

SECTION D: ENVIRONMENTAL AND SOCIAL CONSTRUCTION MANAGEMENT PLANS

CHAPTER D8: WASTE CONSTRUCTION MANAGEMENT PLAN

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8 WASTE MANAGEMENT

8.1 INTRODUCTION

This Waste Construction Management Plan is designed to ensure the control and minimisation of potential sources of waste during the construction of the Oyu Tolgoi Project. The plan describes the proposed measures that will be used to protect affected environmental and social receptors from adverse impacts associated with the generation of Project waste. The plan recognises that the generation of waste is inevitable on a mining project and sets out a systematic approach for the management of wastes in line with good practice procedures.

The plan establishes guidelines for the management of project wastes, including identification of applicable Project Standards, mitigation controls and monitoring programmes. It also includes the management of inert waste rock generated during construction, which primarily relates to rock generated from the general surface excavation works. Rock from the construction of the underground mine shafts will be stockpiled and ultimately fed into the ore stream. There is no mine waste rock generated during construction; the operational phase management plans will include a waste rock management plan to address waste rock from the open pit, and which will be developed in accordance with EU Directive 2006/21/EC.

8.2 OBJECTIVES

The objectives of this Management Plan are to:

- Outline the applicable standards with regards to waste management;
- Identify potential sources of impact from waste for the different phases of the Project;
- Define the operational procedures for waste management;
- Define roles and responsibilities;
- Describe waste management facilities;
- Define monitoring/auditing and reporting procedures; and
- Define training commitments.

8.3 SCOPE

The Oyu Tolgoi Project is committed to comply with various environmental standards which are managed through the Management Plans as described in *Chapter D1: Environmental and Social Management Plan (ESMP) Framework*. The ESMP Framework sets out the management framework for a suite of topic-specific Management Plans for the following phases of the Project (see *Chapter D1: ESMP Framework* for the definition of these phases):

1. Construction Phase
2. Operations Phase

This Waste Management Plan is part of the suite of Construction Phase Management Plans. The plan covers all Construction Phase activities that have the potential to generate waste (see Section 8.4 for further details). This includes the management of rock generated during the construction of the underground mine (which will be stockpiled until it can be processed) and other inert materials generated from excavation works (note that a dedicated waste rock management plan will be developed in due course to address management of waste rock during the operational phase).

Particular reference is made here to the following Management Plans that have direct cross-linkages to waste impacts:

- *Chapter D20: Construction Emergency Response Plan* (e.g. in relation to wastes generated during an abnormal incident);
- *Chapter D6: Flora and Fauna Construction Management Plan* (e.g. in relation to scavenging animals);

- *Chapter D18: Construction Community Health, Safety & Security Management Plan* (waste issues associated with population influx beyond the Project boundary fence e.g. additional strain on already inadequate waste management facilities at Khanbogd);
- Plans within the Oyu Tolgoi Health and Safety Management System (e.g. management of hazardous wastes);
- *Chapter D2: Atmospheric Emissions Construction Management Plan* (in connection with gaseous emissions from waste incinerators);
- *Chapter D7: Water Resources Construction Management Plan* (for discharge of liquid wastes);
- *Chapter D5: Petroleum and Fuels Construction Management Plan* (disposal of waste hydrocarbons); and
- *Chapter D12: Hazardous Materials Construction Management Plan* (disposal of waste chemicals and other hazardous materials).

8.4 SOURCES OF IMPACT

Waste generation during the Construction Phase will include domestic and industrial/construction solid and liquid wastes. Both hazardous and non-hazardous waste will be generated within the Mine Licence Area, and during the construction/upgrade of roads used by the Project, construction of the borefield and water supply pipeline, the construction of the Project infrastructure between the Mine Licence Area and the Mongolia/China border and construction of the temporary domestic airport.

Table 8.1 provides a summary of the primary sources of waste associated with the Construction Phase. They are also described in *Chapter C4* of the ESIA.

- *Chapter C4: Topography, Landscape, Geology and Topsoils Impact Assessment*, Section 4.5.3 (Waste Rock Dump and Tailings Storage Facility) and *Chapter C8: Population and Influx Impact Assessment*, Section 8.1.6 (community solid waste); and
- *Chapter C2: Climate and Air Quality Impact Assessment* (emissions from waste incineration).

The potential impacts associated with waste, if poorly managed, include:

- Contamination of soil and water resources;
- Resource wastage due to poor segregation of recyclable wastes;
- Visual impact/unsightly areas;
- Impact to animals (if allowed to scavenge);
- Human health impacts (if the site is either unsecure or hazardous wastes are not properly contained); and
- Air emissions from the waste incinerator (see *Chapter D2: Atmospheric Emissions Construction Management Plan*).

Waste rock generated from the construction of the underground shafts and other general excavation works may have the potential to be acid forming. If acid-forming, waste rock will be stockpiled in a clay lined facility and run-off collected/allowed to evaporate. This waste rock will be dealt with through the Operational Phase Waste Rock Management Plan

