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BHP Billiton World Exploration Inc. (Ethiopia) Environmental Impact Assessment (EIA) Report

Danakil Potash Exploration Project 2011

DETAILS ABOUT THE DEVELOPER

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CONTENTS

LIST OF FIGURES

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Consultant and Manager of ECO-Consult since 1993. Consulted for World Bank, UNDP, UNFPA among other agencies. Published and co-authored more than eight science/environmental books and contributed to numerous scientific articles.

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EXECUTIVE SUMMARY

This Environmental Impact Assessment (EIA) report has been produced to comply with Federal Democratic Republic of Ethiopia (FDRE) legislation, World Bank (WB) policy requirements and BHP Billiton's internal Health, Safety, Environment and Community (HSEC) Standards as they relate to the environmental management of Projects to be carried out within the framework of the BHP Billiton World Exploration Inc. (Ethiopia) Potash Exploration Program. The requirement for exploration license holders to conduct an EIA and obtain related statutory environmental approvals is defined in the Ministry of Mines and Energy Resource Development Bureau Proclamation Number 678/2010.

BHP Billiton World Exploration Inc. (Ethiopia) was awarded Exploration License 0428-1146/2001 on 2 September 2009, to explore for potash and related salts in the Danakil Depression. The Exploration License, covering 14,368.685km2 is valid for an initial period of 3 years with the option to renew twice, for periods of 1 year each.

The nature of this exploration / prospecting project is of grass roots level and hence will result in very low environmental impacts within the project area. Exploration will be performed using geophysical aerial surveys, seismic surveying and drilling. The project will be designed according to available geological information of the area and will aim to minimise potential disturbances on local communities, wildlife or environmentally sensitive areas.

An Environmental Baseline Study (EBS) was completed for the license area in December 2010. The EBS report included a review of relevant legislation, baseline biophysical and socio-economic description, project description and a description of potential environmental impacts. Several meetings to inform stakeholders about the planned exploration activities within the area have been held and minutes recorded as well as a series of photographs taken.

The main positive environmental and socio-economic impacts of the project include:

- Direct and indirect employment and training of approximately 250 - 300 local people as full time and casual workers on daily rate basis in accordance with the Labour Laws of the Federal Democratic Republic of Ethiopia.
- Procurement of local contractors and providers where possible and corresponding benefits to the local and regional economies; and
- A possible limited increase / upturn in the local economy with some increased trading likely to take place within the area.

The main negative environmental and socio-economic impacts of the project include:

- Land disturbance when constructing temporary access tracks, exploration camps and drill sites to undertake drilling;
- Contamination of soil and groundwater if spillages of fuel, oils and drilling fluids occur;
- Potential for disturbance of archaeological and cultural heritage sites;
- Generating waste at worksites and campsite;
- Possible use of scarce freshwater resources in the Danakil basin;
- Air pollution from vehicles, generators and drilling rigs;
- Elevated noise levels due to operating vehicles, generators and drilling rigs;
- Possible disturbances to wildlife;
- Possible HIV / AIDS and other sexually transmitted diseases transfer.

Methods for avoiding and mitigating the negative environmental and socio-economic impacts are described in the Environmental Management Plan for the project. The frequency, duration, severity and spatial extent of these impacts and the sensitivity of the elements being impacted are considered as being low.

BHP Billiton places great importance on being a welcome contributor and partner in the development of the area and the communities in which it operates. As such, the management and field personnel will be sensitive to the needs and customs of the local population and stakeholders in the project area.

INTRODUCTION

Scope of EIA Report

This Environmental Impact Assessment (EIA) purely addresses activities and impact mitigation measures defined during the exploration phase. A separate environmental and social impact assessment process will be applied should BHP Billiton determine there is a mining development potential in the Danakil area beyond the exploration phase.

Although BHP Billiton World Exploration Inc. (Ethiopia) is primarily obligated to report on activities within our exploration licenses area this assessment has been extended to encompass the full range of expected social and environmental impacts for all exploration related activities in the Danakil area including exploration base camp areas.

Current off-licence activities include the main BHP Billiton and TESLA Exploration camps highlighted in further detail in this report. TESLA-IMC will self-manage and self-operate its own camp and seismic activities independently of BHP Billiton. TESLA-IMC have developed their own Environmental Management Plan, Waste Management Plan and Land Disturbance Plans to cover all environmental aspects of their operations. These plans have been approved by BHP Billiton World Exploration Inc. (Ethiopia). The BHP Billiton camp will be managed by PDL Toll. BHP Billiton's base camp is located within the exploration licence boundary of Afar Exploration LLC and Stratex. A formal agreement covering the camp and exploration activities has been signed with Afar Exploration LLC. BHP Billiton World Exploration Inc. (Ethiopia) is currently in discussion with Stratex regarding management and ultimate rehabilitation of the base camp which is on their exploration licence (awarded February 2011).

Not covered in this report is the Allana Resources exploration base camp which is located within the BHP Billiton World Exploration Inc. (Ethiopia) licence area. Allana Resources' concession covers part of the previously defined Musley potash deposit. A formal agreement between BHP Billiton World Exploration Inc. (Ethiopia) and Allana Resources' concession covers part of the previously defined Musley potash deposit directly north of BHP Billiton World Exploration Inc. (Ethiopia) license. This agreement will contain provisions highlighting the need for sound environmental practices in compliance with Federal Democratic Republic of Ethiopia legal and statutory requirements.

Approach to the Study

Objective

- The primary objective of preparing this Environmental Impact Assessment (EIA) Report is to examine the impacts of the mineral exploration programme on physical, biological, socio-economics, socio-cultural environment and to provide adequate mitigation measures for the potential impacts.

Methodology

The following steps were involved in preparing this EIA:

- Review of relevant legislation. Special emphasis was given to the Environmental Impact Assessment Proclamation No. 299/2002 which is the core law for EIA in the country and the Mining Operations Proclamation (Proclamation No. 678/2010);
- Review of environmental literature;
- Conducting a comprehensive Environmental Baseline Study of the Project Area;
- Identification of significant environmental aspects and development of mitigating measures;
- Community consultation; and
- Development of an environmental management and monitoring plan.

SECTION 1

About the Developer – BHP Billiton

BHP Billiton is the world's largest diversified mining and resources Company with global operations comprising approximately 100,000 employees and contractors located in over 25 countries. The Company is among the world's top producers of major commodities, including steelmaking products – iron ore, metallurgical coal, manganese; non-ferrous products – copper, aluminium, nickel, diamonds, potash; energy products – petroleum, energy coal and uranium.

BHP Billiton Minerals Exploration (MinEx) is the exploration division headquartered in Singapore while the BHP Billiton group is headquartered in Australia. BHP Billiton's exploration program is integral to the Company's growth strategy and is focused on identifying and capturing new world-class projects for future development, or projects that add significant value to existing operations. Minerals Exploration regional offices are located in Perth (Australia), Johannesburg (South Africa) and Santiago (Chile).

Project Partners

BHP Billiton has contracted several international companies to provide a range of world-class exploration and support services during the initial phases of the Ethiopia potash exploration program. Each major contracting partner has significant project experience in Africa and other remote locations around the world. Each partner has a reputation for delivering results in their respective fields. The Company's contracting partners also have well established Health, Safety, Environment and Community policies that readily complement BHP Billiton's comprehensive standards.

