
NYUMBA YA AKIBA sarl
Waste
Management
Plan
AUGUST 2013

Waste Management Plan

For

Nyumba Ya Akiba Cement Plant Project,

Bas Congo Province of Democratic Republic of Congo

Prepared by

Nyumba Ya Akiba sarl

in association with

SRK Consulting (South Africa) (Pty) Ltd

Date: August 2013

Table of Contents

1 Introduction 1
1.1 Background 1
1.2 Waste management plan objectives 2
1.3 Project context 2
2 Project context 2
3 Governance framework and requirements 3
3.1 DRC legal framework 3
3.2 International Standards and Guidelines 6
3.2.1 Equator Principles 6
3.2.2 IFC Performance Standards 6
3.2.3 EHS Guidelines 8
3.3 Other lender requirements 9
3.4 United Nations Conventions 9
3.5 Cement industry sustainability initiatives and guidelines 10
3.5.1 Cement Sustainability Initiative 10
3.5.2 Cement Technology Roadmap 2009 10
3.5.3 Guidelines on Co-Processing Waste Materials in Cement Production 10
3.6 Corporate sustainability policy and organizational structure 11
4 Characterization of NYA waste streams 11
4.1 Waste management infrastructure 11
4.2 Waste streams and management measures 11
4.2.1 Construction 12
4.2.2 Operation 13
4.2.3 Decommissioning and closure 13
5 Waste management implementation 21
5.1 Resources and responsibilities 21
5.2 Procedures for waste management 21
5.2.1 Controls 21
5.2.2 Maintenance of records 22
5.2.3 Implementation of waste hierarchy 22
5.2.4 Safety, security and emergency preparedness 22
5.3 Monitoring, evaluation, reporting and auditing 23
6 Documents to consult 23

List of Tables

Table 3-1: DRC Mining Regulations waste management requirements and management measures planned to be implemented for the project 3

Table 4-1: Waste streams to be generated during the operational phase, means of disposal and management measures 14

List of Figures

Figure 3-1: Waste management hierarchy 7

1 Introduction

1.1 Background

NYUMBA YA AKIBA SARL (NYA), Concession RAFI, 1, Avenue Ngongo Lutete, Kinshasa - Combe, Democratic Republic of Congo (DRC), a joint venture between Lucky Cement Pakistan and Groupe Rawji DRC, proposes to construct a 3,000 tonnes per day clinker and 3,580 tonnes per day cement manufacturing facility, limestone quarry and associated facilities in Bas-Congo Province of DRC. , using indigenous limestone and clay as raw materials and imported coal as fuel.

An Environmental Impact Assessment (EIA) for the project including the limestone quarry and the cement plant was conducted by an accredited local consultant (OEMS) in December 2010 in accordance with the Congolese legislation. This EIA was approved by the local authorities in 2011 and the quarry operational permit granted.

Subsequently, an Environmental and Social Impacts Assessment (ESIA) for lender approval was performed in December 2012 by the Pakistani consulting firm ECTECH, covering the cement plant, limestone quarry and some associated facilities but not covering the entire area of influence of the Project. These and other gaps relative to the required assessment framework to meet the requirements of international funders were identified via an independent environmental and social due diligence (ESDD) by ERM for the account of the lenders. In particular, gaps were identified relating to ecosystem services, cultural heritage, hydrology and biodiversity, as well as the project footprint covered under the previous ESIA.

NYA has therefore appointed SRK Consulting (SRK) to prepare an updated ESIA and Environmental and Social Management Plan (ESMP referred to as the EMMP in section 9) for the Nyumba Project ("the project"), in line with IFC Performance Standards and other requirements, including those of the African Development Bank (AfDB).The purpose of SRK's updated ESIA and ESMP is to fulfill the outstanding requirements identified in ERM's due diligence report, as well as comment received from AfDB. In addition to meeting the DRC legal requirements, the ESIA and ESMP must also meet international good practice standards.

This Waste Management Plan (WMP) is one component of a series of management plans required to ensure that the potential project risks are managed through sustainable development opportunities and programs, thereby improving the security, human rights and well-being of the local populations and employees potentially affected by the proposed project both during and after project operation. As the ESMP is a living document and evolves over the lifespan of the proposed project, this plan will require on-going refinement.

Other management plans forming part of the NYA ESIA/ ESMP of relevance to this WMP are the Occupational Health and Safety Plan (OHS Plan) in Appendix 12 and the Emergency Preparedness and Response Plan (EPRP) in Appendix 16, the Community Health and Safety Plan and the Greenhouse Gas Emissions Plan (GHG Plan) in Appendix 13 and 14 respectively. The Sustainable Development Plan (SDP) in Appendix 19 provides context on the corporate responsibility approach of NYA, while the Stakeholder Engagement Plan in Appendix 17 and the Grievance Mechanism in Section 12 of the ESIA/ ESMP confirm the approach of NYA to transparency, information-sharing and communications.

The WMP forms one component of the updates being carried out by SRK to the ESIA/ ESMP developed by ECTECH earlier in 2012.

1.2 Waste management plan objectives

The primary objective of the WMP will be to ensure efficient waste management so as to avoid and minimize environmental and social impacts. The WMP will be a key part of the integrated environmental and social management system. Other objectives of the WMP will be:

- To ensure that waste management is performed in accordance with DRC legal requirements, NYA internal waste management policies and standards, as well as Good Industrail Industry Practice (GIIP);
- To provide clearly defined roles and responsibilities to identify and co-ordinate each activity within the waste management chain;
- To promote environmental awareness in order to increase and encourage waste minimization, reuse and recycling;
- To ensure the safe transportation, handling and storage of wastes;
- To provide appropriate training for staff and other stakeholders on waste management issues; and
- To operate waste infrastructure in a manner which will allow for progressive decommissioning of infrastructure at capacity, thereby minimizing the closure liability at the end of the cement production plant.

1.3 Project context

The project site is located approximately 250 km west from Kinshasa and 100 km east from Matador in the vicinity of the N1 road to the north. The project will be developed on a green field site in the surrounding area of the Kansu Village, Sangallo territory, Bas Congo province of DRC, located approximately 30 km west from Impose city.

The cement plant will be supplemented by limestone and clay mining through mining concessions located approximately 1.5 km north from the cement plant site. The project is situated in a greenfield location, although it is understood that a number of other new cement production plants are expected to be developed in the greater vicinity of the NYA project (See ESIA/ ESMP for further detail).

Detail on the project description, as well as the environmental and social baseline for the project is provided in the ESIA/ESMP.