Table 8.1: Main sources of waste during Construction Phase

Waste Category	Primary Sources	Types of Waste	Typical Waste Disposal Route
Domestic wastes. Non-hazardous	Kitchens, accommodation blocks and offices	Paper and packaging, food wastes, glass, plastic and cans.	Recycled: Paper and packaging, glass, plastic and cans. Landfill: Food wastes
Domestic wastes. Hazardous	Kitchens, accommodation blocks and offices including Khanbogd Camp	Cleaning products, paints, toner cartridges, fluorescent lights and batteries.	Recycled: Toner cartridges. Stockpiled: Fluorescent lights and batteries <i>Stored for future incineration in new incinerator: Paint, solvents</i>
Industrial wastes. Non-hazardous	Workshops, construction sites, earthworks	Wood, uncontaminated soil and rock, packaging, concrete, scrap metal, drums.	Reused: Drums, wood, scrap metal (<i>some may be recycled</i>). Recycled: Packaging Fill: Uncontaminated soil and rock, concrete
Industrial wastes. Hazardous	Workshops, construction sites, earthworks, refuelling areas, maintenance areas	Spent oil/chemical containers, contaminated earth/rock, fuels and solvents, oily rags, paint, vehicle batteries, tyres, incinerator ash.	Recycled: Vehicle batteries (<i>stored until recycling route found</i>) spent oil (<i>if not recyclable then use in heating plant</i>), Reused: Tyres. Landfill: Incinerator ash Landfarm: Contaminated soil and rock Incinerator: Chemical containers, fuels, oily rags <i>Stored for future incineration in new incinerator: Paint, solvents</i>
Wastewater	Kitchens, accommodation areas, mine dewatering, surface run off	Sewage water (black and grey waters) and sludge from kitchens, accommodation blocks and other work areas, including Khanbogd Camp. Dewatering for the mine (during removal of overburden, excavations for the primary crusher and mine shafts). Surface water run-off (in the event of rainfall)	Reused: Sewage water (treated), dewatering and run-off Landfill: Sewage sludge (from wastewater treatment)
Medical and laboratory waste	Medical and laboratory facilities	Spent chemicals, bandages and non-combustible medical waste e.g. syringes and other sharps.	Disposal to Ulaanbaatar non-combustible medical waste e.g. syringes and other sharps (<i>once the new incinerator is completed sharps to be disposed of to the incinerator</i>) Incinerator: bandages and other combustible medical waste Landfill: Spent chemicals

8.5 PROJECT STANDARDS

8.5.1 Overview

Applicable waste standards and guidelines, as outlined below, specify procedures or standards for the collection, segregation, storage, treatment and disposal of wastes.

Mongolian Standards

- The Mongolian Law on Household and Industrial Waste, 2004 which regulates the collection, transportation, storage, reuse and disposal to landfill of household and industrial waste;
- Law on Hazardous and Toxic Chemicals, 2006 which addresses the import, export, transportation, storage, use, and control of toxic chemicals. It imposes measures to prevent the impact of toxic and hazardous substances on human health and the environment;
- Government Resolution #135 of 2002 which addresses the procedures of the classification, collection, packaging, transportation, treatment, storage, and disposal of the Hazardous Waste.
- Joint resolution #A-320/305 of Ministry of Environment and Tourism and Ministry of Health of 2011 which address the procedures of the disposal of medical wastes; and
- Ministry of Environment and Tourism Resolution # 404 of 2006 which address the procedure of the disposal, landfill of the individual and legal entity and landfill and disposal of the waste.

International Standards and Guidelines¹

- IFC EHS Guidelines for Mining, 2007;
- IFC General EHS Guidelines, 2007 (general construction wastes);
- EU Directive 99/31/EC, 1999 (on the landfilling of waste);
- EU Directive 2000/76/EC of 4 December 2000 (on the incineration of waste);
- WHO Safe Healthcare Waste Management: Policy Paper and fact sheet No 281, (Health-care waste management);
- Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal Convention (the Basel Convention, ratified by Mongolia in 1997); and
- US EPA standards CFR 258 (Criteria for Municipal Solid Waste Landfills) adopted by the Project. Specific requirements in relation to incineration and landfill are provided below.

During construction, Oyu Tolgoi is managing mineral waste management in accordance with applicable standards and its Mineral Waste Management Plan, which is being finalised for operations.

Incineration

Open burning of wastes is prohibited under a range of applicable standards (e.g. US EPA CFR 258) and is not permitted on the Oyu Tolgoi Project.

Combustible hazardous wastes (e.g. oily rags and oil filters) and medical wastes are disposed of in a waste incinerator. This is in line with applicable standards (e.g. the WHO Safe Health Care Waste Management policy paper). For the standards applicable to the waste incinerator see the Air Emissions Construction Management Plan. The current small incinerator which has been used to date on the site is not fully compliant with EU Directive 2000/76/EC of 4 December 2000 given that there is no continuous monitoring port on the incinerator (the documentation indicates that it does operate in accordance with residence time and temperature). The new incinerator which will replace this will be able to comply with the requirements of this directive.

¹ Note that Directive 2006/21/EC on the management of waste from extractive industries, 2006 (the Mining Waste Directive) relates primarily to waste rock and tailings management during mining operations and hence is of limited relevance to this construction management plan. However, this Directive will be addressed in the operational phase Waste Rock Management Plan.

Materials permitted for incinerations are:

- Oily rags;
- Oil filters; and
- Medical waste (not sharps).

Materials not permitted to be incinerated are:

- Chlorinated solvents (due to the risk of dioxin generation unless a temperature of 1,100°C and a residency time of 2 seconds can be attained); and
- Sharp medical waste (until the new incinerator is available).

8.6 LANDFILL

The Project has committed to meeting the design and operational standards of US EPA CFR 258 for the permanent landfill facility (to be built for the operational phase) that is designed to receive non-hazardous wastes. In this regard it is noted that:

- The existing temporary non-hazardous waste pits do not meet international standards (e.g. US EPA CFR 258 or EU Directive 99/31/EC of 26 April 1999), but these will be phased out (see WM21 below) when the new “Waste Management Centre” facility becomes available in August 2012. Once closed the temporary pits will be remediated and validation testing undertaken to ensure that the area is free of contamination. This validation testing will focus on soils, as previous investigations in the vicinity have demonstrated that there is no shallow groundwater in the area due to the thick clay cover. The Project will enact to its best ability all elements of this plan through the existing temporary facility whilst it continues to operate.

The waste management procedures applicable to the two landfills are as follows (note that the Waste Management Centre conforms to all applicable waste management plans):

Temporary non-hazardous landfill facility: WM05, WM08, WM09, WM15, WM20 (part), WM21.

Waste Management Centre: WM05, WM08, WM09, WM15, WM20, WM22.

- The design and operational requirements of US EPA CFR 258 (see WM22 below) are broadly comparable to the requirements defined in EU Directive 99/31/EC. There are minor design differences in detail between the two standards, however these are not considered material, particularly considering the nature of the material to be disposed of the landfill and the presence of the underlying cretaceous clay. In summary the landfill design chosen essentially conforms with the level of environmental protection required under EU Directive 99/31/EC.
- Due to the arid climate at the site and the general lack of moisture expected in the waste material, and from recharge, leachate from the landfills is anticipated to be minimal. Therefore the most efficient and environmentally acceptable approach to the treatment of any leachate will be to contain it and allow it to evaporate in leachate ponds. During the winter months the landfill and leachate will be in a frozen state and no leachate will be produced until the thaw. As the landfill and leachate thaw the release of leachate into the leachate pond for evaporation will restart.

