material changes to operating procedures are required, this Management Plan may be updated on an "as required" basis.

Any revisions to this Management Plan will be uploaded to a Sharepoint or equivalent to ensure that all Project staff have access to the latest version of this Management Plan.

7.0 MONITORING

7.1 Overview of Monitoring Requirements

The Monitoring measures to be implemented during the all Project phases to assess compliance with Project Standards (see *Section 0 Regulatory Requirements*) are described in this section.

The proposed monitoring measures will ensure compliance with Project Standards.

7.2 Key Performance Indicators (KPI's)

The table below (Table 7-1) summarises the suggested mitigation commitments and programs and their monitoring indicators.

Table 7-1: Key performance indicators (KPI's)

Project Phase	Mitigation Commitments and Programs/Activities	Monitoring Indicators	Timeframe
Pre-construction	Written in Table 5-2 Summary of the CHSSP	Collected all baseline data and analyse the results	Until start of construction
Construction	Written in Table 5-2 Summary of the CHSSP	Total number of non-compliances with community health safety & security measures identified in *Table 4.1* of this Plan to be minimised.	On going
Operations	Written in Table 5-2 Summary of the CHSSP	Minimise grievance application number of community health safety & security complaints from local communities	On going
Closures	Written in Table 5-2 Summary of the CHSSP	Grievances and non-compliances with this plan to be zero	On going

8.0 TRAINING

The Community Liaison Senior officer will undergo the following training:

- Introduction to the company mission, vision, values and goals
- Introduction to the organizational structure, working environment, policies and practices
- Knowledge of rules for healthy and safety
- Development of skills for managing the effectiveness and efficiency of company processes
- Understanding leadership styles, managing conflicts and introduction to motivational techniques necessary for the effective organization of people
- Development of skills for problem solving and decision making
- Introduction to the communication channels of the company, development of techniques for giving feedback and managing the performance of employees

The Community Liaison Junior officers will undergo the following training:

- Introduction to the company mission, vision, values and goals
- Introduction to the organizational structure, working environment, policies and practices
- Knowledge of rules for healthy and safety
- Improvement of skills for better efficiency in work
- Improvement of team effectiveness and cooperation in work process
- Improvement of Presentation and Communication skills

Security personnel will undergo the following trainings:

- Healthy working conditions and Safety Knowledge of rules for healthy and safety
- Induction - Introduction to the working environment, policies and practices organizational structure, and Introduction to the company mission, vision, values and goals

DPM will communicate to the relevant public authorities its intent that the security personnel employed by them shall follow the guidelines as set out in the EBRD PR4 (23) and the Voluntary Principles on Security and Human Rights. DPM will ensure the security staff are trained adequately in the appropriate conduct towards the local communities and require to act under the applicable law. DPM will not sanction the any use of force unless it is used for preventative and defensive purposes in proportion to the nature and extent of the threat. Local communities will be made aware of the presence of the Security personnel on site and of their roles and responsibilities. DPM will ensure a grievance mechanism is in place for members of the communities to express their concerns or grievances regarding security conduct. The communities will be trained in how to place grievances and to whom.

9.0 AUDIT AND REPORTING

9.1 Auditing

Daily inspections will be carried out by operational area superintendents / supervisors covering a broad range of operational aspects, including community health safety and security issues as appropriate to activities outside the Mine Licence Area.

Any incidents identified during these inspections will be reported through DPM Krumovgrad Incident Report Form

Conformance will be monitored via annual internal audit program in accordance with DPM's existing Audit Programme in accordance with Integrated Management System (IMS).This will be undertaken to assess broad compliance with requirements of HSE management system (including ESIA and management plans).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the DPM Management System.

9.2 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with DPM's Data and Records Management System.

APPENDICES

APPENDIX 1

ENECE Safety Guidelines and Good Practices for Tailings Management Facilities

UNITED NATIONS **E**

Economic and Social Council

Distr.
GENERAL

ECE/CP.TEIA/2008/9
ECE/MP.WAT/WG.1/2008/5

12 August 2008

Original: ENGLISH

ECONOMIC COMMISSION FOR EUROPE

CONFERENCE OF THE PARTIES
TO THE CONVENTION ON THE TRANSBOUNDARY
EFFECTS OF INDUSTRIAL ACCIDENTS

Fifth meeting,
Geneva, 25–27 November 2008
Item 10 (b) of the provisional agenda

MEETING OF THE PARTIES TO THE CONVENTION ON
THE PROTECTION AND USE OF TRANSBOUNDARY
WATERCOURSES AND INTERNATIONAL LAKES

Working Group on Integrated Water Resources Management

Third meeting,
Rome, 22–24 October 2008
Item 5 (a) of the provisional agenda

SAFETY GUIDELINES AND GOOD PRACTICES FOR TAILINGS MANAGEMENT FACILITIES

Note by the Joint Expert Group on Water and Industrial Accidents

CONTENTS

CONTENTS *(continued)*

I. MANDATE

1. The Conference of the Parties to the Convention on the Transboundary Effects of Industrial Accidents and the Meeting of the Parties to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes mandated the Joint Expert Group on Water and Industrial Accidents to draw up safety guidelines and a summary of good practice for tailings management facilities[1]. This mandate is reflected in the Conventions' workplan for the Joint Expert Group on Water and Industrial Accidents (ECE/CP.TEIA/2006/9 and ECE/MP.WAT/2006/7 section III, paragraph 15) that was adopted by the governing bodies of both Conventions at their respective meetings (Rome, 15–17 November 2006, and Bonn, Germany, 20–22 November 2006).

2. Authorities, TMF operators and the public are invited to apply these guideline and good practices, which are intended to contribute to limiting the number of accidents at tailings management facilities and the severity of their consequences for human health and the environment.