2 Project context

Outside the scope of the current study, it is anticipated that once the NYA cement plant is operational, co-processing of suitable categories of waste from the NYA site could be undertaken. This would require a separate feasibility study. Should this proceed, co-processing will be undertaken in line with best available technology not involving excessive cost (BATNEEC) and GIIP including implementation of the waste hierarchy. It is further expected to reduce greenhouse gas (GHG) emissions from the project, and will be in accordance with multilateral agreements including the Basel and Stockholm United Nations Conventions.

3 Governance framework and requirements

This section sets out the requirements of the DRC and international lenders, and further highlights key relevant guidelines.

3.1 DRC legal framework

The Mining Code (Loi No 007/2002 of July 11 2002) refers to mineral waste, while the Mining Regulations (Decret No 038/2003 of March 26 2003) defines categories of waste and sets out requirements for waste management. Actions in response to the Mining Regulations are set out in **Error! Reference source not found.** below.

Definitions for waste in terms of the Mining Regulations are as follows:

- Hazardous waste is defined as "*material that constitutes, due to its volume, concentration, composition, corrosive, inflammable, reactive, toxic, infectious or radioactive properties or any other factor, either separately or in combination with one or more other substances, a real or potential threat to public health, safety and well-being or to the environment if not properly stored, treated (processed), transported, eliminated, used or otherwise managed*"; and
- Solid waste is defined as "*residual material that is solid at 20^{o}C; residues of incinerated solid waste; household refuse; debris, rubble as well as any other scrap that is solid at this temperature".*

Table 3-1: DRC Mining Regulations waste management requirements and management measures planned to be implemented for the project

Article	Aspect and requirements	Management measures
Articles 84	Management in respect of chemicals, solid waste and hazardous waste, which requires that the operator shall be required to observe appropriate mitigation measures in respect of chemicals, solid and dangerous waste	This WMP will be updated and implemented prior to construction which will address requirements. Implementation will be inspected at regular intervals
Article 86	Measures in respect of solid waste: the operator who disposes of trash, timber, scrap and household waste within the permit area provides a brief description of the properties of the disposal site, its location and the name of the company designated to perform the work	This WMP will be updated and implemented prior to construction which will address requirements. Implementation will be inspected at regular intervals. NYA will manage the waste and if the need arises in the future they will utilize a reputable contractor for managing the waste onsite.
Article 87	Measures in respect of hazardous waste: The operator shall provide a description of how hazardous waste, such as used oil, oil containing polychlorinated biphenyl (PCB) is managed and indicate whether there is a storage site within the permit area	A hazardous waste storage facility and landfill is planned for the project, to be located within the waste management facility inside the plant perimeter Table 4-1 below provides details of the methods planned to be used for managing hazardous wastes

Article	Aspect and requirements	Management measures
Article 91	Hazardous products and mine waste: Hazardous products are required to be stored in labelled containers, and measures for transporting, storing and using these products in accordance must be described in accordance with regulatory requirements. The operator must further describe the measures for the protection of relevant personnel, as well as fire and protection measures	Transport and storage of hazardous materials will be carried out in accordance with the IFC EHS Guidelines for Hazardous Materials Management. Labelling of hazardous products will be in alignment with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). Fire and protection measures are provided in the d Emergency Preparedness and Response Plan (EPRP)
Article 121	Measures in respect of petroleum products for underground or open cast working: The operator must provide for measures relating to the rehabilitation of oil products storage sites, any hydrocarbon mixture in particular used as fuel such as petrol, diesel, furnace oil and heavy fuel oil, and lubricants such as new or used oils and grease. However, this is not applicable to tanks used for motor vehicles or to the following equipment used for non-commercial purposes such as mobile fuel tanks of 225 litters and fuel tanks of less than 4,000 litters. At the end of two full years of non-utilization, all storage system parts such as underground or surface tanks and piping will be dismantled by competent persons and the site decontaminated.	At decommissioning petroleum storage system facilities will be dismantled in accordance with Article 121, and properly disposed of in accordance with the Section 14 of the ESIA/ ESMP.
Article 122	Measures in respect of hazardous waste: hazardous waste in the mining industry covers contaminated oil and grease, used solvents, contaminated containers or material, expired products and also PCB contaminated oil and equipment. Mine waste (tailings) shall not be considered as hazardous waste. No hazardous waste may be left on site following the definitive cessation of the activities. However, if no disposal and treatment technique exists, on site storage may be authorized by the Directorate Responsible for Protection of the Mining Environment (DPEM).	The principles contained in the DRC articles related to waste will be adopted on site. Hazardous waste will be categorized by the nature of the hazardous and chemical compatibility. Table 4-1 below sets out planned disposal measures for hazardous waste. It is unlikely that this issue of disposal of PCB's will arise, since this is a new (greenfield) development site, and PCB-contaminated oil and equipment will be avoided. If required, on-site storage may be applied by at decommissioning/ closure.

Article	Aspect and requirements	Management measures
	Used oil may be transported to a waste transfer centre or to an authorized recycling or re-utilization site. Other hazardous waste must be sent to an authorized disposal, treatment, recycling or re-utilization site for hazardous waste. PCB-contaminated soils and equipment with a concentration less than 50 ppm may be transported to a disposal site authorized thereto by the Directorate responsible for the Protection of the Mining Environment. Mobile treatment units may decontaminate and reduce the PCB concentration. If, notwithstanding treatment, PCB concentrations remain in excess of 50 ppm, the operator shall store these oils and equipment until an adequate disposal technique is available.	
Article 123	Measures in respect of solid waste allow that solid waste as defined in the Mining Regulations may be sent to: [a] a landfill site or in-trench disposal site authorized by the Directorate responsible for the Protection of the Mining Environment; [b] a disposal site for dry material especially authorized for the mining site. However, such practice shall be restricted to backfill and non-fermentable material; [c] an in-trench disposal site of solid waste especially authorized for the mining site. It is generally forbidden to burn waste in the open, including the partial recovery of it, except for matter such as branches of trees and dead leaves. Burning can be allowed in an in-trench disposal site providing that emissions of smoke / fumes do not cause environmental damage.	Domestic waste will be disposed of in a dedicated domestic waste landfill site. Industrial waste will be disposed of in a designated industrial waste landfill site. Where waste is deemed recyclable, it will be reclassified and treated as recyclable waste. Recyclable waste will be cleaned and declared safe prior to being recycled. Table 4-1 provides information on the in-trench management of solid waste and the storm water measures.