8.7 GENERAL APPROACH TO WASTE MANAGEMENT

The Project will comply with applicable national laws on waste management and the international standards as outlined above. In meeting these obligations the Project will adopt the waste hierarchy approach under which management options will be evaluated in the following sequence to minimise the amount of waste generated for final disposal:

- **Reduce:** Where possible, the generation of wastes will be avoided. This requires the operator to use a product to avoid wastage;
- **Reuse:** As far as practicable, potential wastes will be reused. This requires the user of a material to appreciate how often a material can be reused for its original purpose or for an alternative use by others, with or without reconditioning. This includes the reuse of wood and metal by the local communities;

- **Recycle:** There are currently limited facilities for recycling in Mongolia although this situation is expected to improve. Materials or goods that are waste but cannot be reused can often be recycled i.e. paper, wood, metal, plastic, and glass. This recycling may occur on the site, in the immediate communities or in the region;
- **Segregation:** Segregation of inert, hazardous and non-hazardous wastes will be carried out. Segregation of materials such as wood, metal, plastic and inert materials will be the initial targets as this may provide benefits such as cost savings for waste disposal and benefits to the community;
- **Recovery:** If neither reuse nor recycling can be carried out, materials will be considered for recovery as a last resort; and
- **Send for disposal:** Where none of the above is possible, the waste can be sent for disposal at a controlled on-site disposal location, in this case the Oyu Tolgoi Waste Management Centre. Landfilling a waste is only to occur when all other options have been exhausted.

Detailed waste management controls are described in *Table 8.2*.

Wherever possible waste will be segregated at source in the residential and office areas four different colours of wheelie bins are used.

- Blue – all kind of plastics;
- Red – can and glass;
- Yellow – sheet papers; and
- Green – residual waste.

Industrial waste is segregated at their sources into:

- Used waste oil & grease;
- Oil contaminated rags;
- Timber waste;
- Waste metal;
- Concrete waste;
- Plastics;
- Cardboard;
- Paint containers; and
- Chemicals residue (paints, adhesive materials, etc.).

The local waste producer/contractor will provide different bins for each type of industrial waste. Segregated waste is transported to the waste management centre by the waste producers. Until the waste is recorded and accepted at the waste management centre, the producer is responsible for the waste.

All waste from off-site camps will be returned to the Oyu Tolgoi waste management centre, unless an agreed recycling route direct from the camp is approved and adequately controlled by Oyu Tolgoi. The Khanbogd landfill will not be used as it is not considered adequate at present. Oyu Tolgoi is working with the *Soum* Government to develop an adequate and appropriate landfill for Khanbogd that will remove the practise of dumping waste on open ground around the *soum* centre. This will result in significant environmental and health & safety benefits to the local community. All sewage waste from the worker camp in Khanbogd is returned to Oyu Tolgoi's wastewater treatment plant. The treated wastewater is then reused and the sewage sludge disposed of to the Oyu Tolgoi landfill within the Mine Licence Area.

8.8 ROLES & RESPONSIBILITIES

In addition to the specific responsibilities identified in *Table 8.2* below, general responsibilities for the management of waste are defined below. Overall lines of responsibility between Oyu Tolgoi and the

contractors are described in *Chapter D1: ESMP Framework*. More specifically the following roles and responsibilities apply in relation to waste:

The Oyu Tolgoi Environment Department

- Overall responsibility for the implementation of this Management Plan;
- Provide technical support to Oyu Tolgoi Departmental Managers to ensure that they understand the waste management procedures and waste classifications;
- Provide guidance to contractors on the applicable standards, waste management procedures, waste classifications, and appropriate mitigation controls; and
- Have Environmental officers who will ensure all Oyu Tolgoi Departments, Principal Contractors (and their sub contractors) meet the requirements outlined in this plan through a programme of periodic audits and fortnightly waste management inspections at every work place producing waste.

Other Oyu Tolgoi departments

The managers of the relevant Oyu Tolgoi departments including Procurement, Warehouse/Supply, Maintenance, Construction, and Health, Safety Environment and Security ensure that relevant activities within their department are in accordance with this plan.

Principal Contractor (contracted directly by Oyu Tolgoi)

- Coordinate and manage wastes in accordance with this plan and ensure standards are met and wastes correctly classified and disposed of; and
- Develop their own waste management plans and inspection procedures, consistent with the requirements outlined in this plan, prior to the commencement of works where waste generation is expected.

Workplace supervisors (typically a nominated contractor representative overseeing a particular task)

- Provide oversight to ensure waste management controls and segregation measures are in place; and
- Prevent practices that might lead to environmental or safety incidents.

8.9 MITIGATION MEASURES AND MANAGEMENT CONTROLS

The mitigation measures and management controls that are to be implemented during the Construction Phase to minimise the impacts from waste are described in the table below. Contractors are required to incorporate the measures outlined in the table below within their own working procedures. Contractor plans will demonstrate compliance with requirements listed below.

In accordance with **IFC General Environmental, Health and Safety Guidelines (April 2007)** (the Principal Contractor(s) will be required to develop Waste Management Plan(s) for construction outlining as a minimum:

- Regulatory requirements and classification;
- Responsible parties;
- Types and volumes of waste anticipated;
- Waste avoidance and minimisation measures;
- Waste re-use measures;
- Where avoidance, minimisation or re-use on-site is not possible, options for recycling, treatment or disposal of the waste including proposed final destinations;
- Means of collection, transport, labelling and temporary storage of wastes prior to transport off-site;
- Specific measures for the management of hazardous waste;
- Procedures for recording waste transfers through the development of a waste tracking and documentation system; and

- Awareness training for staff and contractors.

Only appropriately licensed waste contractors shall be used by the contractor in order to ensure Project waste is transported and treated and/or disposed at appropriately designed and licensed facilities.

