

SECTION D: ENVIRONMENTAL AND SOCIAL CONSTRUCTION MANAGEMENT PLANS

CHAPTER D21 – MINE CLOSURE FRAMEWORK

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21 MINE CLOSURE FRAMEWORK

21.1 INTRODUCTION

As part of the development of the Oyu Tolgoi Project, a *Mine Closure Management Plan* is being developed. This document sets out the objectives, principles and standards against which that Plan is being developed and in the absence of that Plan being completed, sets out key Oyu Tolgoi commitments with regard to mine closure.

In accordance with the Rio Tinto Corporate Closure Standard, the intent of the Mine Closure Management Plan is to ensure that the Oyu Tolgoi Project is left in a condition which minimises adverse impacts on the human and natural environment, and that a legacy remains which makes a positive contribution to sustainable development. A central principle in the Plan will be to return the maximum amount of disturbed land to conditions suitable for nomadic herdsman and their grazing animals. Another key principle in the Plan is to ensure that, at any time, if the Project is forced to closed for any unforeseen reason during its operational lifetime (either permanently or temporarily) prior to the planned permanent closure date, that there will be sufficient funds available to ensure that all necessary closure management and monitoring activities can be undertaken.

Once completed, the Plan will describe Oyu Tolgoi's objectives with respect to the mine closure, the standards and regulatory requirements to be met with regard to mine closure and the actions that will be undertaken taken to achieve these and to prevent or minimise adverse impact from the mine site. The Plan will include a description of the monitoring plans which will be put in place to determine the effectiveness of management and mitigation actions.

The Mine Closure Management Plan is currently in development and is planned for completion in mid-2012. This Framework Plan outlines the principles and objectives that will form the basis of the Mine Closure Management Plan that is currently under preparation.

21.2 VISION AND OBJECTIVES

The closure vision for Oyu Tolgoi is to leave a positive social, environmental and economic legacy at eventual closure.

21.2.1 Short-Term Objectives

Oyu Tolgoi's short-term reclamation objectives (during construction and operations) can be summarised as follows:

- Progressively reclaim disturbed areas as soon as they are no longer active;
- Minimise the risk and impact of wind and water erosion and sediment transportation;
- Stabilise slopes;
- Restore drainage; and
- Cover ground to prevent soil drifting/dust.

21.2.2 Long-Term Objectives

The long-term objectives are to:

- Reclaim the land to a condition where long-term environmental degradation does not take place with minimal care and maintenance;
- Reclaim the land to a condition where safety risks associated with the mine to the public are minimised;
- Reclaim the land to a condition where local communities can use the site without inheriting significant future liability;
- To the extent practical, create an aesthetically pleasing environment;
- Ensure public health and safety is protected; and

- Minimise adverse socio-economic impacts and provide positive social-economic benefits.

21.2.3 Objectives of the Mine Closure Management Plan

The *Mine Closure Management Plan* will:

- Outline the regulatory and good practice standards with regards to mine closure (both national and international standards) with which Oyu Tolgoi will comply;
- Define Oyu Tolgoi requirements and procedures to guide Oyu Tolgoi management and contractors;
- Define mitigation programmes to manage and minimise adverse impacts;
- Define monitoring and reporting procedures; and
- Develop details of closure cost.

21.3 REGULATORY REQUIREMENTS AND OTHER STANDARDS

Set out below is an outline of the applicable standards and requirements.

21.3.1 Mongolian Regulatory Requirements

Article 37 of the Minerals Law of Mongolia (2006) outlines the restoration and management obligations of mining license holders. These obligations include the requirement to develop mine reclamation plans within the Environmental Protection Plan (EPP), which is a component of the approved Environmental Impact Assessment¹. The EPP is required to include measures to minimise environmental impacts and reclamation including backfilling, re-grading and re-vegetation to achieve designated post-mining uses.