Toll Remote Logistics

Toll provides integrated logistics services and operates over 1100 sites throughout more than 50 countries across the world. Toll's access to transport and infrastructure assets includes road fleets, warehousing, ships, air freight capacity, ports and rail rolling stock. Toll will provide full logistical support for the Danakil exploration program including camp management, food and catering, organising bulk fuel supplies, management of earthmoving contracts food and catering, organising bulk fuel supplies, management of earthmoving contracts and heavy and light vehicle transport.

http://www.toll.com.au

Tesla Exploration Ltd

Tesla Exploration Ltd. and its subsidiaries of Tesla Exploration Partnership, Tesla-IMC International Ltd., Tesla-Conquest Inc.,Tesla Offshore LLC, and Tesla Processing, provide a range of geophysical and marine construction support services to the oil and gas exploration industry. Tesla Exploration Ltd assists clients with their geophysical pursuits from comprehensive project planning for both onshore and offshore surveys, through to completion and finally data processing (2D, 3D, 4D, 3C) and interpretation in a multitude of environments. Tesla operates a fleet of 68 vibroseis units including 14 envirovibes.

http://www.teslaexploration.com

Boart Longyear

Boart Longyear is headquartered in Salt Lake City, Utah and publicly listed on the ASX (Australian Securities Exchange) in Australia. Boart Longyear provides drilling services and products to the global mining and exploration industry. The company also services industries in water exploration, environmental sampling, energy, and oil sands exploration. The Company conducts contract
drilling services in more than 40 countries. The Company provides all types of drilling, including surface and underground coring, multi-purpose, reverse circulation, conventional air/mud rotary, flooded reverse, directional, sonic, and percussive production drilling. Boart Longyear operates the largest sonic rig fleet in the world.

http://www.boartlongyear.com

Capital Drilling

Capital Drilling provides exploration, development, grade control and blast hole drilling services to mineral exploration and mining companies. The Company's operations span four continents with activities in Africa, (Eastern) Europe, Asia and Latin America. The company currently has a fleet of over 60 drilling rigs including three aircore rigs, five deep hole diamond rigs, twenty-four conventional diamond and heliportable rigs, eleven reverse circulation & grade control rigs, nine multipurpose
rigs and eleven blast hole rigs.

http://www.capdrill.com

SEMM Logging

SEMM Logging is a France based Company specializing in geophysical measurements in boreholes. The Company is ISO9001 accredited and specializes in diverse projects including mineral resources, oil and gas; geotechnical and civil engineering, hydrogeology and geothermal.

With its advanced equipment and dynamic team, SEMM Logging is capable of working in any location and provides down hole wireline logging from 0 to 3000 metres depth. SEMM Logging is represented in Niger (Niamey), Congo (Pointe Noire), Madagascar (Antananarivo) and Canada (Montreal).

http://www.semmlogging.fr

Zimex Aviation

Founded in 1969, Zimex Aviation provides aircraft support to the oil and gas industry, humanitarian agencies and non-governmental organizations worldwide. Mainly to enable crew changes, special material, general supplies and fresh-food deliveries, as well as medical evacuation and search and rescue missions. While Zimex is active worldwide, its main focus is on North Africa and the Middle East. Zimex currently operates 22 aircraft.

http://www.zimex.ch

SECTION 2

Review of Relevant Ethiopian Legislation, Policy, Legal and Administrative Frameworks & BHP Billiton Standards

National Environmental Policies and Strategies

The Constitution of Federal Democratic Republic of Ethiopia (FDRE)

The Constitution (FDRE 1995), contains a number of articles which are relevant to environmental matters in connection with development projects, as well as to the environment in general, and it forms the fundamental basis for the development of specific environmental legislative instruments.

Conservation Strategy of Ethiopia (CSE)

The Conservation Strategy of Ethiopia (CSE) provides a comprehensive and rational approach to environmental management in a very broad sense, covering national and regional strategies, sectoral and cross-sectional policies, action plans and programmes, as well as providing the basis for development of appropriate institutional and legal frameworks for implementation.

The plan comprehensively presents the existing situation within the country and gives priority action plans on the short and medium term. In particular, it recognizes the importance of incorporating environmental factors into development activities from the outset, so that planners may take into account environmental protection as an essential component for economic, social and cultural development. Regional States are responsible for the preparation of regional conservation strategies, detailing the specific conditions and environmental issues prevalent in their territory, and outlining the ways in which problems need to be addressed. Afar National Regional State has a Regional Conservation Strategy (ANRS, 1999), which is in line with the Federal CSE.

Environmental Policy of Ethiopia

The Environmental Policy of the Federal Democratic Republic of Ethiopia (EPE) was approved by the Council of Ministers in April 1997. The policy has the broad aim of rectifying previous policy failures and deficiencies which, in the past, have led to serious environmental degradation. It is fully integrated and compatible with the overall long-term economic development strategy of the country, known as Agricultural Development-Led Industrialization (ADLI), and other key national policies.

The EPE's overall policy goal may be summarized in terms of the improvement and enhancement of the health and quality of life of all Ethiopians, and the promotion of sustainable social and economic development through the adoption of sound environmental management principles. Specific policy objectives and key guiding principles are set out clearly in the EPE, and expand on various aspects of the overall goal.

The thorough and holistic approach taken to development of the policy and, in particular, recognition of the importance of addressing cross-sectoral environmental issues, has led to a national approach to environmental management, which is not only comprehensive, but also provides a sound and rational basis for addressing the environmental problems faced by the country now and those which are anticipated over the coming decades.

Environmental Impact Assessment Proclamation

The Proclamation was enacted in 2002 (Proc. No. 299/2002), based on this regulation the EPA has prepared or is in the process of preparing procedures, regulations, environmental guidelines, standards to effectively implement and enforce them. Environmental guidelines are among the tools for facilitating the consideration of environmental issues and principles of sustainable development into development proposals. As a sequel of enacting this Proclamation, sectoral impact assessment guidelines focusing on agriculture, transport, industry, tannery and settlements have been prepared.

Radiation Protection Proclamation

The Radiation Protection Proclamation, Proc. 571/ 2008 established 'The Ethiopian Radiation Protection Authority' that is accountable to the Ethiopian Science and Technology Agency (now a Ministry of Science and Technology). The objectives of the authority include, among others 'protection of individuals, society, its property and the environment, in current and future generations, from radiation hazards emitted from radiation sources and related practices including X-ray machines above the exempted level'. Its activities include among others,(i) establish a system of coordinating public and private activities with a view to ensuring radiation safety and security of radiation sources; (ii) carryout inspection and take appropriate measures to ensure compliance with radiation protection laws and directives; and (iii) issue directives to define dose limit, exemption, clearance and exclusion levels as well as relevant accessory equipment subject to regulatory control.

Environment Policy (Approved 1997)

At the Federal level, there is, already in place, an approved Environmental Policy. The overall objective of the policy is to promote sustainable social and economic development of the country through the conservation and sustainable utilization of the natural, manmade and cultural resources and the environment of the country. It specifies the policy objectives, key guiding principles, sectoral and cross-sectoral policy frameworks and implementation strategies to be followed so that the overall objectives can be realized.

Biodiversity Policy (Approved 1998)

The policy provides for policy guidance towards the effective conservation, rational development and sustainable utilization of the country's biodiversity. In general, the policy consists of comprehensive policy provisions on the conservation and sustainable utilization of biodiversity.

Investment Policy (Proclamation No. 37/1996)

The investment objectives specified in the proclamation emphasize on the maximum exploitation of natural resources without mentioning the consideration of rational use, conservation and rehabilitation of natural resources that are even threatened. Maximization of exploitation of natural resources without maintaining the balance of sustainability is detrimental to the natural resources and the intended development itself. On the other hand, the provision of the proclamation that requires the undertaking of impact assessment for investment projects can be amplified by other laws with a view of addressing the concerns of biodiversity conservation and sustainable utilization of its components.

The World Bank Safeguard Policies

The World Bank provides guidance on requirements in the Environmental Assessment Sourcebook, which includes recent versions of the World Bank Operational Policies as well as the updates. The World Bank has ten "Safeguard Policies" whose primary objective is to ensure that Bank operations do not cause adverse impacts and that they "do no harm". The ten safeguard policies are grouped into Environment, Rural Development, Social Development and International Law. Of these ten safeguard policies, three are not applicable as they relate to international law on waters and disputed areas, and the safety of dams. The policies that will be considered in the EIA comprise OP 4.01 Environmental Assessment (EA), OD 4.15 Poverty Reduction, OP/BP 4.12 Involuntary Resettlement, OD 4.20 Indigenous People, OP/BP 4.36 Forestry, OPN 11.03 Management of Cultural Property, OP/BP 4.11 Physical Cultural Resources, and the Bank's Policy on Disclosure.

Environmental Framework Legislation

The Constitution 1995

The Constitution has provisions for the establishment of the basic legal framework and principles according to which the conservation and utilization of natural resources and the environment shall be directed and regulated. The concepts "natural resources" and "environment" are wide enough to encompass biodiversity. The ownership, conservation and utilization of biodiversity shall, therefore, be regulated and directed in accordance with these constitutional provisions. These constitutional provisions give favourable basic legal framework to promote, regulate and direct the conservation and sustainable utilization of biodiversity resources of the country.