Table 8.2: Mitigation Measures and Management Controls - Waste Management

ID	Topic/ Aspect	Applicability/ Activity	Control Description	Responsible Parties	Means of verification	Comments
WM01	Waste management planning	All waste generating construction activities	The Project will have a suite of mutually compatible construction waste management plans developed by Oyu Tolgoi. Plans shall adopt the principles of the waste hierarchy outlined in D8 'Waste Construction Management Plan' and incorporate all applicable requirements detailed in this document.	Principal contractors Oyu Tolgoi Env. Dept	Contractor plans to be approved by Oyu Tolgoi	
WM02-a	Waste management practices	Collection and storage of waste	Separate bins for food waste, metals, paper, cardboard and other waste will be located throughout the accommodations complex, service complex, process plant, underground shops, and other facilities on site for immediate sorting of domestic waste.	Oyu Tolgoi and Principal contractors	Audit and inspection programme	See audit requirements in section 9
WM02-b	Waste management practices	Collection and storage of waste	Steel bins and dumpsters will be located at each major facility for the collection of burnable and non-burnable materials and recyclable wastes such as scrap metal, timber, tyres, and unsalvageable equipment.	Oyu Tolgoi and Principal contractors	Audit and inspection programme	See audit requirements in section 9
WM02-c	Waste management practices	Collection and storage of waste	Containers will be labelled to identify only those wastes for which they are suitable.	Oyu Tolgoi and Principal contractors	Audit and inspection programme	See audit requirements in section 9
WM03	Waste management practices	Collection and storage of waste	Appropriately licensed waste contractors shall be used by the Contractor in order to ensure Project waste is transported and treated and/or disposed at appropriately designed and licensed facilities.	Oyu Tolgoi Env. Dept	Audit and inspection programme	
WM04	Waste management practices	Collection and storage of waste	Employees of Oyu Tolgoi and Contractors to Oyu Tolgoi responsible for waste management activities shall be provided with toolbox training. Additional, specialist training shall be provided to plant operators and key personnel involved in activities which involve the segregation, storage, haulage or treatment of waste. Hauliers of waste will have appropriate training and hauling will be undertaken in a manner that prevents inadvertent release of wastes or recyclables en-route.	Oyu Tolgoi Env. Dept	Audit and inspection programme	
WM05-a	Waste management practices	Litter Control	Fencing of the waste management facilities (temporary and permanent) will be provided to ensure that waste is not blown out of these facilities.	Oyu Tolgoi Env. Dept and Principal	Site inspections	

ID	Topic/ Aspect	Applicability/ Activity	Control Description	Responsible Parties	Means of verification	Comments
				Contractors		
WM05-b	Waste management practices	Litter Control	Site clean-ups will be undertaken as and when required to keep the site tidy; however these are considered a secondary action to the primary no-litter policy.	Oyu Tolgoi Env. Dept and Principal Contractors	Site inspections	
WM06-a	Waste management practices	Collection and storage (domestic waste)	Food wastes will be collected by the catering contractor from the food waste bins in the accommodation complex, service complex, and other facilities and immediately placed and sealed in plastic bins.	Principal contractors (CIS) Oyu Tolgoi Env. Dept	Waste inspections Waste manifests	
WM06-b	Waste management practices	Collection and storage (domestic waste)	General domestic wastes will be collected in wheelie bins for transfer to the Oyu Tolgoi landfill (and later to the WMC).	Principal contractors (CIS) Oyu Tolgoi Env. Dept	Waste inspections Waste manifests	
WM07	Waste storage/ collection facilities	Storage of waste	Suitable protection from rainfall and sunlight will be provided for waste which may be impacted by (or impact on) rainfall and sunlight, while they are awaiting collection.	Oyu Tolgoi Env. Dept and Principal Contractors	Audit programme	
WM08	Waste management practices	Domestic waste disposal	Non-hazardous solid waste will not be disposed of together with waste rock or overburden.	Oyu Tolgoi Env. Dept	Waste audits and visual inspections at the rock dump	
WM09	Waste management practices	Waste disposal – open burning	Open burning of solid wastes, whether hazardous or non-hazardous, will be prohibited	Principal contractors	Inspection and audit programme	
WM10-a	Waste management practices	Recyclable Waste/ waste minimisation	Oyu Tolgoi will consult with the community on the demand for any recyclable products such as scrap metal, cardboard and wood which may have a value or a use locally	Oyu Tolgoi CRSD Department Oyu Tolgoi Environmental Department	Minutes form community meetings Waste manifests (quantity of recycled wastes)	

ID	Topic/ Aspect	Applicability/ Activity	Control Description	Responsible Parties	Means of verification	Comments
WM10-b	Waste management practices	Recyclable Waste/ waste minimisation	Oyu Tolgoi will consider commercial options for recycling; if recycling facilities are available and accessible on a commercially-justifiable basis, waste will be recycled. Plastic, steel and cardboard recycling programmes are in place.	Oyu Tolgoi CSP Department Oyu Tolgoi Environmental Department	Minutes form community meetings Waste manifests (quantity of recycled wastes)	
WM10-c	Waste management practices	Recyclable Waste/ waste minimisation	As part of its waste reduction procedures Oyu Tolgoi will reduce the use of small plastic water bottles through the installation of a bottled water dispensing system, allowing water dispensers to be available in the workplace.	Oyu Tolgoi Environmental Department	Waste manifests (quantity of recycled wastes)	
WM11-a	Waste management practices	Collection & storage (hazardous waste)	Waste tyres, vehicle batteries and empty oil drums generated from the Oyu Tolgoi (and any other) maintenance workshops are stored separately from other wastes. Non-recyclable hazardous waste will be carefully stored or disposed of by means of appropriate and lawful disposal route.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme	
WM11-b	Waste management practices	Collection & storage (hazardous waste)	Waste batteries will be transported to a designated storage area, stored on pallets located above an impermeable base and collected by a licensed contractor as available (availability of such a contractor is currently being assessed by Oyu Tolgoi). Nickel, cadmium and lead acid batteries to be stored separately.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme	
WM12-a	Waste management practices	Collection & storage (hazardous waste)	All hazardous wastes which are combustible will be disposed of through the incinerator (for emissions from the incinerator see the Air Emissions Construction Management Plan).	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme (review of waste manifest)	
WM12-b	Waste management practices	Collection & storage (hazardous waste)	Waste oils and solvents will be stored in separate drums on pallets, on paved areas equipped with secondary containment and protected from the weather. Drums will be clearly labelled with their contents. Secondary containment systems (in the case of liquid waste where >220 litres is stored) which have the capacity to hold 110% of each individual waste container or 25% of the overall waste volume, will be used.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme (review of waste manifest)	