The Minerals Law also requires a mining license holder to deposit funds equal to 50% of its environmental protection budget for the particular year into a special bank account established by the State central administrative agency in charge of the environment. The environmental protection deposit funds are to be used if a mining licence holder fails to fully implement the environmental reclamation measures. The agency will then use the funds to complete reclamation work and the licence holder would be responsible for any additional funds required. If the licence holder complies with all the obligations of the EPP, the deposited funds are returned to the licence holder. The agency may halt mining activities in accordance with the approved EPP.

Mongolian National Standards applicable to mine closure and reclamation are as follows:

- MNS 3597:1983 Environmental Protection: Hydrosphere. General requirements for surface and groundwater protection against fertiliser pollution;
- MNS 3342:1982 Environmental Protection: Hydrosphere. General requirements for groundwater protection against pollution;
- MNS 3297:1991 Environmental Protection: Soil. Norm and quantity of soil hygienic indicators for settled areas;
- MNS 4586:1998 Aquatic ecosystem quality indicators. General requirements;
- MNS 4920:2000 Environment: Technical requirements for destroyed land slopes;
- MNS 4943:2000 Water Quality: Waste water. Effluent standard;
- MNS 0900:2005 Environment: Human health protection and security. Hygienic requirements for drinking water and its control;
- MNS 5885:2008 Acceptable concentration of air pollutant elements. General technical requirements;
- MNS 5914:2008 Environment: Land reclamation. Terms and definitions;

¹ Eco-Trade (2006), Oyu Tolgoi Project Environmental Impact Assessment, Volume 3 Mining and Processing, Eco-Trade LLC 2006

- MNS 5915:2008 Environment: Classification of land destroyed due to mining activities;
- MNS 5916:2008 Environment: Requirements for fertile soil removing and its temporary storage during the earth excavation;
- MNS 5917:2008 Environment: Reclamation of land destroyed due to mining activities. General technical requirements; and
- MNS 5918:2008 Environment: Re-vegetation of destroyed land. General technical requirements.

These standards include rehabilitation, soil conservation, air quality and water quality standards that are applicable to mine closure and reclamation. Oyu Tolgoi is committed to ensuring that these standards are complied with during the design, construction and operational phases of the Project and the requirements of these standards are incorporated within this plan.

21.3.2 International Guidelines & Standards

In addition to adherence with applicable legal obligations, Oyu Tolgoi is committed to conducting project mine closure and reclamation activities in line with international best practices, as outlined below:

International Finance Corporation Guidelines

IFC Environmental, Health and Safety Guidelines for Mining² (Section 1.4) include the following best practice recommendations for mine closure:

- Preparation of a Mine Closure Plan
- The Mine Closure Plan will be designed so that:
 - Future public health and safety are not compromised;
 - The after-use of the site is beneficial and sustainable to the affected communities in the long term; and
 - Adverse socio-economic impacts are minimised and socioeconomic benefits are maximised.

The mine closure and rehabilitation plan will clearly identify allocated and sustainable funding sources to implement the plan. Closure and post closure plans will include appropriate aftercare and continued monitoring of the site, pollutant emissions, and related potential impacts. The duration of post closure monitoring will be defined on a risk basis; however, site conditions typically require a minimum period of five years after closure or longer.

EU Mine Waste Directive

The EU Mine Waste Directive³ applies to waste resulting from the extraction, treatment and storage of mineral resources and the working of quarries. While this directive is not directly applicable to Oyu Tolgoi, it does represent some best practice and Oyu Tolgoi is committed to comply with the provisions set out by this directive. Requirements of the directive which are considered applicable to Oyu Tolgoi are as follows:

Extractive industry waste facilities

When a new waste facility is built or an existing one modified, the [competent authority] must ensure that the following measures are taken:

- the facility must be suitably located;
- its physical stability must be ensured and soil, air and water pollution prevented;
- it must be monitored and inspected by competent persons; and

² IFC (2007). Environmental Health & Safety Guidelines for Mining, International Finance Corporation, 10 December 2007.

³ Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries

- arrangements must be made for the closure of the facility, the rehabilitation of the land and the after-closure phase.

Waste facility operators must provide a financial guarantee before the beginning of operations so as to ensure that the Directive's obligations are covered and to ensure the existence and availability of funds to restore the site when the facility is closed.