3.2 International Standards and Guidelines

3.2.1 Equator Principles

The Equator Principles Financial Institutions (EPFIs) have adopted a set of guidelines, known as the Equator Principles, published in 2003 and revised in 2006. The principles provide a framework for an accepted international approach to the management of social and environmental issues. Development financiers play a major role in the development and enforcement of international sustainable development standards through the conditioning of their loans. This is often through the Equator Principles, which have now been adopted by around 72 financial institutions. The Equator Principles (EP) III is effective from 4 June 2013. The Principles require observance of the International Finance Corporation (IFC) Performance Standards (PS) and the World Bank Group Environmental, Health and Safety (EHS) Guidelines when developing projects in non-high income OECD countries. Further to other ongoing principles, the EP III lays particular emphasis on energy management, transparency, as well as on human rights.

3.2.2 IFC Performance Standards

The IFC PSs on Environmental and Social Sustainability which were published in January 2012 are recognised as being the most comprehensive standards available to international finance institutions working within the private sector. The principles provide a framework for an accepted international approach to the management of social and environmental issues. The PSs are matched with corresponding Guidance Notes that provide guidance on the requirements contained in the standards and on good sustainability practices to help clients improve project performance. The NYA ESIA/ ESMP process is being undertaken in accordance with the policies, guidelines and procedures of the IFC. The PSs cover the following:

- PS1: Social and Environmental Assessment and Management System;
- PS2: Labour and Working Conditions;
- PS3: Pollution Prevention and Abatement;
- PS4: Community Health, Safety and Security;
- PS5: Land Acquisition and Involuntary Resettlement;
- PS6: Biodiversity Conservation and Sustainable Natural Resource Management;
- PS7: Indigenous Peoples; and
- PS8: Cultural Heritage.

The IFC PS, and the Equator Principles which generally follow the requirements of the IFC, have been adopted for this project. The PS that relate to Waste Management are PS3, Pollution Prevention and Abatement, and PS4, Community Health and Safety. This document aims to address the waste management requirements of both PS3 and PS4.

PS3: Pollution Prevention and Abatement

PS3 outlines a project-level approach to resource efficiency and pollution prevention and promotes application of technologies and practices where feasible based on commercially available skills and resources to achieve this.

Objectives of PS3 cover:

- Avoidance and minimization of adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. This objective is directly relevant to this

WMP applies to the release of pollutants to air, water, and land due to routine, non-routine, and accidental circumstances with the potential for local, regional, and transboundary impacts;

- Promotion of more sustainable use of resources, as set out in Section 14 of the ESIA/ ESMP, as well as this WMP; and *
- Reduction of project-related GHG emissions, of relevance to the WMP, and further dealt with in the ESIA/ ESMP and GHG Management Plan (see Appendix 14).

PS3 lays key emphasis on both non-hazardous and hazardous waste materials, and in respect of the latter is required to comply with GIIP alternatives for environmentally sound disposal while adhering to the limitations applicable to its transboundary movement. Hazardous waste disposal conducted by third parties requires use of reputable and licensed contractors implementing chain of custody documentation to the final destination.

PS3 is aligned to the waste management hierarchy shown in Figure 3-1 below which calls for a paradigm shift in the way in which waste is managed. Instead of managing waste at the “end of pipe” it encourages measures within the process / activity that reduce the volumes of waste generated, through the implementation of more efficient technology. If waste reduction/ minimization is not possible, it then encourages the potential reuse or recycling of waste, which in turn reduces volume. Failing this, the hierarchy requires that waste be treated either to reduce its volume or its potential to impact on the environment, such as reduction in toxicity. Finally if none of the above is possible, then waste disposal should be implemented in a manner where the potential to result in environmental impact is minimized.

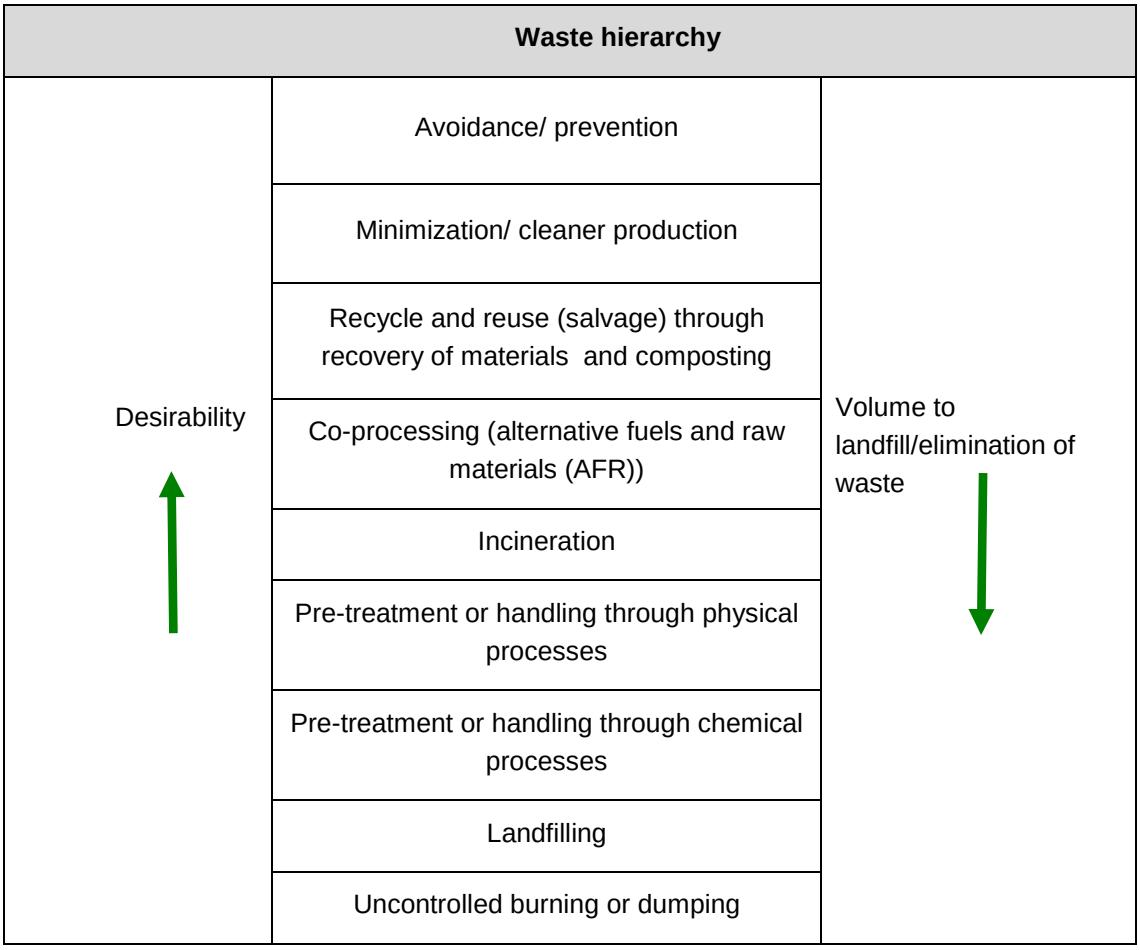

Figure 3-1: Waste management hierarchy

PS4: Community Health and Safety

PS4 sets out to ensure that adverse impacts on the health and safety of communities affected by a development are anticipated and avoided, both from routine and non-routine circumstances throughout the life of the project.