Mining Proclamation and Guidelines

The Mining Proclamation (Proc. No 678/2010), promotes sustainable development of mineral resources in Ethiopia. Part Two, Article 9 (types of License) has identified license types as (i) a reconnaissance license; (ii) an exploration license; (iii) a retention license; (iv) artisanal mining license; (v) small scale mining license; and (vi) large scale mining license. Part Seven of the same proclamation stipulates that except for reconnaissance license or artisanal mining license, any applicant for a license shall submit an environmental impact assessment and obtain all the necessary approval from the competent authority required by the relevant environmental laws of the country.

The guidelines outline standard methods and procedures for a step-by-step approach to environmental management activities to be conducted during each phase of the project, exploration and mining operations. The Environmental Impact Assessment Guideline for Mineral and Petroleum Operation Projects (EPA, 2003) is organized in such a way that the impact of exploration is considered first, the development phase and mining phases separately, thereafter, with the transfer of environmental information from the preceding phase of operation (activities) to the next phase.

Environmental Framework Legislations

Among the Proclamations that have been issued by the Government of Ethiopia, the ones that are aimed to foster environmental protection and sustainable use of the Country's natural as well as man-made resources are listed in figure 1.

Figure 1: List of Proclamations Relevant for the Study

No	Proclamation or Regulations No.	Proclamation or Regulations Title
1	Proclamation No. 299/ 2002	Environmental Impact Assessment Proclamation
2	Proclamation No. 295/ 2002	Environmental Protection Organs Establishment Proclamation
3	Proclamation No. 300/2002	Environmental Pollution Control Proclamation
4	Proclamation No. 159/ 2008	Prevention of Industrial Pollution Council of Ministers Regulation
5	Proclamation No. 678/ 2010	Mining Operations Proclamation
6	Council of Ministers Regulation No. 182/ 199	Council of Ministers Regulations on Mining Operation Regulations
7	Proclamation No. 678/ 2010	Proclamation to Promote Sustainable Development of Mineral Resources
8	Proclamation No. 209/ 2002	Research and Conservation of Cultural Heritage Proclamation
9	Proclamation Nos. 541/2007; 192/1980; 416/1972	Development Conservation and Utilization of Wildlife Proclamation
10	Regulation No. 163/ 2008	Wildlife Development Conservation and Utilization Council of Minister Regulation
11	Proclamation No. 542/ 2007	Forest Development, Conservation and Utilization Proclamation
12	Proclamation No. 197/ 2000	Ethiopian Water Resources Management Proclamation
13	Council of Ministers Regulations No. 115/ 2005	Ethiopian Water Resources Management Regulations
14	Proclamation 200/2000	Public Health Proclamation
15	Proclamation 200/2000	Expropriation of Landholdings for Public Purposes and Payment of Compensation Proclamation
16	Proclamation 456/2005	Rural Land Administration and Land Use Proclamation
19	Proclamation 15/2007	Payment of Compensation for Property Situated on Landholding Expropriated for Public Purposes Council of Ministers Regulations
20	Proclamation No. 571/2008	Radiation Protection Proclamation

Regional Laws/Regulations

- The Constitution of the Afar National Regional State (ANRS) and its Conservation Strategy outlines criterias for land, natural resources and environmental issues;
- Government is responsible to; hold land and natural resources in the name of the people and deploy for the common benefit of the same;
- Government and all citizens of the region are responsible for the conservation of natural resources and the environment; and
- Concerned communities shall be given opportunity to express their opinions in the formulation and implementation of policies and projects in relation to the environment.

Multilateral Agreements and International Conventions

Ethiopia has ratified the following international conventions relevant to natural resource environmental management:

- Convention on Biological Diversity (CBD);
- Cartagena Protocol on Biosafety to the Convention on Biological Diversity;
- Convention to Combat Desertification;
- International Treaty on Plant Genetic Resources for Food and Agriculture;
- Vienna Convention for the Protection of the Ozone Layer;
- Montreal UN Framework Convention on Climate Change (UNFCCC);
- Kyoto Protocol to the UNFCCC;
- Transboundary Movement and Management of Hazardous Wastes with in Africa;
- Stockholm Convention on Persistent Organic Substances;
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade;
- Convention on International Trade in Endangered Species of Wild Fauna and Flora;
- Bamako Convention on the ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa;
- Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal; Basel Ban Amendment & Protocol on Liability & Compensation; and
- CITES through proclamation No.14/1970

The FDRE has established an Environmental Protection Authority, and this Authority is designated as focal point for the implementation of the stated conventions.

BHP Billiton Standards

BHP Billiton has a comprehensive management system that helps drive our contribution to sustainable development. Key elements of this system are set out below.

BHP Billiton Charter

The BHP Billiton Charter sets out the Company's values. In particular, the Company is committed to ensuring the safety of employees, respecting the environment and the communities in which it operates. A copy of the Charter is contained in Appendix 2.1 of this report and can be downloaded from the internet at:

http://www.bhpbilliton.com/bb/aboutUs/charter.jsp

BHP Billiton Sustainable Development Policy

BHP Billiton's Sustainable Development Policy defines the aspirations and approach to all key elements of sustainable development across the Company.Sustainable Development at BHP Billiton encompasses our commitment and policy towards health, safety, the environment and the community (HSEC). To ensure improved performance, we have set specific targets in these areas. BHP Billiton's Sustainable Development Policy is included in the Appendix 2.2. A copy of BHP Billiton's Sustainability Report for 2010 can be downloaded from the internet at:

http://www.bhpbilliton.com/bb/sustainableDevelopment.jsp

BHP Billiton Code of Business Conduct

The BHP Billiton Code of Business Conduct sets the standard for our commitment to working with integrity. Specifically, it provides guidance for everyone who works for or on behalf of BHP Billiton on how to conduct their business activities, placing a priority on upholding a high ethical standard and establishing trust with our stakeholders. The BHP Billiton Code of Business Conduct (the Code) is based on the values contained in the BHP Billiton Charter and represents the commitment by BHP Billiton to uphold ethical business practices and meet or, where less stringent than our standards, exceed applicable legal and other requirements. The Code is applicable throughout the BHP Billiton Group, regardless of location, employer or role.

A copy of the Code of Business Conduct can be downloaded from the internet at:

http://www.bhpbilliton.com/bbContentRepository/docs/workingWithIntegrity.pdf

Health, Safety, Environment & Community Standards

BHP Billiton's Health, Safety, Environmental and Community (HSEC) are part of a wider suite of Group Level Documents (GLD). They provide mandatory performance requirements and performance controls which are the basis for developing and applying management systems at all sites operated by BHP Billiton. BHP Billiton Minerals Exploration has implemented these standards across its business, with specific standards for the management of exploration risks.

BHP Billiton and BHP Billiton Minerals Exploration documents span the four key components of sustainable development:

- Health – focusing on the elimination of risks through the control of potential workplace exposures to noise and substances which could result in long-term harm.
- Safety – providing a workplace where people can work without being injured.
- Environment – delivering efficient resource use, reducing and preventing pollution and enhancing biodiversity protection.
- Community – engaging with those affected by our operations, including employees, contractors and communities, and respecting and upholding fundamental human rights.

Voluntary Initiatives

BHP Billiton also supports a range of voluntary initiatives, including:

- International Council on Mining and Metals
- United Nations Global Compact
- Global Reporting Initiative (we are an organisational stakeholder)
- World Business Council for Sustainable Development
- Carbon Disclosure Project
- Extractive Industries Transparency Initiative
- Partners Against Corruption Initiative
- Voluntary Principles on Security and Human Rights

A list of BHP Billiton Minerals Exploration internal HSEC and management policies that may relate to the Ethiopian potash exploration program are listed in Figure 2.