A waste facility is regarded as finally closed when the competent authority has carried out a final inspection, assessed the reports submitted by the operator, confirmed that the site has been restored and given its approval. After closure, the operator must maintain and monitor the site for as long as the competent authority considers necessary. The costs of these measures are, in principle, borne by the operator.

The requirements of the EU Mine Waste Directive will be covered under the *Mine Closure Management Plan*, the *Waste Management Plan*, and for the operations phase also by the *Waste Rock Management Plan* and the *Tailings Management Plan*.

21.3.3 Rio Tinto Standards

Rio Tinto has a corporate closure standard (the "Closure Standard") for its mining operations⁴. The Mine Closure Management Plan will comply with this Closure Standard. All Rio Tinto managed activities, including exploration projects, order of magnitude, pre-feasibility, and feasibility studies are required to adopt and comply with as many of the clauses in the Standard as are required to ensure withdrawal from a project or study in a manner that meets the intent of the Standard.

The intent of the Closure Standard is to ensure that Rio Tinto managed activities are left in a condition which minimises adverse impacts on the human and natural environment and that a legacy remains which makes a positive contribution to sustainable development. Rio Tinto's assessment of performance in terms of closure and post closure planning and implementation is defined within the context of the Rio Tinto Group sustainable development policy. Accordingly, this standard seeks to influence the design, development, operation and closure of all Rio Tinto managed operations so as to ensure the optimisation of post closure outcomes in terms of social, environmental and economic development needs and expectations.

Specifically it is intended that this Standard will result in improved closure and post closure planning and implementation as indicated by:

- Improved scoping of closure in order to improve accuracy of Group closure cost estimates;
- Minimum costs of closure compatible with the objective of responsible social and environmental closure;
- Integration of closure planning into business plans resulting in reduced actual costs of closure over the long-term;
- Recognition and realisation of positive legacies for local communities and lower exposure to future potential negative legacies;
- Increased host community ownership for post operational outcomes; and
- Enhanced reputation.

This will be accomplished through:

- Planning from project inception to ensure that closure is incorporated into project design;
- Commencement of provision for closure at project onset, followed by regular review and updating of the provision;
- Regularly reviewing and updating the scopes of closure strategy and plans;

⁴ Rio Tinto Closure Standard. V4. October 2010.

- Ongoing implementation and stronger linkages between the outcomes of closure planning and core business plans, including mine plans and all other applicable planning documents;
- Integrated and accurate scoping of all aspects of the work required; and
- Development of strong and credible relationships with all stakeholders by consulting fully both internally and externally to increase levels of input and ownership.

21.4 CLOSURE COSTS

Closure costs will be accounted for in line with the Rio Tinto Closure Standard. Oyu Tolgoi has estimated mine closure costs throughout the operational life of the Project and will accrue mine closure cost provisions on an annual basis. This will ensure that the accrued closure provision meets the costs of a planned closure event, whether permanent or otherwise, at such time as it occurs. In the event of temporary and/or unplanned mine closure, Oyu Tolgoi will develop and agree with the applicable Mongolian regulatory authorities a care and maintenance regime, the costs for which would be covered by Oyu Tolgoi's own cash reserves and cashflows.

The closure cost estimate, as reported in the Project financial statements, will be updated annually during the operation's life to reflect known developments, including scope changes, the effect of a further year's inflation, exchange rate differentials and new regulatory requirements. Closure cost estimation procedures will ensure that identified post-closure costs, whether ongoing or one-off, are realistically estimated and incorporated into the estimate.

Progressive rehabilitation is undertaken on an ongoing basis during construction and is planned, budgeted and permitted on an annual basis as part of the Environmental Protection Plan agreed with the Ministry of Nature, Environment and Tourism. Progressive rehabilitation is built into operations plans and budgets and will also be subject to annual planning, budgeting and permitting.