In terms of hazardous materials safety, PS4 requires that the developer will prevent or minimize the potential for community exposure to hazardous materials that may be released by the project, including through transportation of goods/waste. Where there is a potential for the community (including workers and their families) to be exposed to hazards, particularly those that may be life-threatening, special care will be exercised to avoid or minimize their exposure by modifying, substituting or eliminating the condition or substance causing the hazard.

3.2.3 EHS Guidelines

The Environmental Health and Safety (EHS) General Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP) as defined in IFC's PS3, also relevant to PS4. Applied by agencies including the World Bank and the IFC, they are PS and measures generally considered to be achievable in new facilities at reasonable costs by existing technology. Industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document. Of relevance here are the Mining, the Cement and Lime industry EHS Guidelines, as well as the EHS Guideline for Construction Materials Extraction.

Mining EHS Guidelines

The Mining EHS Guidelines for mining pay particular attention to waste management, incorporating the following requirements in recognition of the large volumes of waste generated by the industry:

- **Waste management structures:** Structures such as waste dumps and containment facilities should be planned, designed and operated such that geotechnical risks and environmental impacts are appropriately assessed and managed throughout the entire project cycle;
- **General non-hazardous waste**: Recommended practices for the management of household and non-process related industrial solid waste which is non-hazardous include the following:
    - Management should be according to the recommendations presented in the General EHS Guidelines
    - Recycling or disposal at an approved landfill should be carried out
    - Disposal of such waste should not take place with waste rock or overburden
- **Hazardous waste:** Recommended practices for the management of hazardous waste include the following:
    - Handling of hazardous waste should be by specialized providers of hazardous waste management facilities specifically designed and operated for this purpose
    - Combustion of waste oils should preferably be undertaken as a supplementary fuel in power generation facilities.

EHS Guideline for Cement and Lime Manufacturing

The 2007 EHS Cement and Lime Manufacturing Guideline incorporates requirements around the use of waste fuel or waste raw material in cement manufacturing , such as minimum calorific value, amounts and types of waste to be used, as well as the maximum concentration levels of specific pollutants, such as PCB, chlorine, PAH, mercury, and other heavy metals. Prevention and control techniques for air pollutants are also provided, as are monitoring and control of the volatile heavy metal content in the input materials and waste fuels. Process wastewater treatment procedures are

also provided in the Guideline, and it is specified, as are measures for prevention of dust emissions from stockpiles of raw materials, clinker, coal, and waste.

EHS Guideline for Construction Materials Extraction

The 2007 EHS Guideline for Construction Materials Extraction includes information relevant to construction materials extraction activities such as aggregates including limestone. It addresses stand-alone projects and extraction activities supporting construction such as cement production projects. The document inter alia provides performance indicators and monitoring guidelines for the industry.

3.3 Other lender requirements

Other lender requirements include those of the African Development Bank (AfDB), and the European Investment Bank (EIB) incorporating the following:

- African Development Bank (AfDB) requirements are documented *inter alia* in its 2003 Integrated Environmental and Social Impact Assessment Guidelines;
- The 2010 European Investment Bank (EIB) Environmental and Social Practices Handbook in which requires likely significant effects of waste (including nuisance) on the environment from a proposed project should be described, evaluated using including valid methodology;
- The EIB's 2009 Statement of Environmental and Social Principles an Standards develops the European Principles for the Environment (EPE), which is based on the relatively stringent approach to environmental matters developed and applied by the EU. Relevant directives to the WMP include:
    - The Directive 2004/35/CE on environmental liability with regard to the prevention and remedying of environmental damage, as amended by the Directive 2006/21/EC on the management of waste from extractive industries
    - The codified Directive 2008/1/EC including all previous amendments to the Directive 96/61/EC concerning Integrated Pollution Prevention and Control (IPPC)
    - The UNECE Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention) . This imposes on Parties and public authorities obligations regarding access to information and public participation and access to justice
    - The EIA Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment as amended by Directives 97/11/EC and 2003/35/EC.
- The Extractive Industry Transparency Initiative (EITI) is a coalition of government, companies, civil society groups, investors and international organisations. The EITI supports improved governance in resource rich countries through the full publication and verification of company payments and government revenues from oil, gas and mining.

3.4 United Nations Conventions

The Conference of the Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (decision BC-10/8) Cartagena, Colombia, October 2011 resulted in the development of the UNEP (2012) Technical guidelines on the environmentally sound co-processing of hazardous wastes in cement kilns. The Basel Convention places obligations on countries that are parties to ensure the environmentally sound management (ESM) of hazardous and other wastes. It confirms the importance of the waste hierarchy as the guiding principle for

securing a more sustainable waste management system, as well as giving due consideration to the protection of the environment and human health. It is recognized that as an example, co-processing in cement kilns provides an environmentally sound resource recovery option preferable to landfilling and incineration.

3.5 Cement industry sustainability initiatives and guidelines

3.5.1 Cement Sustainability Initiative

Under the auspices of the World Business Council for Sustainable Development, the Cement Sustainability Initiative (CSI) is a voluntary structure that promotes sustainability for the global cement industry. Challenges addressed for the cement industry include climate protection and CO_2, responsible use of energy and materials, as well as employee health and safety. The organization further promotes emissions monitoring and report, as well as action regarding local impacts on land and communities.

3.5.2 Cement Technology Roadmap 2009

The International Energy Agency (IEA), along with the World Business Council for Sustainable Development and developed by the European Cement Research Academy (ECRA) developed the Cement Technology Roadmap 2009. This is based on a model for the cement industry to halve global energy-related CO2 emissions in 2050 compared to the 2006 level (IEA, 2009). Four distinct "reduction levers" are identified for the cement industry for emissions reductions, including the use of alternative fuels. The latter involves reducing/ replacing primary fuel (such as coal) for alternative materials that are less carbon-intensive (termed co-processing). As indicated in the Project Description, co-processing is being considered for implementation on the NYA project.