II. INTRODUCTION

3. There is a growing body of evidence and understanding that environmental degradation of transboundary watercourses and/or international lakes can be caused by unintended large-scale transboundary movement of hazardous materials as a result of tailings management facility (TMF) failures.

4. Such failures from TMFs have contributed to transboundary pollution via mass movement of wastes (generally tailings containing heavy metals and hazardous and/or toxic compounds) as suspended solids and dissolved materials.

5. Pollution of such waterways and related damage or risk to human health, infrastructure

[1] In this guidelines, a **tailings management facility** (TMF) is intended to encompass the whole set of structures required for the handling of tailings including the tailings storage facility (TSF), tailings dam(s), tailings impoundment, clarification ponds, delivery pipelines, etc., where:

Tailings are the fine-grained waste material remaining after the metals and minerals recoverable with the technical processes applied have been extracted. The material is rejected at the "tail end" of the process with a particle size normally ranging from 10 μm to 1.0 mm.

A **TSF** is a facility used to contain tailings. This can include a tailings dam (impoundment and pond), decant structures and spillways. A TSF can also be open pits, dry stacking, lakes or underground storages

A **tailings dam** is a tailings embankment or a tailings disposal dam. The term "tailings dam" encompasses embankments, dam walls or other impounding structures, designed to enable the tailings to settle and to retain tailings and process water, which are constructed in a controlled manner.

A **tailings impoundment** is the storage space/volume created by the tailings dam or dams where tailings are deposited and stored. The boundaries of the impoundment are given by the tailings dams and/or natural boundaries.

and environmental resources has the potential to negatively affect relations between neighbouring countries.

6. Such risks are posed by TMFs in all categories: active, idle/inactive, neglected, temporarily or permanently closed, abandoned or orphaned. There is particular concern regarding the large number of neglected, abandoned or orphaned TMFs where active monitoring or maintenance is not undertaken.

7. A TMF represents a large capital investment and an integral part of mining and mineral processing activities. Its proper operation is a key factor in the overall successful operation of a mining project and its industrial processes.

8. The overall importance of TMFs to both the economic viability and social and environmental acceptability of any mining enterprise are often underestimated. Due to the fact that there is no direct financial return from the cost of design, construction, operation and rehabilitation of the tailings storage facility, it may be tempting to assign insufficient managerial and financial resources to the design, operation, management and/or closure of tailings dams.

9. Assigning low priority to the safety of TMFs has been shown to be a seriously flawed approach, as neglect of tailings dams has often been shown to be a major or significant contributing factor in the poor international record of tailings dam failures and incidents.

10. As accidents such as the tailings spill accident at Baia Mare (Romania, January 2000) have shown, failures and incidents at TMFs can have far-reaching consequences for the environment and environmental services to human health and to the social acceptance of mining activities.

11. Such failures and incidents can lead to significant costs for a company for items such as emergency response, clean-up and repairs, disruption of operation, damages claims, law suits, unscheduled closure works and the loss of company’s share value. As such, accident costs almost universally exceed the resulting costs for a company to have ensured proper and adequate levels of safety and control in order to prevent the incident.

12. The failure of a tailings dam in any part of the world now has the potential to rapidly impact the social acceptance and regulatory frameworks for all other operations of the company concerned and also for the mining industry in general. Industry reputation is an important prerequisite for the promotion of mining within national development strategies. Negative impacts of such industrial accidents can be severely exacerbated when transboundary effects are involved.

13. Such damage to industry reputation and national development strategies is a recurring theme in international circles and is exemplified by the increased awareness being raised throughout the world by the European Commission (through its Mine Waste Directive), the United nations Environment Programme (UNEP), the International Council on Metals and Mining (ICMM), the Mining, Minerals, and Sustainable Development (MMSD) Project, the

World Mines Ministries Forum (WMMF), the World Wildlife Fund (WWF) and the World Summit on Sustainable Development (2002). Such organizations are urging the mining and industrial sectors towards safe, sustainable development, which places a high priority on increased safety of tailings dams.

14. Such organizations also recognize the economic importance of the extractive industries to both national and local economies, including economies at all stages of development. Moreover, it is recognized that mining may constitute a first significant channel of foreign direct investment in some host countries and that in such instances the industry can serve a central role as a foundation for economic and social development.

15. The operation phase for a TMF can last many decades. Both mining and minerals processing are under constant evolution. Practices vis-à-vis design, operation and maintenance – as well as to regulation – of TMFs may evolve significantly during the life of a TMF.

16. Experience regarding the long-term behaviour and stability of TMFs after closure is still limited. In the context of tailings dams, long term is defined as 1,000 years, or more. While knowledge is constantly increasing, the majority of tailings dams closed and remediated to date (2007) were closed less than one or two decades ago. As such, practice can be expected to continually evolve.

17. The potential for both chronic pollution and acute risk associated with mine tailings deposits can be very long term. A significant number of examples exist where the remains of tailings and waste from mining operations conducted several centuries or even millennia ago still produce pollution in amounts that are harmful to the environment. This emphasizes the importance of proper operation and closure of today's tailings dams and waste dumps if unacceptable risks or negative impacts are to be avoided in the future.

18. It is recognized that many jurisdictions lack relevant regulations regarding issues related to abandoned and orphaned sites.

19. In recognition of the above, a substantial body of work has been performed by the global mining industry, geotechnical and related geotechnical sciences, international dam safety organizations, intergovernmental agencies and others – to generate guidelines for the building and operation of safe TMFs and their subcomponents – in particular, tailings dams.

20. In recognition of all of the above, in the context of the risk of accidents contributing to transboundary pollution affecting watercourses and international lakes, and to assist the national authorities and the operators in ensuring an adequate safety level at TMFs and an acceptable level of risk posed by such facilities, the UNECE member countries decided to draw up safety guidelines and good practices for tailings dams. These take the form of a set of recommendations that will contribute to the achievement of a basic level of safety for tailings dams.