The details of the approach adopted by Oyu Tolgoi concerning financial provisioning for planned permanent closure and unplanned temporary closure are as follows:

21.4.1 Cost Provisions for Final Mine Closure

Oyu Tolgoi's approach to the estimation and management of costs related to the final closure of the Oyu Tolgoi mine at the end of the operational mine life comprises the following:

- A provision for mine closure costs on Oyu Tolgoi's balance sheet to be determined in accordance with International Financial Reporting Standards including appropriate actuarial assumptions;
- A commitment to comply with the following applicable environmental and mine closure requirements under Mongolian law:
 - Article 37 of the Minerals Law of Mongolia (2006) outlines the restoration and management obligations of mining licence holders for the closure of a mine. These obligations include the requirement to develop mine reclamation plans within the Environmental Protection Plan (EPP). The EPP must include measures to minimise environmental impacts and reclamation including backfilling, re-grading and re-vegetation to achieve designated post-mining uses and the EPP must be approved by the applicable Mongolian authorities; and
 - The Minerals Law also requires a mining license holder to deposit funds equal to 50% of its environmental protection budget for the particular year into a special bank account established by the Ministry of Nature Environment and Tourism. The deposited environmental protection funds are to be used if a mining license holder fails to fully implement the environmental reclamation measures. The Ministry would then use the funds to complete reclamation work and the license holder would be responsible for any additional funds required. If the license holder complies with all the obligations of the EPP, the deposited funds are returned to the license holder.
- An Oyu Tolgoi commitment to review, monitor and update mine closure plans and costs on a yearly basis ("Annual Mine Closure Assessment"). The Annual Mine Closure Assessment will provide (i) an ongoing estimated date of closure ("Mine Closure Date") (ii) an update of the

estimated cost of mine closure (“Mine Closure Cost”) and (iii) as presented further below an assessment of the date by which Oyu Tolgoi will start setting aside cash contributions against the Mine Closure Cost (“Closure Contribution Date”);

- The Closure Contribution Date will be the earlier of (i) 7 years before the Mine Closure Date and (ii) the date on which Oyu Tolgoi forecasts aggregate post finance cash flows from such date to the Mine Closure Date falls below x2 the Mine Closure Costs; and
- From the Closure Contribution Date, Oyu Tolgoi will commit to making cash contributions in priority to shareholder dividend payments ensuring that a dedicated mine closure reserve account is funded by the Mine Closure Date in an amount equal to the Mine Closure Cost by making equal annual cash contributions (the determination of which will take account of interest on the funds in the mine closure reserve account). To the extent that cash flow in any year is insufficient to meet the required annual contribution, any shortfall shall be made up in the following year. The cash contribution shall also be adjusted to reflect any change to the Mine Closure Cost.

Temporary/ Unplanned Mine Closure

Oyu Tolgoi will give a commitment to comply with an agreed care and maintenance regime if there is an unplanned closure of the mine at any time. From a financial perspective, it is expected that there will be sufficient cash within Oyu Tolgoi (e.g. from cash balances and payments received on concentrate sales made before closure) not only to cover care and maintenance obligations but also, together with proceeds from the sale of Oyu Tolgoi’s realisable assets, to meet any closure costs. Oyu Tolgoi will ensure that any spending on care and maintenance and closure costs is prioritised, ahead of other costs, in the event of an unplanned closure.

21.5 PREPARATION OF THE MINE CLOSURE MANAGEMENT PLAN

A previous (and preliminary) version of the Mine Closure Management Plan was prepared as part of the Mongolian Feasibility study in 2009⁵. In addition to this, Oyu Tolgoi prepares a quarterly closure cost estimate as part of the financial reporting requirements for the parent company, Ivanhoe Mines Ltd as a Canadian listed company.

Oyu Tolgoi has commissioned AMEC to prepare an updated Mine Closure Management Plan as part of the Detailed Integrated Development and Operations Plan (DIDOP). This will update the plan included in the Mongolian Feasibility Study, incorporate the most recent mine planning data and integrate Mongolian regulatory requirements, Rio Tinto standards and practices and Lender requirements – specifically the EU Mine Waste Directive (2006/21/EC) and the IFC Environmental, Health and Safety Guidelines for Mining.