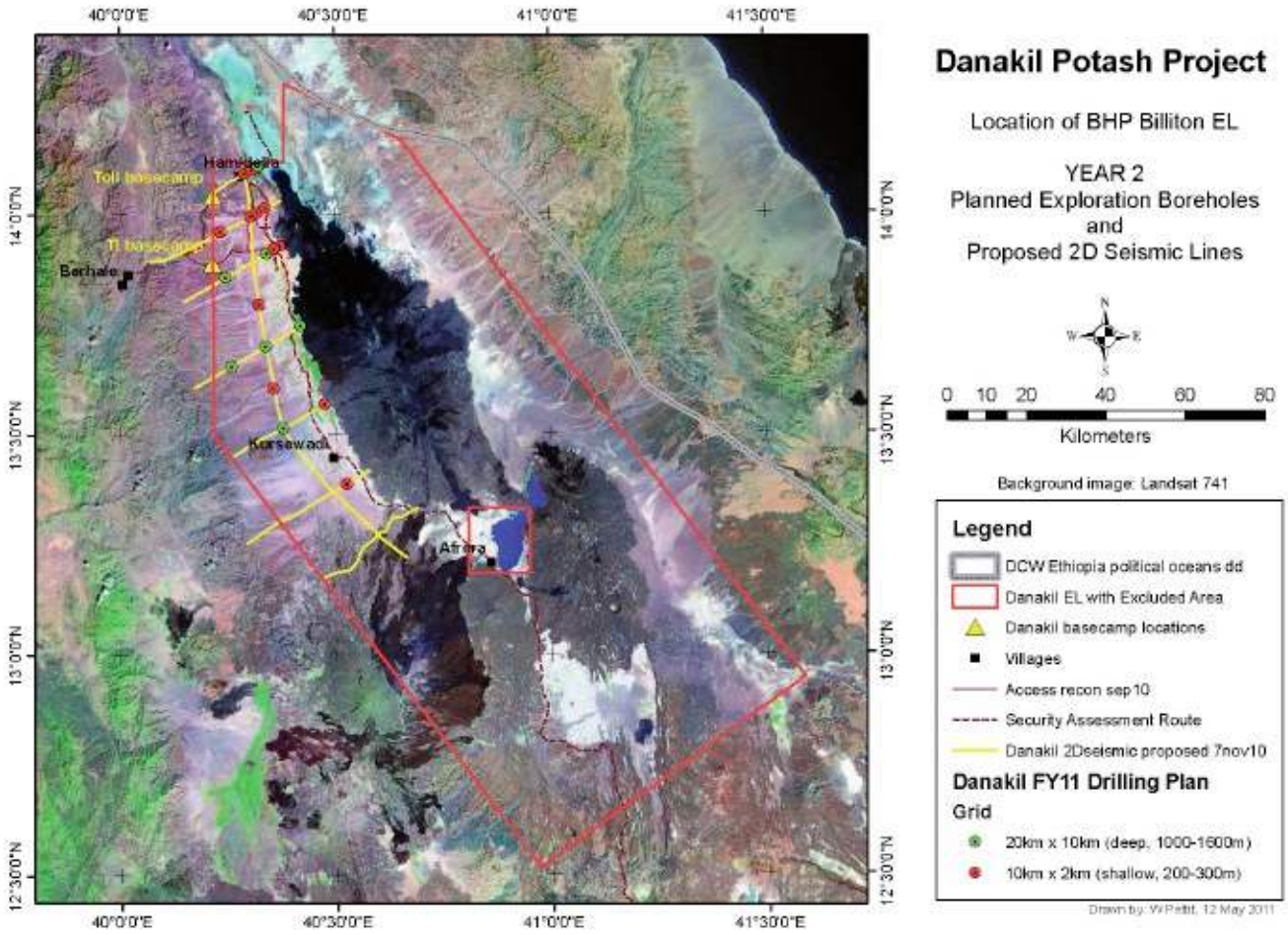
Figure 2: BHP Billiton Minerals Exploration HSEC & Management Standards

MEW 300	Learning from Incidents and Reporting
MEW 301	Lessons Learned Bulletin
MEW 302	Reportable Incidents
MEW 303	HSEC Data Spreadsheet
MEW 304	Aviation Safety
MEW 305	Helicopter External Loads
MEW 306	Aviation Journey Management Plan
MEW 307	Pre Flight Checklist
MEW 308	Vehicle and Mobile Equipment Safety
MEW 309	Vehicle and Mobile Equipment Delivery Checklist
MEW 310	Vehicle Daily Checklist
MEW 311	Vehicle Weekly Checklist
MEW 312	Vehicle Journey Management Plan
MEW 313	Mobile Equipment Checklist
MEW 314	Traffic Management Plan
MEW 315	Drilling Safety
MEW 316	Drill Rig Pre Delivery Checklist
MEW 317	Daily Drill Rig Checklist
MEW 318	Drill Rig Weekly Inspection Checklist
MEW 319	Working Safety
MEW 320	Task Hazard Analysis
MEW 321	Significant Hazard Management Plan
MEW 322	Mandatory Personal Protective Equipment
MEW 323	Travel Safety
MEW 324	Personal Safety, Health and Security Management Plan
MEW 325	Equipment Safety
MEW 326	Equipment Requiring Guarding Register

MEW 327	Critical Equipment Register
MEW 328	Equipment Requiring Isolation Register
MEW 329	Field Safety
MEW 330	Daily Field Work Plan
MEW 331	Field Response Plan
MEW 332	Lightning Protection
MEW 333	Working at Height
MEW 334	Harness and Anchor Point Register and Inspection Record
MEW 335	Working at Height Checklist and Work Approval
MEW 336	Explosive Remnants of War
MEW 337	Camps
MEW 338	Medical
MEW 339	Drug and Alcohol Management
MEW 340	Personal Fit for Work Management Plan
MEW 341	Incident Management Plan
MEW 342	Crisis and Emergency Management
MEW 343	Office Emergency Contact List
MEW 344	Environmental Management
MEW 345	Environmental Management Plan
MEW 346	Community and Stakeholder Engagement
MEW 347	Stakeholder Register
MEW 348	Obligations Register
MEW 349	Stakeholer Grievance Register
MEW 350	Risk Management
MEW 351	Risk Register
MEW 352	Management of Change
MEW 353	Change Management Plan

SECTION 3 - PROJECT INFORMATION

Figure 3: Map of project location in the Danakil area



About The Project

BHP Billiton World Exploration Inc. (Ethiopia) was awarded Exploration License 0428-1146/2001 on 2 September 2009, to explore for potash and related salts in the Danakil Depression. The Exploration License, covering 14,368.685km2 is valid for an initial period of 3 years with the option to renew twice, for periods of 1 year each.

BHP Billiton World Exploration Inc. (Ethiopia) commenced exploration activities immediately after the granting of the Exploration License. During Year 1 (2 September 2009 – 1 September 2010) of the Exploration License, an airborne gravity and magnetic geophysical survey was completed over the license. A Cessna Grand Caravan fixed wing aircraft was used to fly 23,371 line km to collect gravity and magnetic data. Separate plans were submitted and approvals were provided by the Ministry of Mines for these activities.

Planning is currently at an advanced stage to commence follow-up exploration work in Year 2 (2 September 2010 – 1 September 2011) of the Exploration License. The proposed Year 2 Work Program will involve construction of a base 120 man camp, completion of mineralisation testing and stratigraphic drilling, and completion of an estimated 200 line km of 2D reflection seismic survey.

The proposed 2D seismic and stratigraphic drilling activities have the potential to adversely impact on the environment and Afar communities in the Project Area. BHP Billiton World Exploration Inc. has an overriding commitment to the environment and communities in the Project Area. Potential environmental and social impacts that could result from BHP Billiton World Exploration Inc. (Ethiopia's) exploration activities need to be evaluated and effectively managed. Positive impacts include employment with the project.

In undertaking the 'Baseline Study' and producing an Environmental Management Plan, BHP Billiton Ethiopia will be able to operate safely and protect the environment and communities in the Project Area. BHP Billiton World Exploration Inc. (Ethiopia) undertook the Environmental and Social Impact Assessment during Year 2 of the Exploration License. The completion of the Environmental Baseline Study and full Environmental and Social Impact Assessment also conforms to the requirements of the new Mining Operations Proclamation No. 678/2010 of Ethiopia.