Waste materials used in co-processing are termed alternative fuels and raw materials (AFR). AFRs are wastes that may otherwise be burnt in incinerators, landfilled or else be inappropriately discarded.

Significant numbers of waste tyres can be anticipated from the project, including from vehicles and machinery on the quarry site, as well as vehicles transporting materials to and from the project during construction and operation. Cement kilns are able to use either whole or shredded tyres which contain higher energy content than coal, and when burned in a controlled manner do not have more emissions than other fuels. The Roadmap notes that heavy metal residues are further captured and locked into the clinker.

3.5.3 Guidelines on Co-Processing Waste Materials in Cement Production

The 2006 Guidelines on Co-processing Waste Materials in Cement Production is the result of a Public Private Partnership between the Duetsche Gesellschaft fur Technische Zusammenarbeit (GTZ) and Holcim Group Support Ltd (Holcim). The Co-Processing Guidelines, focused on developing countries and countries in transition state that co-processing of waste, including categories of hazardous waste, is environmentally sound as a means of disposal and is in alignment with the Basel and Stockholm Conventions. The Guidelines are not legally binding, but call on role-players to be ethical, carry out good governance and social responsibility. There is general agreement amongst role-players involved with the cement industry that co-processing of waste in cement kilns requires controls as detailed in the Co-Processing Guideline. The Guidelines contain legal, environmental, operational, occupational health and safety, as well as communication and transparency Principles.

AFRs in the 2009 Road Map that will be generated by the NYA project cover:

- Discarded tyres;
- Waste oil and solvents;
- Plastics;
- Textiles;
- Paper residues (if any), paper and cardboard;
- Biomass in the form of logs and wood chips; and
- Sewage sludge.

3.6 Corporate sustainability policy and organizational structure

The approach to be taken by NYA to sustainability is set out in Appendix 10, with the organization structure aimed at an effective Environmental Management System (EMS) provided in Section 9.

4 Characterization of NYA waste streams

4.1 Waste management infrastructure

The wastes anticipated for the NYA Project have been classified into waste streams in accordance with GIIP principles, lender and DRC legal requirements. Waste management infrastructure will include:

- The waste management facility (WMF) with separate compartments. An area surrounding the WMF will be permanently cleared to serve as an access road and firebreak. The facility will be contained within a security fence with a guard post, and will be divided into compartments including:
  - An unlined non-hazardous waste landfill
  - The salvageable material yard on an engineered terrace
  - A synthetically lined hazardous waste landfill with an effective leak detection system
  - A bunded waste oil storage facility
- Incinerator for medical waste situated at the clinic;
- The overburden stockpile for the storage of unmineralized overburden material;
- Sewage treatment facility (packaged sewage treatment plant); and
- Burning ground for burning of waste explosives and explosives packaging.

In the longer term, it is anticipated that waste management for the Project will incorporate AFR storage for co-processing. It is also planned that sludge from the sewage treatment plant will contribute to AFR. An oil incinerator will be installed should it be decided that co-processing will not be pursued.

4.2 Waste streams and management measures

Disposal options may be revised as the WMP is further refined. However, in principle best international practice will be applied to the management of wastes generated by the NYA Project in accordance with DRC waste management guidelines, the waste hierarch and in line with volumes and character of the waste, as well as the site conditions.

As there are currently no suitable solid waste disposal facilities in the vicinity of the project, it is assumed that as much of the waste as possible will be salvaged or recycled onsite as possible, and if and where feasible, will be recycled offsite as may be possible for waste metals. Suitable waste streams are planned to be used as alternative fuel sources for heating of the cement kiln.

It is anticipated that once the NYA cement plant is operational, co-processing of certain categories of waste from the NYA site will be considered as part of a detailed feasibility study. This will involve the processing of waste on site but will exclude the accepting of waste from waste streams not generated through the NYA project. It will further serve to reduce to a certain extent the volume of coal required for the production of cement. In accordance with the 2009 Cement Technology Road Map, the suitable wastes which comprise AFR are as follows:

- Discarded tyres;
- Waste oil and solvents;
- Plastics;
- Textiles;
- Paper residues (if any), paper and cardboard;
- Biomass in the form of logs and wood chips; and
- Sewage sludge.

The volumes of conventional recyclable materials such as glass are unlikely to be warrant transportation to a recycling or disposal facility outside of the DRC, and similarly the volumes of hazardous waste will not warrant off-site disposal. It is expected that recycling will be undertaken as far as possible within the informal sector in the vicinity of the project, although it is possible that bulk scrap may be accumulated for possible transportation for recycling or disposal elsewhere.

An inventory of waste streams will need to be developed prior to commencement of construction which will need to be regularly updated. The AFR wastes will be categorized in terms of their nature (hazardous or non- hazardous), and whether they should be stockpiled for co-processing once the plant is operational according to accepted classification procedures, the onsite management described and final disposal determined.

While precise details of the waste streams that will arise construction and operation cannot be provided until all the details of the supply of materials is known, provided below is an overview of the anticipated waste streams for the project during its different phases.

4.2.1 Construction

Based on experience on similar projects, it can be anticipated that during construction the following waste streams will be generated:

- Vegetation cleared during construction activities;
- Putrescible waste from construction camp catering facilities;
- Paper, card, toner and other office consumables from offices;
- Plastic, card, wooden pallets and polystyrene from packaging of goods delivered to site;
- Steel and plastic drums/containers from packaging of goods delivered to site;
- Cement, rubble, wood and metal off-cuts from the construction of buildings;
- Electrical cable and plastic fittings from electrical wiring work;
- Pipework off-cuts;
- Grease, tyres, waste oils and obsolete parts from vehicle maintenance;
- Waste material from road maintenance;
- Spent process chemicals used during construction;
- Spent non-hazardous chemicals, including herbicides, pesticides and their containers;
- Batteries and fluorescent tubes; and
- Medical waste.

Since there is limited infrastructure currently on the site, it can be assumed that there will be no existing buildings, plant structures, infrastructure, pipelines and roads or foundations requiring demolition or refurbishment. Thus building rubble and related waste is unlikely to be generated until decommissioning/ closure.

As waste will begin to be generated at the outset of construction on site, it may be necessary to store some wastes until a suitable disposal facility can be constructed. A small landfill site, with a lined cell for hazardous materials, will be in place from the outset of construction and capacity will need to be reviewed as construction progresses. Provisional arrangements for non-hazardous waste will also need to be made. Where feasible and as appropriate, a stockpile of AFR for later co-processing during operation will be established, such as for waste tyres.

Waste management during construction will be closely controlled through binding agreements with contractors. It is likely that during the early stages of construction, putrescible waste will need to be buried timeously to prevent risk of disease spread by vectors such as rats and insects.