21. The Joint Expert Group on Water and Industrial Accidents, through the established steering group with recognized expertise on tailings dams and transboundary accidents, drew up

the guidelines. It took into account input from authorities, operators of TMFs, financing institutions and non-governmental organizations (NGOs) during the workshop on safety of tailings dams held from 12 to 14 November 2007 in Yerevan.

22. The established steering group has based the guidelines directly upon the body of work produced by the global community of dam safety scientists, professional bodies and inter-governmental agencies. Notable among these is work by the European Commission, the International Commission on Large Dams (ICOLD), UNEP, ICMM and others. Regulating bodies such as the European Commission have also produced directives and regulations that influence TMF design and operation, and major financing bodies have developed safety assurance and design guidelines for their investments. Finally, a number of international instruments and guidelines on industrial accidents, chemicals management, environment impact assessment and public information on environmental risk are pertinent to the design and operation of TMFs.

23. The following are the recommendations and the key elements of UNECE guidelines and good practices for TMFs designed to prevent incidents at TMFs, with a key focus on tailings dams, and to limit the potential for negative impacts on environment, human health and infrastructure. They are based extensively on accepted and published good practice procedures to ensure conformity with international standards. Security concerns (e.g. sabotage, antagonistic actions.) and workers' safety are not within the scope of these guidelines; nevertheless, these are the concerns that should also be taken into account at all stages of the life cycle of TMFs.

III. PRINCIPLES FOR TAILINGS MANAGEMENT FACILITIES' SAFETY

24. Governments should provide leadership and create minimum administrative frameworks to facilitate the development, safe operation and decommissioning of TMFs.

25. The operators of TMFs have the primary responsibility for ensuring safety of TMFs and for formulating and applying safety management procedures, as well as for utilizing technology and management systems to improve safety and reduce risks.

26. Within the general scope of the relevant guidelines and good practice principles TMFs should be planned, constructed, operated and closed applying a case-by-case or site-by-site approach, as a result of varying climate and hydrology, topography, geology, tailings properties and other conditions.

27. Only competent – properly certified (in accordance with the national legislative, regulatory and safety management norms) – personnel should be engaged in the planning, design, construction, operation/management and closure of TMFs and the relevant competences should be described in the operation and management plan (see para. 57).

28. A systematic approach to managing TMF safety should be acknowledged by all stakeholders, and the high-quality life-cycle "planning – construction – operation – closure –

rehabilitation" approach should be ensured in all cases.

29. Understanding of processes in the life cycle of a TMF should be developed at the planning and design stage of the TMF, and should be further refined through practice and simulations.

30. The safety of TMFs depends especially on the individuals responsible for TMF planning and design (and approval), construction companies, operators, government and commercial inspectors, rescue services and professionals in closure and rehabilitation. Therefore, such persons should be adequately trained and qualified as well as certified when required.

31. TMFs should be operated in accordance with the construction, safety and environmental norms of the country concerned, taking into account internationally established best practice, and on the basis of an operating and management plan (operation manual) evaluated and accepted by the relevant competent authority, as appropriate.

32. TMFs should be classified based on a risk assessment taking into account parameters as specified in the annex to these guidelines.

33. Land-use planning, hydrological and geological considerations should be taken into account when evaluating optimum TMF placing and intended post-operational use.

34. For TMFs which pose a potential risk to neighbouring communities and land-uses due to their size or presence of hazardous materials, information to and involvement of these communities and individuals, in accordance also with internationally recognized procedures, should be ensured for the purpose of drawing up an emergency plan that the community understands.

35. Projects for TMF construction which have the potential to cause adverse environmental impacts across borders should be notified and consulted between Governments of neighbouring countries and the UNECE Espoo Convention and its provision to perform an environmental impact assessment should be applied.

36. TMFs should be operated in accordance with the provisions of the UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention). Where the subject of concern is of transboundary nature, the principles of the Almaty Guidelines on Promoting the Application of the Principles of the Aarhus Convention in International Forums (http://www.unece.org/env/pp/ppif.htm) should apply.

IV. RECOMMENDATIONS

37. These guidelines constitute a minimum set of requirements to ensure a basic level of safety for TMFs. They highlight aspects to be considered to achieve an acceptable level of safety through applying different policies, measures and methodologies. Nevertheless, owners and

operators are encouraged to apply additional procedures and safeguards in accordance with local assessments to achieve the highest practical level of performance of their TMF.

38. These guidelines should also be applied in the context of relevant national requirements and existing international guidelines, recommendations and standards concerning TMFs, and using internationally accessible information sources.

39. Below are recommendations to the UNECE member countries, competent authorities and TMF operators. The technical and organizational aspects, listed in the annex, are an integral part of these guidelines and good practices.

A. Recommendations to UNECE member countries

40. UNECE member countries should identify competent authorities at the national, subnational and local levels that are given access to the necessary human resources and professional competences for the tasks foreseen in these recommendations.

41. UNECE member countries should adopt and enforce adequate legislation for ensuring the safe construction, operation, maintenance and closure of TMFs, including legislation for handling abandoned and orphaned sites from past activities. They should also make appropriate institutional arrangements, through, inter alia, the establishment of a coordinating mechanism comprising key players concerned.

42. UNECE member countries should ensure that if not done so, national inventories of operational as well as closed, abandoned or orphaned TMFs that may constitute a risk to human health or the environment are elaborated and maintained. National inventories of closed, abandoned or orphaned TMFs should consider both current impacts and risks for future negative effects (accidents and spills).

43. UNECE member countries should share experience and information on good practice for TMF safety in all the phases of its life cycle on a regular basis.