Interested and Affected Parties

Primary Stakeholders within the immediate surroundings to the Exploration License 0428-1146/2001 area are:

- Local communities
- Traditional leaders
- Local Government and Authorities (woreda)
- Ministry of Mines & Energy Resource Development Bureau
- Federal Democratic Republic of Ethiopia.

Secondary Stakeholders to the project are:

- Community representative groups including local and international Non-Government Organisations (NGOs) and unions where applicable.

Public Participation

BHP Billiton's overall communication strategy is to maintain an ongoing dialogue with key stakeholders via regular meetings coordinated by 'Local Stakeholder Managers', capturing feedback and providing tailored and timely responses in a continuous loop. A Stakeholder Communication Plan has been prepared which includes plans for reporting on the progress of the project and for stakeholder visits and engagement.

A copy of the Community Relations & Stakeholder Engagement Plan has been attached in Appendix 5.1.

Budget

Total exploration program expenditure is USD $30M.

Exploration Strategy

The aim of mineral exploration in the Exploration License area is to discover significant resources of economic potash mineralization large enough to support development of a new mine in the Danakil Depression.

BHP Billiton Minerals Exploration's Strategy guides exploration investment towards opportunities that meet certain minimum size and grade criteria. Identification and delineation of such opportunities involves systematic design and planning of exploration activities. Based on this, BHP Billiton Minerals Exploration designed and planned an exploration work program involving regional airborne gravity and magnetic survey aimed at screening the entire tenement in Year 1, and follow up exploration work on identified targets using diamond core drilling and 2D seflection seismic survey in Year 2 and 3.

Year 2 Exploration Work Plan

The planned Exploration Work for Year 2 will involve;

- establishment of a 120 man camp to support field activities;
- building of access roads to drill sites;
- completion of an Environmental Baseline Study and Environmental Impact Assessment (EIA) prior to commencing drilling;
- Stratigraphic drilling in Priority 1 Area focused on the western flank of the basin;
- Downhole wireline logging; and
- 2D reflection seismic survey in Priority 1 Area focused on the western flank of the basin potentially requiring a semi-permanent camp for approximately 100-120 employees.

Stratigrahic Drilling and Wireline Logging

It is proposed that a minimum of 3500m will be drilled. A deep diamond drill rig capable of drilling down to 1250m depth will be utilized, as well as a sonic drill rig which has capability to drill 300m deep holes. A total of 10 potential drill hole locations have been planned along 20km spaced drilling fence lines. The drilling fence lines have been planned to coincide with the seismic lines. Drill holes will be spaced either 2km or 10km apart along each line. All

drill core will be logged and potash zones intersected will be sampled and analyzed at an international laboratory. Depending on the thickness of potash mineralization intersected, approximately 100-300 core samples will be collected and submitted for analysis for the initial exploration phase. A decision to drill additional holes will be taken in accordance with the submission of future work programs referred to in the Assessment of Alternatives in Section 6.

Downhole wireline logging will be undertaken in all drill holes completed. Selection of logging tools and type of data to be collected will be influenced by a number of factors. These will include drill hole stability, drill hole diameter, temperature and casing. Depending on the influence of the above factors, the wireline logging runs will include gamma, density, neutron, resistivity, sonic, temperature, borehole survey, and acoustic imaging.

The main objectives of the Year 2 Stratigraphic Drilling and Wireline Logging Program are to:

- Establish extent and distribution of evaporites in the western part of the license area;
- Establish stratigraphy of the basin;
- Test Falcon gravity anomalies;
- Confirm the presence or absence of potash mineralization;
- Establish thickness and grade of identified potash mineralization;
- Determine mineralogy of potash mineralisation; and
- Determine petrophysical properties and map basin stratigraphy and potash horizons through wireline logging.

2D Reflection Seismic Survey

A test 2D reflection seismic survey was completed in December 2010. The Test Survey was conducted over two 5 line km lines and one 1.5km line. The test survey lines were positioned to test different ground conditions in order to determine the appropriate number of channels, energy source parameters, energy source intervals and receiver intervals to be used during the production seismic survey. The test seismic survey has confirmed the applicability of the seismic method on the BHP Billiton license in the Danakil Depression. In the production seismic survey a total of 190 line km will be completed along lines coinciding with the drill fence lines.

The main objectives of the 2D reflection seismic survey are to:

- Map basin stratigraphy to >1000m depth;
  In combination with drilling and wireline logging map basin structures and architecture;
- Identify less structurally complex sections of the basin amenable to mining;
- Map lithological contacts between halite, carbonates, clastic sediments, basalts and basement rocks;
- Identify potential target areas for infill drilling and delineation; and
- Determine reflective characteristics of the anhydrite marker and its potential use as a vector towards potash mineralization.

Figure 4: Exploration Program Snapshot – Year 2

Activity	Volume / Size
Camp Construction	120 Man
Environmental Baseline Study	Complete
2D Reflection Seismic Test Survey	Complete
2D Reflection Seismic Production Survey	190 line km
Stratigraphic Drilling	3500m (initially)
Core Samples	100m - 300m (initially)
Wireline Downhole Logging	3500m (initially)

Figure 5: Exploration Program Snapshot – Year 2

Raw Material	Source	Mode of transportation for all material
Diesel	Local (Mekele)	In closed/sealed container or drums in long range tanks on vehicles with dangerous goods signage
Petrol	Local (Mekele)	
Oils	Local (Mekele) or importation where required	
Hydraulic Fluids	Local or importation where required	
Drilling Fluids	Local or importation where required	

Note: Material Safety Data Sheets (MSDS) for chemicals to be used during the exploration process have been Included in Appendix 8.0.

Base and mobile camps

A series of camps will operate in and around the licence area. These include a main BHP Billiton base camp and an independent seismic camp operated by TESLA-IMC. In addition to the fixed base camps mobile exploration camps, or fly camps, will also be successively established across the main target areas as the seismic and drilling campaign progresses. These camps will accomodate approximately 60-120 people in each camp. Occupants will include geologists, drilling contractors, drivers, security personnel, paramedics and support staff (catering and cleaning). International logistics company Toll will coordinate and manage all aspects of the main base camp from establishment, catering, and day to day management. TESLA-IMC will manage their own camp arrangements and may utilise support services through PDL Toll where required. Specifications and design layouts for each camp have been included in the Appendix 4.0.

Access Routes

Road infrastructure within the exploration permit area is generally poor and roads are unsealed. Some unsealed public roads might require minor rehabilitation. This work will be carried out as and when necessary. It will be necessary to construct access tracks to drill sites.

The types and quantities of chemicals used for drilling is as follows:

- Drilling fluids suitable for potash drilling
- Rotafoam 20 litres per shift
- Ezeemix 20 litres per shift
- Petrol 5-10 litres per shift

Fuel Quantities

The equipment that will consume the most fuel are the generator sets that will run continuously to power the camp and nightshift drilling operations. The drill rigs will also require 200 litres of diesel per shift. It is estimated that the total monthly fuel consumption could be as high 45,000 litres of diesel. This figure includes approximately 10,000 litres per month for vehicles and a maximum of 35,000 litres per month for combined camp and drill rig requirements. The project will initially commence with 25,000 litres fuel consumption for BHP Billiton exploration camp and drill rig requirements.

Fuel Storage Facility

Fuel will be stored in a TransTank T30 which meets Australian Standards for hydrocarbon storage. The tank is a self bunded design. A copy of the Transtank storage design has been included in Appendix 4.0. The specifications for the Transtank are as follows:

- Overall dimension: 6000mmL x 2450mmW x 2900mmH
- Safe fill level 28000 litres
- Bare tank weight 8500kg
- Containment compartment (internal bunding) with pressure vent
- Bunded pump bay housing
- Air breather vents with screen
- Designed and manufactured in accordance with Australian Standards AS1940 and AS1692, Underwriters Laboratories standard UL 142 (USA) and Underwriters Laboratories Standard ULC/ORD-142.18-95 (Canada)

Fuel Supplies

Fuel supplies will be sourced from a registered supplier who is approved by the FDRE to supply fuel and provide fuel transport to site. A decision will be made in the near future regarding how fuel supply will be provided to the drill rigs and fly camps on the exploration licence. BHP Billiton may elect to use similar tanks used in other BHP Billiton exploration projects. The tank material usually has a double skin and is built for purpose. In the case of temporal operations they would sit on their own legs. A copy of the storage tank design and specifications drawn to scale showing the storage installation and the design of the storage is in Appendix 4.0. A copy of the fuel tank designs from another project has also been included as a reference in Appendix 4.0 Note the Transtank design mentioned above has been used in other projects without incident.