Waste management during construction will be coordinated by the Sustainable Development Manager so as to facilitate central control of the disposal of waste and prevent uncontrolled proliferation of waste on the site. The creation of ad-hoc shallow dumps across the site must be discouraged.

4.2.2 Operation

Table 4-1 below provides detail on the anticipated waste streams to be generated during the operation phase of the project, the means of disposal and the waste management measures to be implemented.

Waste that has been stockpiled and non-putrescible wastes accumulated during construction will be transferred to the appropriate compartments in the WMF once constructed and as environmentally appropriate. Where no undue environmental or human health risk is posed, wastes may remain in place and be decommissioned and closed.

Waste generated during the operational phase, after appropriate prevention, minimization, segregation and handling for recycle and/or reuse will either be diverted to the AFR stockpile, or as a last report to the new WMF, or other appropriate disposal facility or means.

Wastes classified as hazardous will be managed according to the proposed strategies, as identified in Table 4-1 below.

The Sustainable Development Manager will, through binding agreements with contractors, strictly control waste management during the operational phase. This will take place through measures including appropriately designed integrated waste management programmes, procedures and protocols. Suitable training of operational staff on sound waste management, monitoring, reporting, as well as response to incidents will need to be carried out.

4.2.3 Decommissioning and closure

Large quantities of bulky waste such as building rubble will be generated during decommissioning and closure and the detailed design process will need to take into consideration landfill and other disposal requirements at closure. The Closure Management Plan in Section 9 of the ESIA/ ESMP will need to be updated to assess the capacities of the existing landfill sites towards the end of project life in terms of which management measures for waste can be revised if required at that time. Measures might include co-disposal of wastes in the overburden stockpile.

Contaminated waste, including soils, could arise from the decommissioning of the plant. Risk to the environment or human health will be assessed at that time based on the hazard profile of the wastes and their leachates, and appropriate disposal will be implemented. Hazardous waste may require stabilization and/or disposal in the on-site lined hazardous waste compartment.

Table 4-1: Waste streams to be generated during the operational phase, means of disposal and management measures

Waste stream	Disposal	Management measure
Non-hazardous waste (including industrial and domestic waste)		
Wastes including office & household solid wastes, and non-hazardous industrial waste • Office paper and cardboard • Packaging materials • Tins (cool drinks, milk etc.) • Glass / bottles • Kitchen waste • Plastics and rubber • Building rubble including metals • Used cooking oil • Conveyer Belts • Non-hydrocarbon filters • Cables • Rubber products including linings • Alkaline batteries • Filters and bag filters	Unlined non-hazardous waste landfill	Waste will be collected from dedicated collection points throughout the project site and placed in the non-hazardous compartment. Where waste is deemed salvageable or recyclable, it will be reclassified and treated as such. The possibility of dry and wet waste compactors being used is being investigated. The non-hazardous waste landfill will consist of a series of excavated trenches with only one exposed trench being used at any given time. Waste will be disposed of in the trench and then covered with excavated material after each deposition. Once an entire trench is full, it will be covered with the remaining excavated material, compacted where possible, and covered with suitable material such as Kando clay. The site will contain storm water diversion channels to minimize storm water ingress, and will be fenced and access-controlled. Development and maintenance of a waste stream inventory, classification/ characterization of waste streams, as well as development of specific management procedures for handling and storage
Salvageable material/ Recyclable material		

Waste stream	Disposal	Management measure
Materials including: • Scrap metal including copper • Used oil drums • Used drums (non-contaminated) • Used chemical drums /scrap metal (non-contaminated) • Old machinery including vehicles • Scrap wood and wood chipping • Metal pipes • Mill rods • Metal cuttings • Mill and crusher linings • Pipes (HDPE and Steel)	Salvageable material yard (on an engineered terrace)	Where practical, material in the waste stream will be salvaged and stored in a designated area for reuse on the project. Decontaminated/ safe recyclable material which will not be salvaged for use on the project will where feasible be made available for reuse or recycling by external parties including surrounding communities. This will be carried out in a controlled manner. This waste will be cleaned. Where waste is deemed recyclable, it will be reclassified and treated as recyclable waste. Industrial waste will be disposed of in a designated industrial landfill site. This site will consist of a series of excavated trenches with only once exposed trench being used at any given time. Once a trench is full, it will be covered with excavated material, compacted where possible, and closed. The site will contain storm water diversion channels to minimize storm water ingress. The site will be fenced and access controlled. The viability for creating a demand for a scrap steel market or trade (buy and sell) will be investigated. Used tyres will be stored in the overburden stockpile area for potential co-processing use. Development and maintenance of a waste stream inventory, classification/ characterization of waste streams, as well as development of specific management procedures for handling and storage will be implemented.
Hydrocarbons for separate incineration		
Waste streams covering: • Used hydrocarbons including oil, diesel, and paraffin • Solvents • Oily rags	Storage for future co-processing, or if it is determined through feasibility assessment that co-processing will not be	These will be collected from dedicated collection points throughout the project site and brought to the waste management facility. The oils storage area will be properly bunded with GIIP design features including oil separators. The used hydrocarbons will be transferred to central storage tanks. Should it be decided that co-processing will not proceed, incineration of the hydrocarbons will take place in a separate oil incinerator designed to manage such. The incinerator will be emission compatible with the IFC,

Waste stream	Disposal	Management measure
• Sewage sludge	implemented, an oil incinerator will be installed	AfDB, EIB and other lenders, and will further abide by GIIP safety requirements. Development and maintenance of a waste stream inventory, classification/ characterization of waste streams, as well as development of specific management procedures for handling and storage will be implemented
Hazardous waste		
Wastes including: • Transformer oil • Hydrocarbon contaminated material including soils • Waste and expired chemicals • Chemical contaminated material (incl. paint) • Spilled material • Incinerator ash • Lead anodes • Lead acid batteries • Electronic waste • Fluorescent tubes • Used glycol coolant • Paints • Electronic waste (lead, copper, mercury, nickel, and associated heavy metals) • Sodium hydroxide degreaser • PCB wastes • Aerosol tins	Synthetically lined hazardous waste landfill	Where possible, hazardous waste will be avoided, and machinery or goods containing such substances as for asbestos and PCB's will not be accepted on site Hazardous waste will be collected from dedicated collection points throughout the project site and placed in the hazardous compartment. The waste will be periodically covered with suitable material such as Kando clay Development and maintenance of a waste stream inventory, classification/ characterization of waste streams, as well as development of specific management procedures for handling and storage will be implemented. Material safety data sheet (MSDS) controls for management of risks from mixing of hazardous materials