B. Recommendations to competent authorities

44. Competent authorities should ensure that all relevant authorities involved in TMF safety should cooperate with each other, preferably within an integrated system in which one authority plays a coordinating role.

45. Competent authorities should notify their counterparts in neighbouring countries about the TMFs which in the event of an accident could cause transboundary effects.

46. Competent authorities should introduce authorization and/or a licensing procedure to permit the construction of a TMF.

47. Competent authorities should evaluate and approve the design, operations and

management plans (operation manual) drawn up by operators.

48. Competent authorities should verify and endorse the TMF monitoring performed by the operator (or his agent) so that it fulfils set quality standards.

49. Competent authorities should ensure that TMF operators develop internal emergency plans for TMFs with significant risks and that they provide necessary information to the public and to relevant authorities, and cooperate with relevant authorities on preparing external plans.

50. For TMFs with significant risks to outside communities, relevant authorities shall develop external emergency plans in association with operators, community groups, local authorities and rescue services, and apply these plans off-site in the event of accidents (see, for example the APELL process discussed in the annex).

51. Competent authorities should ensure that the internal and external emergency plans are reviewed and tested periodically and, where necessary, revised and updated.

52. Competent authorities should apply methodologies for risk identification and assessment of closed, abandoned or orphaned TMFs using a step-by -step approach, starting with a basic screening of sites, whereby resources are gradually directed towards sites with the highest risk.

53. Based on the risks identified, competent authorities should make plans for risk reduction measures and/or monitoring (early warning) for closed, abandoned or orphaned TMFs.

54. Competent authorities should ensure (i.e. organize or arrange) training of inspectors on an ongoing basis so that the inspections are performed effectively. In addition, non-mining professionals dealing with environmental impact assessment and land-use planning for mining projects should be trained on tailings issues.

55. Competent authorities should encourage and engage in a “train the trainers” programme at existing educational institutions, so that trainers attain the necessary capacity for training company and government staff. Where possible, use can be made of international training programmes offered by various national and United Nations institutions.

56. Competent authorities should ensure meaningful public participation and easy access to information in accordance with the relevant provisions of the Convention on the Transboundary Effects of Industrial Accidents, the Convention on the Protection and Use of Transboundary Watercourses and International Lakes and in particular the Aarhus Convention (see para. 36).

C. Recommendations to tailings management facility operators

57. All TMFs should have an operation and management plan (operating manual) that is available to all personnel, local inhabitants, government inspectors and other relevant stakeholders. All documents relating to planning, design and construction should be maintained

in an accessible way, with records kept permanently for future reference.

58. TMF operators should monitor the TMF in accordance with the operation and management plan as approved by the competent authorities.

59. TMF operators should draw up and implement internal emergency plans and apply them on-site whenever a tangible risk for major accidents to occur has been identified or an uncontrolled event occurs that could lead to a major accident or a major accident has occurred. TMF operators should review, test, revise and update the internal emergency plans periodically, and always when there has been a change in the mine operation and management.

60. The TMF operator should notify competent authorities in the event of emergencies that have occurred on the site.

61. TMF operators should cooperate with competent authorities and local communities in preparing external emergency plans.

62. TMF operators should train their personnel and reinforce and revise personnel's knowledge on safety, in particular on how to identify potentially harmful events and/or circumstances.

63. TMF operators should implement safety audits for their facilities and promote the use of environmental management systems based on international standards.

Annex

TECHNICAL AND ORGANIZATIONAL ASPECTS

I. PRE-CONSTRUCTION AND CONSTRUCTION

A. Licensing

1. There should be a system of licenses dependent on the risk assessment for the TMF. The assessment should be done by the operator and evaluated by competent authorities. The risk assessment will be done on the basis of the operation and management plan (operating manual) drawn up by the operator. (More information can be found below in section C on hazard identification and risk assessment.)

2. The licensing procedure should differentiate between:

(a) Basic authorization procedure;
(b) Authorizations involving public participation;
(c) Authorizations involving environmental impact assessment and public participation.

3. The complex procedure (c) should be applied for TMFs where:

(a) The waste facility contains waste considered hazardous (recommended classification and threshold quantities under EU Directive 91/689/EEC); or
(b) The waste facility contains substances and preparations classified as dangerous (recommended classification and threshold quantities EU Directive 67/548/EEC or 1999/45/EC); or
(c) A failure or incorrect operation can give rise to a major accident.

B. Environmental impact assessment and land-use planning

4. An environmental impact assessment (EIA) should be considered as a precondition for construction and operation of a TMF (see the recommendations above in the section on licensing). The EIA should address the potential physical impact of the TMF on the environment and should be open for general public and interested or affected persons to comment and provide input on the assessment and if there are prerequisites to object it.

5. The EIA should address:

(a) Location criteria: climate, general topography, regional geology, seismic hazard, environmental sensitivity, hydrology (ground and surface waters), local geomorphology;

(b) Tailings criteria: geochemical character of the tailings, physical and geotechnical character of TMF;

(c) Site criteria: downstream infrastructure, cadastral boundaries, potential underlying mineralization, site topography, hydrogeology;

(d) Management: tailings deposition method, water balance, method for managing storm events, monitoring;

(e) Closure: completion criteria, intended post-operational land use, long term physical, geotechnical and biological stability, as well as ecosystem rehabilitation, if appropriate;

(f) Evaluation of "O" solution/non implementation of the project.

C. Hazard identification and risk assessment

6. Before licensing the construction of a TMF a risk assessment should be performed. There are different ways to conduct a risk assessment and standard procedures are described in literature. To a lesser or greater extent they all include the five steps outlined below. These steps need to be taken by the applicant and the results should be evaluated by competent authorities. The process involves here also a sixth step, which is an evaluation of acceptability of risks.