ID	Topic/ Aspect	Applicability/ Activity	Control Description	Responsible Parties	Means of verification	Comments
WM12-c	Waste management practices	Collection & storage (hazardous waste)	Waste oils will not be stored for extended periods in underground sumps; tanks and sumps will be emptied and inspected regularly for any signs of cracks or holes. The findings of the inspection will be recorded; any cracks or holes will be repaired, and any repairs conducted will be recorded.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme (review of waste manifest)	
WM12-d	Waste management practices	Collection & storage (hazardous waste)	As far as practical, waste oils will be reused. If waste oil is not of suitable quality for onsite use, it will be collected by a licensed contractor for offsite recycling; copies of contractor licenses will be retained onsite. If recycling is not possible it will be incinerated or used in the boilers.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme (review of waste manifest)	
WM12-e	Waste management practices	Collection & storage (hazardous waste)	Spill cleanup and fire extinguishing equipment will be available in the storage area, and personnel will be trained in its use.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme (review of waste manifest)	
WM12-f	Waste management practices	Collection & storage (hazardous waste)	There will be no onsite disposal of waste oils. Solvents will be directed to the soil surface or storm water collection system.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme (review of waste manifest)	
WM12-g	Waste management practices	Collection & storage (hazardous waste)	Volatile wastes will be stored in ventilated areas.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme (review of waste manifest)	
WM13-a	Waste management practices	Collection & storage (hazardous waste)	Wastes will be labelled in relation to contents and chemical compatibility.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme Review of training records/ competency	

ID	Topic/ Aspect	Applicability/ Activity	Control Description	Responsible Parties	Means of verification	Comments
WM13-b	Waste management practices	Collection & storage (hazardous waste)	Access to waste storage areas will be restricted to qualified personnel.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme Review of training records/ competency	
WM13-c	Waste management practices	Collection & storage (hazardous waste)	Waste storage areas will be clearly identified and marked on facility maps/plans.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme Review of training records/ competency	
WM13-d	Waste management practices	Collection & storage (hazardous waste)	Waste storage areas will be inspected and findings documented.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme Review of training records/ competency	
WM13-e	Waste management practices	Collection & storage (hazardous waste)	Emergency plans will be in place for hazardous waste storage areas.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme Review of training records/ competency	
WM14-a	Waste management practices	Contaminated Soils	Hydrocarbon contaminated soils will be excavated and placed within a dedicated area for storage and treatment.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme Post spill monitoring	
WM14-b	Waste management practices	Contaminated Soils	Other potentially contaminated soils that cannot be remediated by land farming (or other feasible treatment) will be placed within the tailings impoundment for encapsulation within the tailings.	Oyu Tolgoi Environmental Department and Principal Contractors	Audit programme Post spill monitoring	

ID	Topic/ Aspect	Applicability/ Activity	Control Description	Responsible Parties	Means of verification	Comments
WM15	Waste management practices	Operation of non-hazardous landfill	Suitable soil cover material will be used for intermediate and final cover (minimum of 30 cm depth).	Oyu Tolgoi Environment Department Waste management facility supervisor	Records Auditing	IFC EHS guidance for Waste Management Facilities
WM16-a	Waste management practices	Laboratory Waste	Liquid wastes from the laboratory will not be disposed of down sinks, to the ground or storm water drainage system.	Oyu Tolgoi Environment Department Principal Contractors Laboratory Staff	Audit programme	
WM16-b	Waste management practices	Laboratory Waste	Liquid wastes will be collected for temporary storage and disposal at waste management centre.	Oyu Tolgoi Environment Department Principal Contractors Laboratory Staff	Audit programme	
WM16-c	Waste management practices	Laboratory Waste	Non-liquid wastes will either be incinerated or if appropriate sent to the landfill for disposal.	Oyu Tolgoi Environment Department Principal Contractors Laboratory Staff	Audit programme	
WM17-a	Waste management practices	Disposal of medical Wastes	Wastes from the medical centre will be segregated into sharp and non-sharp waste.	Oyu Tolgoi Environment Department Principal Contractors	Audit programme Waste manifest	

ID	Topic/ Aspect	Applicability/ Activity	Control Description	Responsible Parties	Means of verification	Comments
				Medical Staff		
WM17-b	Waste management practices	Disposal of medical Wastes	Once the new incinerator is installed sharp waste will be incinerated under the supervision of the medical staff at the site incinerator.	Oyu Tolgoi Environment Department Principal Contractors Medical Staff	Audit programme Waste manifest	
WM17-c	Waste management practices	Disposal of medical Wastes	Non-sharp waste will be incinerated under the supervision of the medical staff at the site incinerator.	Oyu Tolgoi Environment Department Principal Contractors Medical Staff	Audit programme Waste manifest	
WM18-a	Waste management practices	Transportation	Hauliers will provide receipts or other confirmation that recyclables and wastes were disposed at authorised, approved facilities.	Oyu Tolgoi Env Dept Principal Contractor Haulage and Earthmoving Contractor	Inspections and waste transfer documentation	
WM18-b	Waste management practices	Transportation	Drums, bins, receptacles, and dumpsters used for storage of waste will be selected based on waste material requirements, prevention of wildlife attraction (steel or heavy-duty plastic containers), and transport requirements (truck, forklift).	Oyu Tolgoi Env Dept Principal Contractor Haulage and Earthmoving Contractor	Inspections and waste transfer documentation	
WM18-c	Waste management practices	Transportation	All wastes leaving the site will be properly loaded, secured and have a manifest which describes the properties and volumes.	Oyu Tolgoi Env Dept Principal Contractor Haulage and Earthmoving	Inspections and waste transfer documentation	