Waste stream	Disposal	Management measure
Medical waste		
All medical waste derived from the NYA Project	Medical waste Incinerator	This waste stream will be treated at an incinerator located near the clinic. Waste from the incinerator will be disposed of in the hazardous waste compartment. Where appropriate, alternative off-site disposal options will be explored and considered. Development and maintenance of a waste stream inventory, classification/ characterization of waste streams, as well as development of specific management procedures for handling and storage will be implemented
Overburden stockpile		
• Stripped vegetation • Rocks and other non-top soil material • Tyres	Material storage facility: Overburden stockpile	An overburden stockpile, approximately 45 ha in size, will be constructed for the storage of unmineralised overburden material. The overburden stockpile will reach a height of approximately 20m. Ripping and re-compaction will not occur at the overburden stockpile area. As per the 2007 EHS Guideline for Construction Materials Extraction, measures include: • Operational design and planning should include procedures for the reduction of waste production (e.g. blending high-quality rock with poor rock) • Topsoil, overburden, and low-quality materials should be properly removed, stockpiled near the site, and preserved for rehabilitation • Hazardous and non- hazardous waste management plans should be developed and adopted during the design and planning phase (this WMP and the associated management plans for the project). Further, rocks and other non-top soil material will be used to ensure visual and topographic integration, as well as storm water and erosion control. Tyres, as well as stripped vegetation, will be stockpiled adjacent to the overburden for potential use as AFR

Waste stream	Disposal	Management measure
Production wastes		
Sources of solid waste in cement manufacturing include: • Clinker production waste, mainly composed of spoil rocks, which are removed from the raw materials during the rawmeal preparation • Kiln dust removed from the bypass flow and the stack, if it is not recycled in the process.	Clinker production waste will be returned to the production process	Wastes will be disposed of in accordance with DRC and lender requirements including the IFC EHS Guidelines. Consideration will be given to reused / recycling of dust
Sewage		
Waste water from: • Kitchen sinks (pretreated by a grease trap) • Water from showers, baths, washbasins and laundries • Flushed toilet water • Waste from portable toilets	Packaged sewage treatment plant	A package sewage treatment plant will be used to treat sewage. A factory-built packaged sewage treatment plant will be installed for around 500 people during the construction phase, at a design average daily flow of approximately 100m^3/day of domestic wastewater input. The treatment process will ensure that the final effluent complies with the DRC and international effluent discharge standards. The final effluent will then be diverted to the lined treated sewage effluent dam at the sewage treatment plant. Overflow from this dam will be released to the environment. Waste from the portable toilets will be added to the packaged sewage treatment plant. Where appropriate, sewage sludge will be used for composting including for revegetation as part of rehabilitation activities.
Explosives		
Pieces of unexploded blasting media	Burning ground; Ashes will be	Waste explosive material and explosives packaging will be safely destroyed by burning on an appropriately selected burning ground in line with GIIP. Residue will be

Waste stream	Disposal	Management measure
Packaging for explosives	disposed of in the hazardous waste compartment	disposed of in the hazardous waste compartment. Development and maintenance of a waste stream inventory, classification/ characterization of waste streams, as well as development of specific management procedures for handling and storage will be implemented.
AFR for potential co-processing		

Waste streams covering:
• Discarded tyres
• Waste oil and solvents
• Oily rags
• Plastics
• Textiles
• Paper and cardboard
• Biomass in the form of logs and wood chips
• Sewage sludge
	Cement kiln	Following a feasibility process outside the scope of this project, should it be decided that co-processing will proceed, waste suitable as AFR will be collected from dedicated collection points throughout the project site and placed in the AFR stockpile to be situated adjacent to the coal stockpile. Detailed measures for the operation of co-processing and management of waste streams will be developed.
		In line with the GTZ-Holcim 2006 Guidelines:
		• Waste streams which **cannot** be included as AFR include:
		  ○ Infectious and biologically active medical waste
		  ○ Explosives/ blasting media
		  ○ Radioactive wastes
		  ○ Mineral acids and corrosives
		  ○ Asbestos
		  ○ Unsorted general waste
		• Alternative fuels need to be fed into the most suitable zones, such as materials with high volatile content need to be fed into the high temperature zone of the kiln. Management measures will be put in place to ensure that waste streams inappropriate for inclusion in AFR, do not get stored in or near this area, and are not allowed to be burned in the cement kiln
		• Materials which contain mercury should be avoided since the kiln will result in emissions
		• GIIP fire protection measures need to be in place (See the EPRP contained in Appendix 16)

Waste stream	Disposal	Management measure
		Waste not in compliance with lender, GIIP, DRC as well as the UN Conventions (including the Basel Stockholm Conventions and the Montreal Protocol) will not be accepted as AFR. Wastes generated in the local environment, such as tyres, may be considered for inclusion as AFR. Sewage sludge will be handled in accordance with GIIP to include measures for OHS and for management of odours. The incinerator will be emission compatible with the IFC, AfDB, EIB and other lenders requirements. Emissions from the kiln will be monitored as per requirements set out in Section 14 of the ESIA/ ESMP.

5 Waste management implementation

5.1 Resources and responsibilities

The development of the WMP to be undertaken prior to the commencement of construction will be the responsibility of Sustainable Development Manager who will be appointed prior to commencement of construction. The WMP will incorporate procedures for disposal of the different categories of waste, and will be reviewed at regular intervals and when particular events occur that trigger a review. Such events would include the appointment of a new facility manager or the introduction of a new activity at site. Responsibilities for implementation of the WMP will be as follows:

- **Sustainable Development Manager**: Ensure implementation of the WMP;
- **Environmental Coordinator:** Develop management procedures for waste streams and maintain records of waste volumes placed in cells. The Environmental Department will further undertake quarterly estimates of capacity remaining in each cell, and estimate expected time until full. It will further be the responsibility of the Environmental Department to conduct regular inspections to verify waste is properly segregated, as well as to collect and analyse samples of leachate and maintain records in this regard. Regular testing of the groundwater monitoring wells located down gradient of the Waste Management Facility will be undertaken;
- **Supervisor**: Ensure compliance with the waste segregation procedures, as well as maintain good housekeeping practices at waste collection areas;
- **Superintendent:** Ensure compliance with the waste segregation procedures; understand waste disposal requirement for wastes generated in their areas, and implement procedures to determine disposal requirements. The Superintendent will further oversee the management of waste related to Non-Industrial Construction, including the appropriately scheduled pickup of metal bins; appropriate disposal of waste, as well as the completion of monitoring forms for each waste load. Good housekeeping practices at the landfill will further be the responsibility of the Superintendent, as will the management of landfill attendants; and
- **Contract:** Day-to-day management of the WMF will be carried out by NYA; with contractors being brought in for this purpose should this become necessary. The contractors will provide daily reports to the office of the Sustainable Development Manager. Collection and processing of waste will take place on a daily basis, and when required on a 24-hour basis.