Step 1 – Hazard identification

7. The applicant needs to evaluate possible hazards such as:

(a) Toxicity and eco-toxicity of tailings material;

(b) Hazards to the aquatic environment arising from other than toxic effects of tailings material (pH, COD, salinity, dispersed material);

(c) Flood hazards due to the free liquid in tailings dam;

(d) Physical/mechanical hazards due to the movement of solid material (slurry transport and/or liquefaction phenomena) in the event of an accident;

(e) Hazards resulting from soil contamination by tailings/sludge.

8. The hazards identified will decide the level of ambition needed in the further assessment.

Step 2 – Accident scenarios

9. The applicant should describe scenarios of possible failure modes and identify what could cause them. The scenarios need to consider: (a) possible extreme events at the TMF location (e.g. rain and snowfall, snowmelt, earthquakes, landslides, avalanches); (b) failures of already built structures (e.g. other dams) situated upstream, whose failure could cause domino effects; and (c) causes related to the TMF management and control including human error.

10. During scenario description, records of accidents and near-misses at similar TMFs should be considered. No plausible scenario should be excluded.

Step 3 – Identification of potential receptors

11. In this step the applicant needs to identify who and what can be affected assuming possible scenarios (failures). Aspects for consideration relate to environment (water, soil, and biota), humans (life, health and living conditions), economical losses of population (damage to infrastructure, property). Special attention should be directed to scenarios that can cause damage in a transboundary context.

Step 4 – Safety measures

12. The applicant needs to describe safety measures aimed primarily at the prevention of potential scenarios (causes of failures) as identified in step 2. Secondly, measures aimed at limiting the consequences/impact, should a failure still happen, should be described. The latter will include measures for preparedness (warning, alert and alarm systems) and emergency response plans. Cooperation between TMF operators, competent authorities and local authorities (the community) is recommended for emergency planning.

Step 5 – Impact assessment

13. The applicant needs to assess the impact/effects of possible scenarios on the potential receptors as identified in step 3. In doing so the safety measures proposed under step 4 should be considered and an evaluation should be made as to how they limit the potential impact/effects.

Step 6 – Risk assessment and evaluation

14. Finally, the applicant should also assess the probability of principal scenarios (potential failures) as described in step 2, taking into account the proposed safety measures and their reliability. In doing so, site specific or generic data should be considered and in the event of the lack of such data, expert judgement should be applied. In some cases it will be possible to quantify the probability, e.g. return periods for flood events; in other cases, it will only be possible to discuss low and high probabilities in general terms. The resulting risks are a combination of the probability that a certain scenario will take place and the potential impact if it does. The different scenarios (failure modes) studied can be presented in a matrix with probability on one axis and impact on the other.

15. In this step, the applicant should also make a judgement if the risks related to the different scenarios are to be considered acceptable. Such acceptability assessments will distinguish risks potentially ranging from low probability and low impact to high probability and high impact. It is useful to make a division into three classes of risk: green – acceptable; yellow – conditionally acceptable; and red – unacceptable.

16. If all the risks associated with the planned TMF are deemed acceptable (i.e. fall into the green class of risk) the applicant can go ahead with his application, including the safety measures proposed in step 4 or otherwise. In other cases, stricter design and operational criteria, more frequent monitoring and/or other risk reduction measures should be evaluated and proposed as relevant. If there are no economically feasible or technically available measures to reduce the risk to an acceptable level, the logical result should be an objection to the construction of the TMF. Under such circumstances, an alternative location for the TMF may be a feasible solution.

17. The final decision about the acceptability of risks will be part of the licensing procedure and should involve competent authorities and other stakeholders (e.g. involved community representatives, the public etc.)

D. Dam safety

18. While planning and designing a safe TMF, particular attention should be directed to:

(a) The tailings pond – the following parameters need to be assessed accurately:

(i) The stability of tailings (or other deposited material such as water treatment sludge);
(ii) Geological situation;
(iii) Hydrogeological situation;
(iv) Hydrological situation;
(v) Geophysical situation.

(b) The tailings dam – the following parameters need to be assessed accurately:

(i) The slope stability of the dam;
(ii) The strength and stability of the foundation for the dam;
(iii) The stability of the tailing material (induced liquefaction);
(iv) Erosion to the dam (suffusion and outside erosion);
(v) Water recovery systems;
(vi) Emergency spillways;
(vii) Slope sliding;
(viii) The tailings delivery system to and on/around the TMF
    a. Safety;
    b. Environmental protection.

19. The dam-raising method should be chosen with regard to the local conditions (e.g. seismicity, tailings composition, severe climate). Special attention has to be given to quality control and site supervision during the starter works construction phase of the TMF.

20. Additional impoundments should be designed to receive inflow from emergency outlets.

21. Hazardous substances and process water should be reused as far as technically possible

(recycling) and in case it is not possible to recycle hazardous substances, they should be neutralized before they are discharged into the TMF.

II. OPERATION AND MANAGEMENT

A. Management

22. The TMF should be operated and managed on the basis of an operation and management plan (operation manual) and waste management plan (if such is not part of the operation manual) evaluated and approved by the competent authorities, which is developed in the planning phase and progressively modified. Its aim is to effectively manage the risks and hazards at the TMF (or waste facility) in order to stay within the risk green class (see risk classification the previous chapter's section C, on hazard identification and risk assessment).

23. The operation manual should contain:

(a) A description of the tailings delivery system to and on/around the TMF (safety, environmental protection);
(b) A description of all monitoring procedures –mechanisms for investigations: sampling locations, sampling frequency, checklists and compliance parameters such as: minimum capacity/freeboard, pore pressure, groundwater level, functioning of the drainage system, surface water diversion, dam movement, slope stability;
(c) Procedures for reporting on non-compliance and failures;
(d) Corrective actions to be applied in the event of non-compliance;
(e) Internal emergency plan;
(f) Assessment parameters for effectiveness and suitability of the operation manual.