ID	Topic/ Aspect	Applicability/ Activity	Control Description	Responsible Parties	Means of verification	Comments
				Contractor		
WM19-a	Waste management practices	Documentation	A waste register will be developed to record the quantity of wastes generated, locations, risk category (hazardous or non-hazardous), disposal methods, details of contractors and vendors, and quantities of wastes recycled, incinerated or sent to landfill. The reduction of material consumption (through waste minimisation initiatives) will also be recorded. Records will be collected from the relevant departments and kept centrally at the HSES Department.	Oyu Tolgoi Env Dept Principal Contractors	Audit of Waste records	
WM19-b	Waste management practices	Documentation	The amount and type of waste produced is recorded. This data will be summarised on a quarterly register.	Oyu Tolgoi Env Dept Principal Contractors	Audit of Waste records	
WM19-c	Waste management practices	Documentation	The Oyu Tolgoi Environmental Department will be responsible for preparing and filing Waste Transfer Notes for any wastes leaving the site which details the following: <ul style="list-style-type: none"> ▪ Nature of waste; ▪ Waste classification; ▪ Waste volume; ▪ Date of collection; ▪ Disposal route; and ▪ Details of haulier. 	Oyu Tolgoi Env Dept Principal Contractors	Audit of Waste records	
WM20-a	Waste management practices	Operation of non-hazardous landfill	Operational requirements for the non-hazardous landfill include: <ul style="list-style-type: none"> ▪ Implementation of procedures to prevent hazardous wastes being disposed of to the facility including: <ul style="list-style-type: none"> ○ training of facility management personnel to recognise hazardous wastes. ○ inspections (including inspection records) E274+E251. 	Oyu Tolgoi Environment Department Waste management facility supervisor	Records Auditing	
WM20-b	Waste management practices	Operation of non-hazardous landfill	Daily coverage of waste with earthen material to a minimum thickness of 10cm.	Oyu Tolgoi Environment Department Waste management facility	Records Auditing	

ID	Topic/ Aspect	Applicability/ Activity	Control Description	Responsible Parties	Means of verification	Comments
				supervisor		
WM20-c	Waste management practices	Operation of non-hazardous landfill	Methane monitoring and Waste Management Centre will be implemented including measurement to ensure that methane levels at the waste facility site boundary do not exceed 25% of the explosive limit (see also Section 8.12 of this Plan).	Oyu Tolgoi Environment Department Waste management facility supervisor	Records Auditing	
WM20-d	Waste management practices	Operation of non-hazardous landfill	Adequate records of waste inventories, inspections (see above) and training.	Oyu Tolgoi Environment Department Waste management facility supervisor	Records Auditing	
WM21-a	Waste management facilities	Interim waste facility	The temporary non-hazardous landfill pits will be closed and replaced by a permanent Waste Management Centre that incorporates a permanent landfill. The groundwater quality in this area will be assessed through the collection and chemical analysis of existing groundwater monitoring wells in this area. This will be done at the time of closure and annually thereafter.	Oyu Tolgoi Environment Department	Rehabilitation plan See also Section 9 and the Water Resources Construction Management Plan	
WM21-b	Waste management facilities	Interim waste facility	Wastes from the temporary waste facility will be transferred to the permanent Waste Management Centre once commissioned. The interim facility will be assessed for residual contamination and decontaminated if required. The empty pits will have validation testing done on the base, sides and any encountered groundwater to determine if any residual contamination remains. If required, further removal and/or remedial works and re-testing and/or monitoring will be undertaken until it is demonstrated that no further contamination remains	Oyu Tolgoi Environment Department	Rehabilitation plan See also Section 9 and the Water Resources Construction Management Plan	

ID	Topic/ Aspect	Applicability/ Activity	Control Description	Responsible Parties	Means of verification	Comments
WM22-a	Waste management facilities	Non-hazardous waste disposal	The permanent non-hazardous landfill is scheduled for completion in June 2012 and will be designed to US EPA CFR 258 requirements, including:	Oyu Tolgoi Environment Department	Design documentation	See also A2MW-5310-10C-OT001
WM22-b	Waste management facilities	Non-hazardous waste disposal	Solid subgrade foundation layer;	Oyu Tolgoi Environment Department	Design documentation	See also A2MW-5310-10C-OT001
WM22-c	Waste management facilities	Non-hazardous waste disposal	An Engineered Clay Liner (ECL) on the soil subgrade, with minimum thickness of 600mm and maximum hydraulic conductivity of 1×10^{-7} cm/sec;	Oyu Tolgoi Environment Department	Design documentation	See also A2MW-5310-10C-OT001
WM22-d	Waste management facilities	Non-hazardous waste disposal	A minimum thickness of 1.5mm of HDPE geomembrane;	Oyu Tolgoi Environment Department	Design documentation	See also A2MW-5310-10C-OT001
WM22-e	Waste management facilities	Non-hazardous waste disposal	A crusher protection layer, comprising a geotextile, located between the HDPE geomembranes and leachate drainage layer;	Oyu Tolgoi Environment Department	Design documentation	See also A2MW-5310-10C-OT001
WM22-f	Waste management facilities	Non-hazardous waste disposal	A leachate collection layer with a minimum thickness of 300 mm and minimum hydraulic conductivity of 1×10^{-2} cm/sec;	Oyu Tolgoi Environment Department	Design documentation	See also A2MW-5310-10C-OT001
WM22-g	Waste management facilities	Non-hazardous waste disposal	A leachate removal system, perforated pipe network, is located within the leachate collection layer. The maximum head of leachate on the liner system must less than 300 mm;	Oyu Tolgoi Environment Department	Design documentation	See also A2MW-5310-10C-OT001
WM22-h	Waste management facilities	Non-hazardous waste disposal	A filter layer, comprising a geotextile, located between the leachate collection and removal system	Oyu Tolgoi Environment Department	Design documentation	See also A2MW-5310-10C-OT001
WM22-i	Waste management facilities	Non-hazardous waste disposal	Waste above the filter layer; Landfill upgrade and design requirements.	Oyu Tolgoi Environment Department	Design documentation	See also A2MW-5310-10C-OT001
WM22-j	Waste management facilities	Non-hazardous waste disposal	The associated leachate lagoon liner system will include a soil subgrade foundation layer;	Oyu Tolgoi Environment Department	Design documentation	See also A2MW-5310-10C-OT001
WM22-k	Waste management	Non-hazardous	An Engineered Clay Liner (ECL) on the soil subgrade, with minimum thickness of 600mm and maximum hydraulic conductivity of 1×10^{-7} cm/sec; and	Oyu Tolgoi Environment	Design documentation	See also A2MW-5310-