Purion Water & Sewerage Treatment Plants

The main camp will use a Purion Sewerage Treatment Plant and a Purion Water Treatment Plant. The Purion Mini STP system is based on the "High-Speed Bio-Tec " bio-degradation and sedimentation technology, which is unique to its compactness and performance in respect of volumetric efficiency. These technologies are combined in a prefabricated, skid mounted and standardized tank system with variable length, suitable for overseas transportation in ISO freight containers. These systems include sludge, buffer, and feed tanks.

Ultraviolet disinfection units are used to protect against bacterial contamination in the water supply. UV units consist of stainless steel chamber, quartz sleeve, high quality lamp and control box. Options include automatic lamp wipers and UV intensity monitors. Ozone disinfection is effective against bacteria, viruses and spores. Ozone does not produce toxic by-products such as trihalomethanes that can occur with chlorine. It also oxidizes and precipitates iron and manganese and acts to remove colour and organics. Treatment plants require some form of chemical dosing system to inject chemicals such as flocculants, acid, soda ash, lime and chlorine to assist the treatment process, adjust pH and to disinfect the treated water.

Copies of the Purion Water and Sewerage Treatment Plant brochures have been included in Appendix 4.0.

Charter Flights

Charter flights from Mekele to the Danakil project site and return will be provided by Zimex Aviation who operate a Pilatus PC6 6 seat aircraft with a 480kg payload capacity. The current aircraft registration is HB-FLA. There is an option to upgrade to a PT 6 aircraft where operational requirements dictate.

Electricity

The project area is not connected to the national grid and as such, power will be supplied using generators.

Water

The area is not serviced by the national supply. As such, for the water supply, boreholes will be drilled onsite and a water treatment plant will be used. At the mobile camps micro filters may also be used to clean the water that is supplied. Bottled drinking water will be purchased locally.

Labour Requirements

Figure 6 highlights expected labour requirements during the exploration program:

Figure 6: Table of Year 2 Employment

Category	Position	Responsibilities and Training
Technical	Geoscience Team Leader 2 x Senior Geologists 6 x Field Geologists 2 x Potash Geologists/Specialists	• Evaporite and potash drilling • Evaporite core logging • Drilling supervision • Core sampling • Analytical data handling and interpretation • Geochemical standards and procedures • Technical report writing
	Technical Assistants	• Core cutting and sampling • Supervision of geophones and cable layout
	Operational Support	• 3 x Paramedic, 6 x Pilots, 2 x HSEC Officer, 2 x Seismic QC, 1 x Community Assistant, 1 x Security Assistant, 2 x Wireline Practitioners, 2 x Drilling Supervisors, Drilling Contractors.
Administration and Management	Office Administrator	• Office administration • Managing human resources • Induction and training on internal BHP Billiton procedures
	Accountant	• Managing local accounts • Maintaining books of records • Managing tax requirements • Induction and training on internal accounting procedures • Training on Sarbanes Oxley reporting standards
	Country Representative and Legal Advisor	• Government Relations • Legal advice on mining legislature • Legal advice on local legislature • Foreign Corrupt Practices Act and BHP Billiton legal standards and procedures
Skilled	Drivers	• Operating mobile earthmoving equipment • Driving of project light vehicles • Driving of project trucks • Operation of forklift and truck hiab • 4 x4 off-road driving
	Cooks	• Camp Catering
	Electrician	• Managing of camp electricity • Wiring and maintenance of camp electrical cabling
	Mechanic	• Maintenance of camp vehicles
Unskilled	Militia	• Security • Induction and training on BHP Billiton's internal Firearms Handling Procedures
	Cleaners	• Laundry and housekeeping • Training on internal health and safety standards
	Field Assistants	• Seismic cable layout • General hands

SECTION 4 - IMPACTS

Physical Project Environment

Environmental Baseline Study (EBS)

The Environmental Baseline Study (located Appendix 1.0) comprehensively describes the physical project environment and socio-economic conditions in the area. In order to avoid duplication of data, it is recommended that the EBS be consulted to obtain relevant information regarding these parameters. The EBS covers the following issues in detail as per the study chapter headings listed below:

4.1 Socio-Economic Environment

4.1.1 Stakeholders Awareness, Expectations and Concerns
4.1.2 Local Government
4.1.3 Population Size and Household Characteristics
4.1.4 Land Use and Land Cover
4.1.5 Livestock Production
4.1.6 Crop Production
4.1.7 The Livelihood Assets
4.1.8 Food Security and Coping Mechanisms
4.1.9 Social and Physical Infrastructure including Telecommunications
4.1.10 Gender Issues and division of labour between men and women
4.1.12 Religious Practices, Traditional Institutions & Resources
4.1.13 Education: Schools and Enrolments
4.1.14 Health including HIV/AIDS

4.2 Bio Physical Environment

4.2.1 Physical Environment & General Description of the Project Area

- Geology and Soils
- Air Quality
- Ambient Noise
- Climate Hydrology

4.2.2 Biological Environment / Floristic and Faunistic Resources

- Floristic Resources
- Wildlife
- National Parks and Protected Areas
- Aquatic Organisms
- Endangered plant/ animal Species or encroached Ramsar sites

4.3 Water Resource

Projected Environmental Impacts

Archaeological and Cultural Heritage

Issues for consideration in respect to archaeological and cultural heritage include 'Tangible Cultural Heritage' both immovable and moveable historical, and man made cultural heritage. These are defined as:

(a) Immovable Cultural Heritage.

- Sites where Cultural Heritage have been discovered, paleontological historic and pre-historic archaeological remains;
- Buildings, memorial places, monuments and palaces;
- Remains of ancient towns, burial palaces, cave paintings, and inscriptions; and
- Church, monastery, mosque or any other places of worship.

(b) Movable Cultural heritage :

- Parchment manuscripts, stone paintings and implements, sculpture and statues made of gold, silver, bronze, iron, etc., inscriptions of skin, ivory, horn, archaeological and bone or earth or of any material, etc.
- Written and graphic document or cinematographic and photographic documents or sound and video recordings;
- Coins made of gold, silver, bronze, copper or any other materials;
- Ethnographic implement, ornament or any other cultural object of nations, nationalities and peoples.

Geology

The Danakil Depression is part of a larger topographic feature, the Afar Depression, which in turn represents a section of the East African Rift Valley and Red Sea Rift systems. The Danakil Depression forms an elongate extensional basin oriented NNW, parallel to the NW striking Red Sea. It is bounded to the west by the Ethiopian Highlands, which attain heights over 2,000m, and is separated from the Red Sea in the east by the Danakil Alps rising to over 1,000m. Within the present study area, the depression is 50km wide in the north, broadening to over 100km in the south-central part of the area.

At its deepest part, in the north, the depression is covered by modern salt lakes with surface elevation 130m below

sea level. The southern part of the depression is occupied by lines of basaltic volcanoes, some active or recently active, which rise to hundreds of metres above sea level. The flanks of the depression expose rocks of Mesozoic and pre-Mesozoic age. The Danakil depression is filled with late Cainozoic to Recent sediments and volcanics. During the Miocene to Pleistocene, while the northern Danakil rift was periodically connected to the Red Sea, large thicknesses of evaporates accumulated. These are now largely covered by younger valley fill sediments and salt lakes and, in the centre and south of the study area, by younger basaltic volcanics. Between the Kebrit Ale eroded volcanic centre and Lake Afrera to the SE the central volcanic range effectively bisects the subcrop of the basin sedimentary infill.