24. Any changes to the operation manual should be subject to its performance analysis, which should be documented.

25. The performance of the TMF should be assessed and described during significant seasonal events and the data gathered should be used for rehabilitation planning.

26. In the event of TMF acid rock drainage potential, the management plans should primarily be developed to prevent or reduce the production of acidic drainage, and secondarily to collect and treat the acidic water to meet permit conditions or relevant emission standards.

B. Education and training of personnel

27. The life-cycle approach to TMFs requires that personnel in a variety of different professions and institutions have a common understanding and knowledge of the technical and managerial aspects, and use complementary professional procedures in their work. This complementarity may require a certain level of training (and retraining) of various persons in

different institutions.

28. The personnel concerned should be identified along the “planning-design-construction-operation-decommisioning-rehabilitation” chain.

29. A variety of different professions is involved, including engineers and managers, planners, regulators, environmental and safety specialists, and monitoring and auditing staff. It is important to appreciate the importance of the two-way training – informing mining engineers of issues in environmental and safety management, and conversely, giving environmental personnel the insights needed to deal with TMF issues.

30. The following are among the subjects where adequate skills need to be built through training programmes and on-site experience:

(a) Technology and future trends in TMF design;
(b) On-site procedures for safe operation and risk management;
(c) Standards and regulations on TMF and for safety and environmental performance;
(d) Managements systems and tools, including corporate social responsibility (CSR);
(e) Measurements for operational and environmental quality;
(f) Environment (including basic hydrology) and health issues;
(g) Safety and environment auditing of the site and its facilities;
(h) Reporting, both internal and for public information;
(i) Communication.

31. The inherent uncertainties surrounding all potentially hazardous TMFs require special skills in risk assessment and management, but also in risk communication and reporting.

32. Inspectors will naturally have knowledge of design principles and of the current regulations. However they also need to develop a good understanding of operational and risk management practices for TMFs, as such facilities do not generate a revenue stream for the operating company and may therefore be neglected. More details on training of inspectors can be found in the next section.

33. Where TMFs are located in populated areas, communication and negotiation skills need to be built up to ensure that the public stakeholders are properly informed about (and involved in) decisions relevant to their interests. These interests often centre around social, environmental and economic issues for the local community which must be understood by managers and designers in particular, but also by inspectors and consultants.

34. Numerous avenues are already available for building the necessary broad-based competencies, especially through existing national education institutions and mining schools, nevertheless it is often very useful to first launch a “train the trainers” programme to bring all relevant staff up to a common level of understanding. Looking beyond existing national institutions, a number of online or correspondence courses are becoming available, and various

United Nations agencies have published self-learning manuals and train-the-trainers packages in subjects relevant to TMF management. Increasingly, international institutions and professional conferences also play a valuable role in promoting information exchange and learning. Wherever possible, training should focus on active, hands-on methodologies as the most effective means of training adults.

C. Education and training for inspectors

35. The inspectors should be trained in:

(a) New technologies;
(b) Standards and procedures;
(c) Corporate (environment and safety) management methods and tools, and corporate auditing;
(d) Monitoring and auditing standards for operations;
(e) Risk assessment and risk communication;
(f) Communication with operator personnel and the local community.

36. The training resources should be evaluated and augmented as necessary to provide the complete range of subjects and skills required for life-cycle TMF inspection.

37. The training should include simulations, practice, drills, role play, field exercises and discussing case studies of lessons learned. It should be an ongoing process and not a one-shot affair. Extensive material is available from United Nations agencies to support such events and programmes. Study tours of practices in other countries are also extremely valuable.

38. The training should be spread over time and be subject to reinforcement, revision and follow-up, with refresher courses provided at regular intervals.

III. INSPECTIONS

A. Facility inspections

39. Facility inspections should be performed by competent authorities at all phases of the life cycle of the TMF and should ensure that TMF operators are taking all the necessary steps to manage the safety of a TMF without posing any risk to the environment or human health. The inspectors should verify in particular if the TMF is managed in accordance with the legal and regulatory standards, as well as with the approved operation manual and waste management plan:

(a) *During the pre-construction and construction phase*: verification of the location for the waste facility; verification of assumed factors affecting design in the field; construction of the tailings dam;

(b) *During the operation phase:* verification that the physical stability of the waste facility is ensured and that pollution or contamination of soil, air, surface water or groundwater are prevented; verification of regular monitoring of immission and emission measurements; verification if failures were properly reported and proper corrective action were taken;

(c) *During closure and after closure:* verification that the physical stability of the waste facility is ensured; verification of the rehabilitation process, including its proper documentation;

40. If the management of the TMF does not follow the operation manual and/or waste management plan, the inspection authority should urge the operator to introduce corrective actions within a specified period, and if this is not done, to take back the operation permit.

IV. IDENTIFICATION, ASSESSMENT AND MANAGEMENT OF ABANDONED SITES

A. Assessment and priority tasks on abandoned sites

41. The abandoned or orphaned sites should be regularly inspected by competent authorities depending on the risk posed by the site as assessed in the initial screening.

42. The initial screening should include a walkover survey concentrating on TMF features such as the containment dam, the beach, the water management system and the hydrographic catchment area as well as vulnerability factors of nearby or downstream communities and land-use, and any important natural areas requiring special protection.

43. Public access to sites which present significant risks to persons and animals should be restricted.

44. The components, structures and parameters specifically considered for inspection and screening in the event of any signs of unusual behaviour should include the following:

(a) Geomorphological situation and catchment area (inflowing streams, size and topography of TMF catchment area, expected frequency and magnitude of flood events);
(b) Dam crest (materials used, irregularities, depressions, signs of erosion);
(c) Slope geometry (height, angle, berms);
(d) Containment dam slope condition (materials, vegetation, signs of erosion, seepages, slumping, active mass movements such as slumping, sliding or rotational failures);
(e) Lagoon condition (size relative to TMF, depth, geometry, vegetation, alien deposits such as litter);
(f) Water management system (existence and condition of drainages, bypasses, decantation plant, contingency/emergency spillways, pumps);
(g) Monitoring equipment (inter alia trigonometric points, survey targets, piezometers/standpipes)

(h) Historic incidents and accidents.