5.2 Procedures for waste management

5.2.1 Controls

Wastes will be separated into relevant categories, with specific standard task procedures to be developed for wastes including hazardous, non-hazard, medical waste to be incinerated and recyclable/ salvageable waste.

Management of the WMF and related waste management infrastructure will incorporate the requirement for WMF attendants to direct disposal to the appropriate disposal site and for volumes of each load to be recorded. Liquids will be mixed with sufficient quantities of a suitable absorbent medium prior to being deposited so that there is no free flow, while hydrocarbon-contaminated waste will be placed in the industrial waste cell.

Emission specifications for oil incineration will be compliant with good practice emissions standards in line with IFC requirements.

Food waste in the unlined non-hazardous waste landfill general cell will be covered on a daily basis with approximately 300 mm of capping material, while other waste placed in the general cell will be covered at least weekly, or daily where there is the potential for excessive windblown litter , flies, odours, or if waste is unsightly.

Hazardous waste will be managed as set out in **Error! Reference source not found.** above.

5.2.2 Maintenance of records

Regular (at least monthly) updating of records will be carried out on volumes of the different waste streams.

5.2.3 Implementation of waste hierarchy

NYA will endeavour to avoid and minimize the generation of waste in line with the waste hierarchy (see Section 3.2 above). Waste will be salvaged for reuse, and alternatively will be recycled where feasible. In order to facilitate implementation of this goal, the introduction of waste minimization as part of the scope of works for contractors should be investigated.

5.2.4 Safety, security and emergency preparedness

Full time security, fencing and signage will be maintained at the WMF in order to minimize the risks from trespassing. In particular, hazardous waste will be clearly indicated as such. Alignment of the WMP and EPRP needs to be ensured, including for hazardous waste spills, fires and other incidents. Measures including regular grass and bush clearing round the WMF, strict implementation of good housekeeping and regular checks on safety equipment must be carried out.

Environmental operational procedures relevant to waste management must be put in place to cover aspects including:

- Safe handling, storage and disposal of hazardous, as well as non-hazardous waste;
- Cleanup of hydrocarbon and chemical spills;
- Oil and silt trap cleaning;
- Storage, handling and disposal of used oil drums; and
- Metal waste handling.

Safety procedures and standards relevant to waste management which must be put in place to deal with issues including:

- Contractual requirements for service providers;
- Protocols for dealing with events (e.g. fire and breach of hazardous waste cell) dangerous that pose a danger to the health and safety of staff and nearby communities;
- Communications, to incorporate community involvement as set out in detail in the Stakeholder Engagement Plant (SEP);
- Emergency preparedness;
- Good housekeeping;
- Incident reporting, investigation, non-conformances, and preventive as well as corrective action; and
- Hazard and risk assessment, and associated management measures.

5.3 Monitoring, evaluation, reporting and auditing

Monitoring activities must include the following:

- Documentation of the volumes of individual waste loads and a description of waste category;
- Implementation of water quality monitoring as set out in Section 14 of the ESIA/ ESMP. This must include at least two groundwater monitoring wells to be located down gradient of the WMF, as well as monitoring down gradient of the septic tank; and
- Implementation of the air quality monitoring as set out in Section 14 of the ESIA/ESMP.

Evaluation of waste management by the NYA environmental department will incorporate:

- Compilation of reports analysing the quantities of waste disposed in each cell on a monthly basis; and
- Estimation of remaining life of the waste cells on a quarterly basis.

Reporting on waste management will include annual reporting on the status of the WMP and its implementation in the Sustainable Development Manager's report to the NYA Board. This will incorporate notes on significant changes to waste management, future plans, and feedback on annual review of the WMP for the reporting period. The report will also quantify the waste streams as far as possible, based on the proposed Environmental & Social Management System which NYA which will be implemented in line with ISO 14001.

Rigorous and regular auditing of the implementation of the WMP will enable the generation of recommendations that will monitor adherence to the WMP including the waste hierarchy, and will make recommendations for improved efficiency and reduced environmental/social impacts.

6 Documents to consult

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes.

CSI (undated). Cement Sustainability Imitative under the auspices of the World Business Council for Sustainable Development. http://www.cement.ca/en/Commited-to-Sustainability.html . Date accessed: 28 June 2013.

EIB (2009). The EIB Statement of Environmental and Social Principles and Standards.

EIB (2010). European Investment Bank Environmental and Social Practices Handbook.

GTZ-Holcim Public Private Partnership (2006). Guidelines on co-processing Waste Materials in Cement Production. Produced jointly by Holcim Group Support Ltd and Duetsche Gesellschaft fur Technische Zusammenarbeit (GTZ).

OECD/IEA and the World Business Council for Sustainable Development. (2009). Cement Technology Roadmap 2009 - Carbon emissions reductions up to 2050. Published by the OECD and IEA in partnership with the World Business Council for Sustainable Development.

IEA (2009). Energy Technology Transistions for Industry. www.iea.org/roadmaps/cement.asp.

IFC (2007). World Bank Group General EHS Guidelines. Published by the International Finance Corporation. 30 April, 2007.

IFC (2007). World Bank Group Mining EHS Guidelines. Published by the International Finance Corporation. 10 December, 2007.

IFC (2007). World Bank Group EHS Guideline for Cement and Lime Manufacturing**.** Published by the International Finance Corporation. 30 April, 2007.

IFC (2007). World Bank Group EHS Guideline for Construction Materials Extraction**.** Published by the International Finance Corporation. 30 April, 2007.

IFC (2012). Environmental and Social Review. Procedures Manual. Environment, Social and Governance Department. Version 8. 31 May, 2012.

IFC (2012). Performance Standards on Environmental and Social Sustainability, including the Guidance Notes. Published by the International Finance Corporation, 1 January, 2012.

Natural Resources Canada (2010). Guidelines for Bulk Explosives Facilities – Minimum Requirements. Series of Guidelines, including the 'Guidelines for the destruction of explosives, Bulletin #43'. Explosives Regulatory Division, Explosives Safety and Security Branch, Minerals and Metals Sector, Department of Natural Resources, Canada.

UNEP (2012) .Technical guidelines on the environmentally sound co-processing of hazardous wastes in cement kilns. 2012 Secretariat of the Basel Convention.