ID	Topic/ Aspect	Applicability/ Activity	Control Description	Responsible Parties	Means of verification	Comments
	facilities	waste disposal		Department		10C-OT001
WM22-l	Waste management facilities	Non-hazardous waste disposal	A minimum thickness of 1.5 mm of HDPE geomembrane.	Oyu Tolgoi Environment Department	Design documentation	See also A2MW-5310-10C-OT001
WM23	Waste management facilities	Hazardous waste disposal	Waste incinerators will be designed and controlled as described in the Atmospheric Emissions Construction Management Plan (<i>Chapter D2</i>).The new incinerator is scheduled for completion in June 2012.	See Air Emissions Construction Management Plan Oyu Tolgoi Environmental Department	See Air Emissions Construction Management Plan	
WM24-a	Off site waste management	Community risk	The Project will exercise all reasonable efforts to control the safety of transportation and disposal of wastes, and will implement measures to avoid or control community exposure.	Oyu Tolgoi Environment Department Oyu Tolgoi CSP Department	Records of community engagement Review of waste contractors procedures for the transportation of waste off site.	
WM24-b	Off site waste management	Community risk	Information on risk, exposure of population, mitigation measures and monitoring will be provided to the relevant authorities and communicated to locally affected communities.	Oyu Tolgoi Env Dept Oyu Tolgoi CSP Department	Records of community engagement Review of waste contractors procedures for the transportation of waste off site.	

ID	Topic/ Aspect	Applicability/ Activity	Control Description	Responsible Parties	Means of verification	Comments
WM25-a	Off site waste management	Community waste management (associated with the population influx)	Oyu Tolgoi will provide technical assistance to the development of local waste management facilities, but these will remain under the control of the local <i>soum</i> administration and are therefore not covered by this management plan (Applicable to Regional Development Strategy-below).	Oyu Tolgoi Environmental Department Oyu Tolgoi CSP	Review of the regional plan	
WM25-b	Off site waste management	Community waste management (associated with the population influx)	Oyu Tolgoi will develop a Regional Development Strategy to address regional infrastructure and development issues posed by the Project, including the provision of waste management infrastructure (and Oyu Tolgoi support to the South Gobi Regional development council), where this is accepted by the <i>soum</i> authorities.	Oyu Tolgoi CSP	Review of the regional plan	
WM26	Waste rock management	Excavation of mine shafts	Waste Rock generated from the construction of the underground mine works will be assessed for its acid forming potential. Waste rock with acid forming potential from mine shafts (and other sources such as overburden if applicable) will ultimately be processed as ore disposed within a dedicated Waste Rock Dump (see Chapter C, Section 5.4.10 of the ESIA).	Oyu Tolgoi Environment Department.	Assessment records	
WM27-a	Waste rock management	Non acid forming (NAF) rock	Waste rock from general construction works and overburden will either be stockpiled for later use or else graded in a manner that is sympathetic to the surrounding topography (see <i>Chapter D4: Topsoil Construction Management Plan</i>).	Oyu Tolgoi Environment Department	Site inspections (design and location of rock stockpiles)	
WM27-b	Waste rock management	Non acid forming (NAF) rock	NAF rock will also be used during construction of Tailings Storage Facility and for capping the Waste Rock Dump.	Oyu Tolgoi Environment Department	Site inspections (design and location of rock stockpiles)	
WM27-c	Waste rock management	Non acid forming (NAF) rock	Restoration of remaining waste rock dump areas will take place as soon as feasible. Stored topsoil will be used to rehabilitate the lower slopes of the waste rock facilities where the risk of losing the topsoil through windblown erosion is limited (see also <i>Chapter D4: Topsoil Construction Management</i>	Oyu Tolgoi Env. Dept.	Site inspections (design and location of	

ID	Topic/ Aspect	Applicability/ Activity	Control Description	Responsible Parties	Means of verification	Comments
			<i>Plan).</i>		rock stockpiles)	

8.10 TRAINING

All employees of Oyu Tolgoi and Contractors to Oyu Tolgoi responsible for waste management activities shall be provided with toolbox training. This will include details on the importance of adequate waste management and the classification and segregation of waste. Additional, specialist training shall be provided to plant operators and key personnel involved in activities which involve the segregation, storage, haulage or treatment of waste. Landfill and incinerator operators will be trained in waste designation to ensure that they have a detailed understanding of which wastes can be recycled, reused or are permitted to be landfilled and incinerated.

Hauliers of waste will have appropriate training, and hauling will be undertaken in a manner that prevents inadvertent release of wastes or recyclables en-route.

8.11 MONITORING

The monitoring measures that are to be implemented during the Construction Phase to ensure compliance with the Project Standards (see Section 8.5) are described *Table 8.3* below. In the event that any monitoring results identify a non-conformance with the Project Standards, these will be investigated and corrective actions identified (see the ESMP Framework Document for further details).

The Project will, as part of the Oyu Tolgoi Management Systems, develop and implement a waste management audit/inspection programme (for Oyu Tolgoi and Contractor activities) to verify compliance with applicable Project Standards outlined in Section 8.5. Specific compliance assurance requirements are further detailed below.

The Oyu Tolgoi Environmental Engineer, or his/her delegate, will undertake weekly inspections to check housekeeping and waste segregation practices at the warehouse, maintenance workshop, processing plant, the office building, and the mess. This will also identify any wastes for bulk recycling. The inspections will also cover the waste contractors' performance if used on the Oyu Tolgoi site.

Further specific monitoring requirements are tabulated below.