The thick K-bearing evaporates have been subject to a number of geological investigations dating at least as far back as 1906. A major exploration program for potash undertaken during 1957-1967 by US company Parsons resulted in the discovery and drill out of potash resources at the Crescent and Musely deposits (Allana Resources is currently developing the Musely deposit), both located near Dallol in the northern part of the depression. During 1968 a German company Salzdetfurth AG, undertook a regional geological program aimed at establishing the stratigraphy of rocks hosting the salt deposits. The results of mapping and limited drilling established that the salt formation was probably intermediate in age between continental red bed conglomerates, sandstones, clays and intercalated basaltic volcanics of the 'Red Series' or Danakil Formation, and gypsum and limestone beds of the 'White Series' or Zariga Formation. The 'Red Series' directly overlies Mesozoic and pre-Mesozoic rocks exposed along the flanks of the depression. The 'White Series' is thought to be the youngest Quarternary marine transgression. It is overlain by partly consolidated alluvial terrace sediments, basaltic to rhyolitic volcanics, and unconsolidated sediments which include fluvial fans, brackish mud and aeolian deposits.

The structure of the Danakil Depression is dominated by NNW oriented faults which run parallel to the margin of the rift basin. A number of cross-cutting, NW faults are evident on Landsat imagery and on the limited available reconnaissance gravity and magnetic data. The results of limited historical drilling indicated that the modern basin is asymmetrical, with the axis located about 8 km from the western edge but 55-65 km from the eastern edge. The rift system is reportedly well exposed in the western escarpment where a series of sub-parallel, near vertical normal faults displace alluvial terrace deposits and all older rocks. A considerable number of buried faults may be inferred in the more poorly exposed sections of the basin from the straight and curvilinear contacts between Landsat interpreted lithological units.

Seismic and Volcanic Hazard Assessment

BHP Billiton is actively supporting a seismic array study conducted by the Afar Rift Consortium in the Danakil Region. The researchers are from the University of Bristol in the United Kingdom. The study is also supported by the National Oceanography Centre, Southampton, also a member of the Afar Rift Consortium.

The first results of the survey will be reported to BHP Billiton in 2012. At this stage BHP Billiton will wait for the seismic and volcanic hazard assessment results prior to agreeing to further studies. If an economic potash resource is discovered, further studies of seismic and vulcanology will be required to understand the potential impact for open cut or solution mining extraction methods. BHP Billiton will undertake a methodical and sequential approach to build its knowledge regarding seismicity and volcanic studies in the Danakil area.

In response to increasing exploration activities in northern Afar and in collaboration with BHP-Billiton's project, it was decided to redistribute seismic stations to cover not only the Manda-Harraro segment, but to extend coverage to the Tat-Ali-Erte Ale segment further north. This will allow for a better understanding of seismicity around the rapidly developing Danakil region, and highlight the connection between continental rifting in Afar and oceanic spreading in the Red Sea.

The seismic array consists of 12 Guralp ESP seismometers. Seven stations were serviced and left in place, 5 stations were relocated within the BHP Billiton Danakil exploration license area.

If active volcanic eruptions occur within the active rift system where extrusive lava flow or ash cloud disperses gas and particles into the atmosphere, or where serious seismicity has the potential to cause harm to project staff, equipment or infrastructure, the exploration operation may be periodically shut down.

BHP Billiton maintains a Pilatus PC6 plane from Mekele, if volcanic ash is dispersed into the atmosphere to prevent safe flying conditions, the field operations will be limited in its operational capacity as BHP Billiton policy is to maintain air evacuation at all times to respond to emergency situations, should the plane be prevented from flying due to dispersed volcanic ash, exploration operational activities will be limited. Should volcanic and seismic events threaten staff, camps or equipments, the operations will be stood down and staff withdrawn to safe locations until further notice, or sufficiently safe to return to the work environment and re-commence normal operations.

Z

Hydrogeological Assessment

BHP Billiton conducts hydrogeological assessments depending on the stage of project development. These range in the level of focus and spend from early stage exploration, to concept, pre-feasibility, feasibility and mining construction studies. Each study builds progressive knowledge of the hydrogeological environment based on the information required for each phase.

Given BHP Billiton are looking at the initial phase of exploration and are yet to discover potash on its license or determine an economic resource, preliminary hydrogeological assessment will include the following data gathering:

- Aquifers to be determined through exploratory drilling.
- Use of hydrogeologists for water borehole drilling as required.
- Where possible map water table through cross section interpretation and/or seismic data interpretation.

If BHP Billiton advance this project beyond the preliminary exploration phase, further detailed hydrogeological studies and investments will be made. This has particular relevance for open pit or solution mining methods should the exploration phase be successful.

Social and Environmental Issues Relevant to the Envisaged Project Activities.

The EBS primarily addressed the potential environmental and social impacts of the proposed exploration activities which include the 2D seismic survey and exploration drilling.

The social and environmental issues relevant to the proposed exploration activities are directly related to the following activities:

- Road construction within the project area, to camps and drill sites. This includes construction of an access road from the west to the east of the project area which would be approximately 15km. This road would be an addition to the pre-existing road constructed by Allana Resources. Careful engineering and selective transport of gravels will be required;
- Seismic line dozing and rubble clearing using heavy construction equipment;
- Construction of two camps one for BHP Billiton and the other for TESLA-IMC personnel. These will be constructed using semi-permanent and mobile structures;
- A series of mobile or fly camps to accommodate employees and contract personnel within target areas of the licence. These fly camps will accommodate between 40-60 employees per camp primarily in air-conditioned tents/units.
- Drilling of freshwater boreholes; and extracting brackish water for production drilling purposes;
- Possible establishment of an airstrip or airstrips as required for light aircraft.

Land Disturbance at a Glance

Table 7 highlights land disturbance requirements for various aspects of the exploration program.

The project area is made up in part or in whole of the following six Woredas of the Afar National Regional State (ANRS) namely Afdera, Berhale, Biddu, Dalol, Erebti, and Kuri. Mekele is the Capital of the Tigray National Regional State (TNRS), the main administrative centre in the Region.

Figure 7: Table of Forecast Land Disturbance by Area

Activity	Area
Exploration Base Camps x 2 (multiple locations)	110m x 56m each
Exploration Base Camp Road Access	150m x 6m
Seismic & Drill Line Road Access	130km x 6m width
Boart Longyear	80m x 80m each
Capital Drilling	25m x 25m each
Accumulative km access tracks to be cleared within the project area	515km
Air strips x 4	1100m x 30m each

The FDRE has granted the following Exploration and production concessions in the ANRS. The companies that have granted concessions include:

Exploration Concessions

- BHP Billion World Exploration Inc. (Ethiopia)
- SAINIC Coal Mining PLC
- FORBIS and Management Incorporated
- SB Management Inc.orporated
- NOVA Potash PLC
- ETHIO – Gibe Canada Mining PLC
- G and B Central Africa Resource Led
- Stratex