45. Depending on the result of the screening, the sites should be labelled from green to red classes of risk (“low risk”, “intermediate risk”, “high risk”)

46. Sites should be prioritized for a further detailed assessment based on the initial risk assessment. This assessment should lead to the development of a risk management strategy, which in some cases may be limited to monitoring, while other sites may require immediate action due to a non negligible probability of failure in the short term. The detailed assessment should include:

(a) Research on existing documentation;
(b) Detailed site surveys;
(c) Potential spot investigations;
(d) Calculations “back of the envelope” on probabilities of identified specific failure modes.

47. Starting with the highest risk sites, all risk sites should undergo appropriate investigation and data generation measures (e.g. topographical surveys). For each of them specific risk management programmes should be designed, tendered and contracted within a reasonable time frame. These risk management programmes will in some cases include plans for a full site remediation, while in other cases monitoring will be sufficient. Programmes can be divided in phases where the more acute risks are dealt with in the short term, and site remediation may come at a later stage.

B. Management of abandoned sites

48. The competent authorities should make an attempt to locate responsible party (former operator, landowner) for abandoned or orphaned sites and force them through legal actions to properly manage the site. In the event of long legal processes, the competent authorities should take required actions to prevent any disasters.

49. The management system for abandoned or orphaned sites should include the organizational structure, responsibilities, procedures and resources for determining and implementing the accident prevention policy:

(a) *Organizational structure*: competent authorities should be nominated to carry out the assessment and monitoring of abandoned or orphaned sites. They should be allocated adequate staff, technical means and budget to accomplish its mandate;

(b) *Identification and evaluation of hazards:* closed, abandoned or orphaned sites should be known and catalogued in an inventory containing their location and key characteristic and they should be labelled accordingly;

(c) *Monitoring and maintenance:* the sites should be monitored and maintained and remediation should be undertaken in the first place at those sites, where failures are likely or very likely to happen.

50. Removing or reengineering of sites will in most cases be very costly and should only be undertaken where appropriate risk reduction measures fail.

Note: Further guidance in dealing with abandoned sites, including the administrative machinery needed to address the management of such sites, can be found in the United Nations publication, *Identification and Management of Contaminated Sites – a methodological guide* (UNEP/ADEME 2005).

V. EMERGENCY PLANNING

51. Emergency plans should be established for each TMF for phases of construction, operation and closure. The appropriate emergency plan needs to be established prior to the issuing of permits for construction, operation or closure. Hence, they shall be drawn up within the periods set by local or international rules.

52. Emergency plans should be established, tested and revised by the TMF operator (internal plans) and by authorities (external plans), in particular:

(a) Prior to commencement of operations;
(b) If an accident or emergency situation occurred at the site or other similar sites;
(c) When the emergency service organization or its senior personnel was changed;
(d) After new technical knowledge becomes available or when new risks are identified;
(e) If design values are approached as a result of changes, or in the case of mismanagement, structural problems, equipment modification or natural events;
(f) At regular intervals as determined in the emergency plans themselves.

53. Among other things, the plan should evaluate downstream inundation hazards resulting from floods or dam failure, and upstream conditions that might result from major land displacements or increased flood flows. If applicable, the emergency plans should include inundation maps for the flows resulting from design floods and from possible failure of the dam.

54. Where there is a series of dams on the stream, analyses should be made considering the potential for progressive “domino” failure of the dams. To evaluate the effects of dam failure, maps should be prepared delineating the area which would be inundated in the event of failure. Analyses should be made to determine conditions which could be expected to result in slow, rapid or practically instantaneous dam failure.

55. The emergency plans, both internal and external, should include:

(a) The scope and objective of the emergency plan;

(b) Evaluation of emergency scenarios, risks, potentially affected areas, etc.;

(c) Responsibilities of each member of the organization (chain of responsibility and authority for actions to be taken);

(d) Organization of communication and notification procedures;

(e) Available equipment for interventions;

(f) Procedures for emergency response for each of the determined emergency scenarios;

(g) Procedures for remediation.

A. Internal emergency planning

56. Internal emergency plans should be developed for each specific site and situation. Emergency plans should be tested and evaluated through periodic drills as defined in each plan.

57. Prior to development of an internal emergency plan an analysis should be made to determine the most likely mode of dam failure under the most adverse conditions and the resulting peak water outflow following the failure. The analysis should also identify any chemical substances or other potentially polluting materials that might be released in event of a TMF failure.

58. Internal emergency plans should contain estimations of amounts and types of equipment needed to deal with polluting or dangerous releases as well as construction materials and equipment needed for emergency repairs of the TMF based on the structural, foundation and other characteristics of the dams. Provisions should also be made for clean-up of any material that might be released from a TMF.

59. Internal emergency plans should be compatible with external emergency plans of the competent public authorities, and should be activated in a coordinated fashion in the event of a major accident.

60. Plans for notification of key personnel, local authorities and emergency services and the public must be an integral part of the emergency plan and should be prepared for all types of dam failure conditions.

61. The internal emergency plans should be part of the company’s operating and management plan (operating manual), and should be regularly reviewed by senior management. Corporate personnel responsible for emergency management must be clearly identified to all staff on the site, and on-site personnel must receive adequate training for emergency procedures and incident reporting.

B. External emergency planning

62. External emergency plans should be prepared and implemented by the relevant authorities, conform to local needs and vary in complexity in accordance with the type and degree of occupancy of the potentially affected area. Where a TMF is identified as a substantial risk in such plans, the internal and external emergency procedures must be compatible.