Table 8.3: Monitoring Measures – Waste Management

ID	Topic/Aspects	Parameters	Methods	Periodicity	Location	Comments
WMM1	Waste minimisation	NA	The volume of domestic waste material will be highly variable; monitoring will be conducted with the use of a Waste Inventory which will take into account any recycled waste materials. The volume of wastes generated will be registered in order to establish a reliable baseline for waste minimisation purposes	Monthly	NA	Applies to Project waste generated within the Mine Licence Area or other construction areas. Oyu Tolgoi Environment Department and the Principal Environment Advisor will be responsible for collating waste data
WMM2	Waste facility audits and inspections	NA	To facilitate the monthly inspections all designated waste storage locations will be marked on a plan and each waste storage area will be numbered to facilitate inspections. During the monthly inspection: <ul style="list-style-type: none"> ▪ Waste storage area audits will be conducted using an Environmental Inspection Checklist; ▪ Any spills, leaks, poor containment, lack of labelling or other issues will be recorded and reported to the relevant department for corrective action; and ▪ Corrective actions will be documented on completion. 	Monthly	All areas generating significant amounts of waste	Inspections to be conducted by the Oyu Tolgoi Environment Department
WMM3	Waste facility audits and inspections	NA	Monthly inspections shall be carried out to check housekeeping and waste segregation practices at the warehouse, maintenance workshop, processing plant, the office building, and the mess. This will include the identification of any wastes for bulk recycling. The inspections will also cover the waste contractors' performance if used on the Oyu Tolgoi site.	Monthly	All areas generating significant amounts of waste	Inspections to be conducted by the Oyu Tolgoi Environment Department
WMM4	Groundwater contamination	Water quality (see Surface and Groundwater)	Field measurement (level, pH, conductivity, temperature) Laboratory analysis (hydrocarbons, TDS, TSS,	Monthly (level) Quarterly	Dedicated boreholes around the waste management facility	Changes in water quality will be assessed. See also the Water Resources

ID	Topic/Aspects	Parameters	Methods	Periodicity	Location	Comments
		Quality Parameters list below)	ions, metals and NH ⁴⁺)	(quality)	areas (both the interim and permanent facilities). Locations include background wells up gradient of the facilities.	Construction Management Plan
WMM5	Air emissions (landfills)	Methane levels	Methane levels to be monitored to ensure they are below 25% of lower explosive limit.	Monthly	Boundary of the waste management facility areas (both the interim and permanent facilities).	Requirement in line with US EPA CFR258
WMM6	Air emissions (incinerator)	See 'comments' column	See 'comments' column	See 'comments' column	See 'comments' column	Monitoring of air emissions from incinerators will be as defined in the Air Quality Construction Management Plan
WMM7	Third party facilities	NA	Oyu Tolgoi will periodically audit any third party waste facilities receiving project waste	Upon an award of contract and periodically thereafter.	3 rd party waste facilities	Oyu Tolgoi will use third party waste management facilities that are appropriately managed

Surface and Groundwater Quality Parameters to be monitored are as follows:

- pH;
- Electrical conductivity;
- Temperature;
- TDS;
- TSS;
- Major ions (Cl⁻¹, F⁻¹, NO²⁻, NO³⁻, SO⁴⁻²⁻, CO³⁻²⁻, HCO³⁻²⁻, Na⁺, K⁺, Ca²⁺ and Mg²⁺);
- Hydrocarbons;
- Metals (Fe²⁺, Fe³⁺, Fe (total), Cu²⁺, Cu (total), Ti, Cr, Mn, Ni, Zn, Br, Sr, Pb, As, Se, Hg and Cd); and
- NH⁴⁺.

8.12 KEY PERFORMANCE INDICATORS

Oyu Tolgoi will continue to evaluate waste management performance within and beyond the Mine Licence Area site boundary. Specific monitoring provisions are detailed in Section 9 above. Key Performance Indicators (KPIs) to assess its waste management are presented in *Table 8.4*.

Table 8.4: Key Performance Indicators – Waste Management

ID	KPI	Target	Monitoring measure
WM-KPI 01	No of reported non-compliances with the mitigation controls identified in this EMP (<i>Table 8.2</i>).	Minimise and continued improvement in number of reported non-compliances	See 'means of verification' column in <i>Table 8.2</i>
WM-KPI 02	Percentage of waste recycled vs disposed to landfill – aim is to improve percentage recycled.	Minimise disposal to landfill and continued improvement Target for 75% recycling for plastics	Records of waste types, quantities and recycling/disposal routes.
WM-KPI 03	Total volume of waste generated – Oyu Tolgoi aims to reduce the volume of waste generated during operations.	Minimise total volume of waste generated and continued improvement. Specific target of 10% reduction in volume of household waste generated per person by Q3 2011	Records of waste types, quantities and recycling/disposal routes
WM-KPI 04	No complaints about waste or litter from the regulators or the local community.	Aim for zero grievances	Waste related grievances captured by the grievance procedure
WM-KPI 05	No soil or groundwater contamination originating from permanent Waste Management Centre or interim waste facility.	Zero change in identified parameters from background.	Analysis in accordance with the monitoring programme.

Consultation with stakeholder communities will be held regularly to obtain feedback on community's views on the Project's performance in respect of waste management (particularly off site waste management practices). This will help to ensure that the amenity of the community is recognized and taken into account by the company. The frequency of these meetings, where waste management practices will be discussed amongst other topic areas, will be agreed with the stakeholder communities, but are expected to be monthly at the start of the Project and become less frequent as the Project becomes established. (See *Stakeholder Engagement and the Community Health Safety and Security Plans* for further details).

The implementation of Oyu Tolgoi's waste management plan, and replacement of the interim waste management facility and incinerator, will result in a series of environmental and health & safety improvements as follows:

- Reduced potential for soil and groundwater contamination; the new landfill design will render potential impacts negligible;
- Improved combustion in the replacement incinerator resulting in improved air quality;
- Robust waste management aimed at minimising material use and maximising the reuse and recycling of materials;
- Encouragement of recycling businesses in the local communities; and
- Technical assistance to the Khanbogd *soum* in the development of a purpose built landfill with significant improvement to current waste disposal practices resulting in environmental and health & safety benefits for the local community.