The Mine Closure Management Plan will be prepared and submitted as part of the operations-phase management plans and will be subject to the review and the approval of the Project Lenders.

21.5.1 Development of the Closure Planning and Implementation Strategy

The Mine Closure Management Plan will be developed based on the Integrated Development and Operations Plan (IDOP) closure date as the planning basis (i.e. the 27-year mine life discussed in the ESIA). The Plan will be developed using a series of workshops to bring together AMEC, Rio Tinto and Oyu Tolgoi expertise and experience.

Key activities that will be undertaken to develop the Plan include:

- **Options workshop:** to identify closure options and develop a strategy to identify and develop the preferred closure option taking into account social, environmental and economic implications;
- **Risk assessment workshop:** to identify risks associated with the preferred closure option(s) and to develop mitigation programme to manage risks to acceptable levels as defined in the Rio Tinto Closure Standard;

⁵ Mongolian Feasibility Study, Oyu Tolgoi Project, 2009. Oyu Tolgoi.

- **Closure cost estimation:** to develop an estimate of mine closure costs, including the construction, demobilisation, demolition, removal and remediation of all plant facilities as well as all other ongoing remediation activities. The closure cost estimate will include direct and indirect costs and will be within a typical order of magnitude study cost range of -30/+30%. Cost categories will include:
 - Site rehabilitation and restoration;
 - Dismantling;
 - Workforce retrenchment;
 - Socio-economic activities;
 - Post-closure management & monitoring;
 - Administration;
 - Other costs as defined by engineering studies; and
 - Contingency.

21.5.2 Scope of Issues Addressed

The Mine Closure Management Plan will cover all facilities owned and operated by Oyu Tolgoi, at the time of mine closure. This will include:

- Underground mining:
 - Underground workings and equipment;
 - Surface openings; and
 - Surface subsidence area.
- Open pit mining:
 - Potential use of the pit for waste disposal and storage;
 - Slope stability; and
 - Pit access and mining benches.
- Materials handling:
 - Crushers;
 - Conveyors; and
 - Vehicles.
- Processing facilities;
- Buildings and surface infrastructure:
 - Buildings;
 - Site access roads;
 - On-site access roads;
 - On-site power lines;
 - Water supply borefield and pipeline; and
 - Borrow pits and quarries.
- Waste management centre;
- On-site water management facilities:
 - Industrial water supply; and
 - Potable water supply.

- Mine waste management:
 - Waste rock dumps; and
 - Tailings storage facility.
- Undai river diversion;
- Other potentially impacted areas;
- Community initiatives;
- Economic initiatives; and
- Local and regional opportunities at closure.

21.5.3 Types of Closure Events Covered

The Mine Closure Management Plan will cover the full range of closure events:

- Unexpected mine closure (either temporary or permanent);
- Progressive rehabilitation through the life of the mine; and
- Permanent closure.

21.5.4 Socio-Economic Initiatives at Closure

The Mine Closure Management Plan will set out:

- Initiatives with local communities;
- Broader economic initiatives; and
- Plans to maximise local and regional opportunities at closure.

21.5.5 Post Closure Monitoring

The Mine Closure Management Plan will set out:

- Physical stability monitoring:
 - Open pit and subsidence area;
 - Mine site and disturbed areas;
 - Waste rock dumps;
 - Tailings storage facility;
 - Undai river diversion; and
 - Site security features.
- Chemical stability:
 - Open pit and subsidence area;
 - Mine site and disturbed areas;
 - Waste rock dumps;
 - Tailings storage facility; and
 - Undai river diversion.
- Environmental impacts and anticipated mitigation, management measures and associated monitoring;
- Expected maintenance requirements;
- Monitoring of community initiatives; and
- Monitoring of socio-economic activities.

21.5.6 Closure Costs

The Mine Closure and Reclamation Plan will set out information on closure costs in terms of:

- Closure cost estimate summary;
- Basis of the estimate;
- Opportunities related to closure costs and financing; and
- Financial assurance.