63. The local community should be given the opportunity to participate in the preparation and revision of the external emergency plans, and to partake in any exercises that might be carried out. The local community should be entitled to express comments within reasonable time frames and due account should be taken of these comments.

64. It should be ensured that in border areas the contingency plans of two regions of neighbouring countries are compatible with each other and include contact details to allow proper notification of any emergencies that might occur. Ideally, the local communities and competent authorities of such neighbouring countries are given the same rights to participate in preparation and revision of the compatible external emergency plans.

Note: It should be recalled that the United Nations- approved process of "Awareness and Preparedness for Emergencies at the Local Level" (APELL process) has been developed to guide the preparation of external emergency plans. A version of APELL specific to mining has been developed jointly by UNEP and the mining industry.

C. Emergency planning for abandoned sites

65. The competent authorities should develop emergency plans for abandoned and orphaned sites, considering the above regarding internal and external emergency planning. Before developing the plans, which capabilities and responsibilities already exist should be verified:

(a) Existing regional emergency response frameworks, such as civil protection, fire brigades, flood response;

(b) Emergency response plans in place for a coordinated regional/transboundary response;

(c) Clear command structure and management of interfaces between concerned authorities;

(d) Existing models of scenarios for mining accidents and their integration into the community emergency plans.

VI. REFERENCES TO DOCUMENTATION ON MINING AND TAILINGS

66. A large amount of literature is available on tailings and tailings management. Some of the more relevant have been selected here, with emphasis on sources that offer access to readily available online documents and references, as these are often more accessible to readers with limited financial resources to purchase books.

67. Where possible, relevant United Nations documents have been highlighted, as these have often been subject to extensive international review prior to publication.

68. Finally a number of reference works published by industry or professional associations have been included.

69. Some of the sources below provide links to the primary references, but do not stock the full documents.

Note: Even the sources below that are not fully up to date can still provide valuable insights, information and further links.

General sources of information:

Mining Association of Canada (MAC; www.mining.ca).

Mineral Resources Forum (MRF; http://www.mineralresourcesforum.org/): Contains overview of main issues. Extensive literature on TMF and cyanide.

Good Practice Mining (http://www.goodpracticemining.org/). Case studies and guidelines on good practice in mining, including TMF.

Catalogue of United Nations documents on minerals development (http://www.natural-resources.org/minerals/CD/index.htm).

A general review of issues affecting the mining sector was published in several editions of the discontinued journal *Mining and Environment*, the last edition also being available in electronic form (http://www.mineralresourcesforum.org/library/bookreviews/ie2000.htm).

The International Commission of Large Dams (www.icold-cigb.net/) is an international non-governmental organization that provides a forum for the exchange of knowledge and experience in dam engineering. ICOLD has published authoritative bulletins concerning tailings dams.

The European Union Reference Document, “Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities” (http://eippcb.jrc.es/pages/FActivities.htm).

Directive 2006/21/EC of the European Parliament and Council of 15 March 2006 on the management of waste from extractive industries (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:102:0015:0033:EN:PDF)

Authorities in Australia, Canada and South Africa have published guideline documents on tailings management. Relevant regulations from these countries are available from the relevant national institutional websites.

An excellent set of very easy-to-read "Best Practice Guidelines" is available from the Australian Government at: http://www.unep.fr/pc/mining/library/library.htm.

The International Council on Metals and Mining (ICMM) has produced a range of good publications (see http://www.icmm.com/library_pubcats.php).

References on **cyanide** can be found in the MRF website (see above) or on the website of the International Cyanide Code (www.cyanidecode.org)

For safe handling of cyanide and other chemicals during minerals processing, the OECD Guiding Principles are especially useful (http://www1.oecd.org/scripts/ehs/guidingprinciples/index.asp).

The references on **emergency preparedness and response** can be found on the UNEP APELL website see http://www.unep.fr/pc/apell/publications/pdf_files/pub-catalog-APELL.pdf . This includes the useful handbook on APELL in the mining sector (http://www.uneptie.org/pc/apell/publications/publication_pages/apellmanual.html). (available in English and Russian)

Other useful sources are also listed at: http://www.icmm.com/sitewide.php?kw=APELL and http://www.icmm.com/sitewide.php?kw=emergency
The new report on case studies in emergency response can be found at: http://www.icmm.com/library_pub_detail.php?rcd=184

A handbook on **hazard identification** in a local community can be found on the APELL website above. See http://www.uneptie.org/pc/apell/publications/publication_pages/hazardid.html

Identification and Management of Contaminated Sites – a methodological guide, (UNEP/ADEME 2005).

The International Association for Impact Assessment (IAIA)brings together researchers, practitioners, and users of various types of impact assessments worldwide (www.iaia.org/).

The International Organization for Standardization ISO 9000/ISO 14000 · Specific applications (www.iso.org/).

The Global Reporting Initiative – (GRI) develops and disseminates globally applicable "Sustainability Reporting Guidelines" for voluntary use by organizations reporting on economic, environmental, and social performance (www.globalreporting.org/).

Corporate social responsibility (CSR) is a concept whereby organizations consider the Global Reporting Initiative's Sustainability Reporting Guidelines (see: en.wikipedia.org/wiki/Corporate_social_responsibility).

For **training**, a number of publications have been produced by UNEP and other partners. Some of these can be found at: http://www.unep.fr/pc/mining/library/library.htm Training in other areas such as EIA and Environmental Management Systems (EMS) is sponsored by the appropriate sectoral associations. UNEP has also produced trainers' manuals on EIA and EMS. The The International Cyanide Management Institute (ICMI) trains prospective auditors in various aspects of cyanide management including TMF (www.cyanidecode.org).