Production Concessions

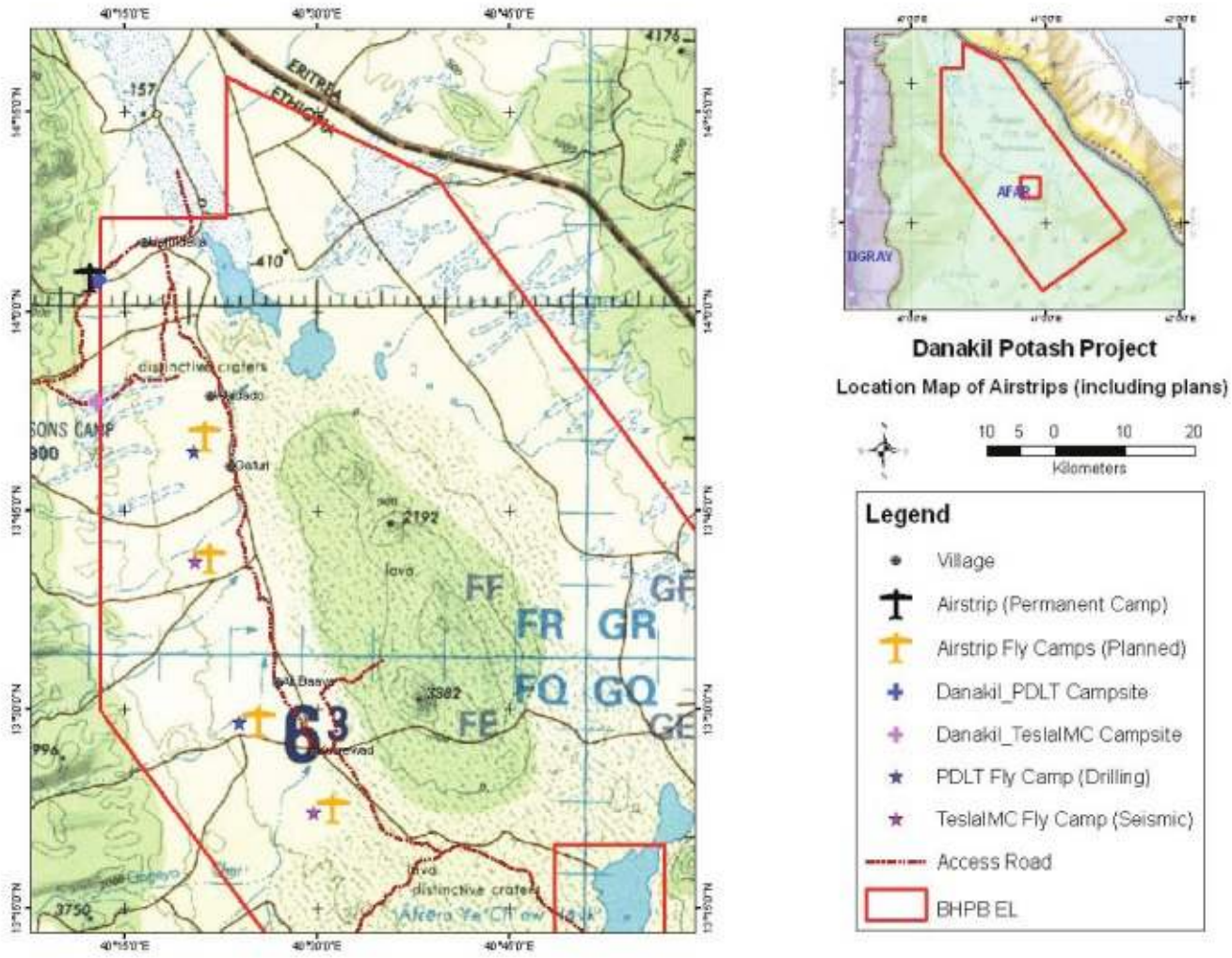
- SAINIC Potash LT/ O Dalol
- Samaria Carpets PLC Dalol
- Afar Salt Corporation Afdera
- Lucy Salt Mining PUL LT/ O Afdera
- Afdera Salt Prod PUL LT/ O Afdera
- Art Ale Salt Prod PUL LT/ O Afdera

Presence of other concession holders in the general vicinity of the Danakil Potash Project area will also affect the overall cumulative environmental and social impacts.

Construction of access roads/ establishment of airstrip within the concession (project) area

In any construction activity, the issues of social and environmental importance include, among others, (i) assessment of the adverse impacts of the project on sensitive natural environment such as wild life, vegetation, sensitive habitats, ecosystems and biodiversity, (ii)

Figure 8: Map of Proposed Airstrips which may be developed within the BHP Billiton licence area.



assessment of the adverse impacts of the project on soil erosion resulting from excessive earthwork and deforestation, (iii) assessment of the adverse impacts of the project on surface and subsurface water resource of the area as a result of boreholes and water extraction, earthwork operations and structure related works, (iv) assessment of the contamination of soil and water due to hazardous materials and waste,(v) assessment of impact on livelihoods, and (vi) assessment of the impacts of the access roads on cultural heritage and historical sites within the project area. Access road construction will also require establishment of quarries to extract selected earthern materials to construct the road access.

It is apparent that resettlement which is a major issue in such ventures is bound to be minimal or non-existent in the present case, since the study area is thinly populated, as well as, the fact that Afar 'Tortoise Huts' are not in clusters at any site, and major settlements such as townships will be out of the direct physical impact area of the project.

BHP Billiton World Exploration Inc. (Ethiopia) is currently u using the established light aircraft air strip close to Hamadela and may require use of further air strips as shown in Figure 8.

Seismic line dozing and rubble clearing using heavy earth moving construction equipment

This activity will entail social and environmental issues/impact similar to the access road construction listed above. Most of the seismic dozing sites will not cause any displacement of people because of their location, and paucity of settlements on the licence area.

Figure 9: Location of proposed access tracks and seismic lines to be established within the exploration licence area:

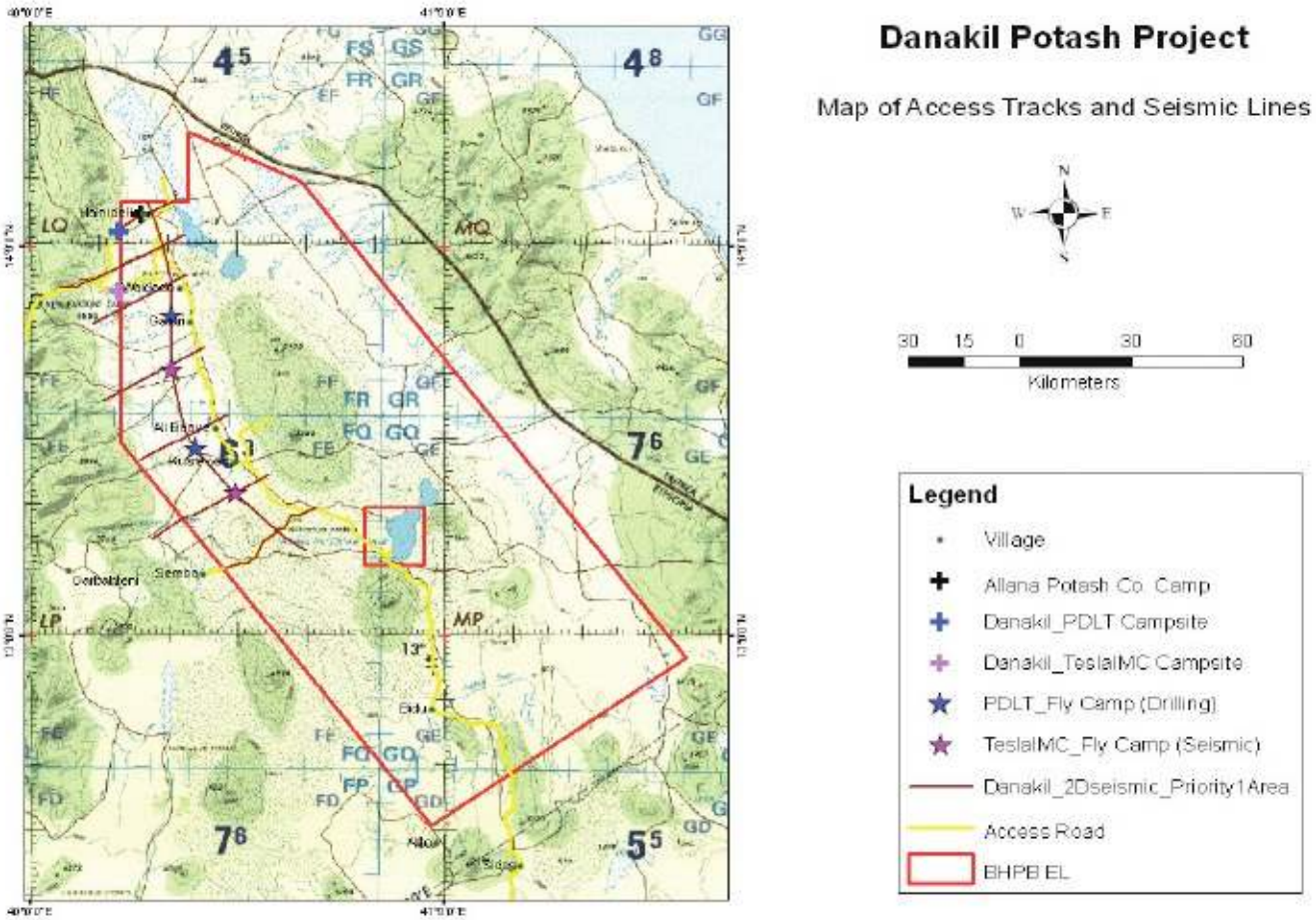
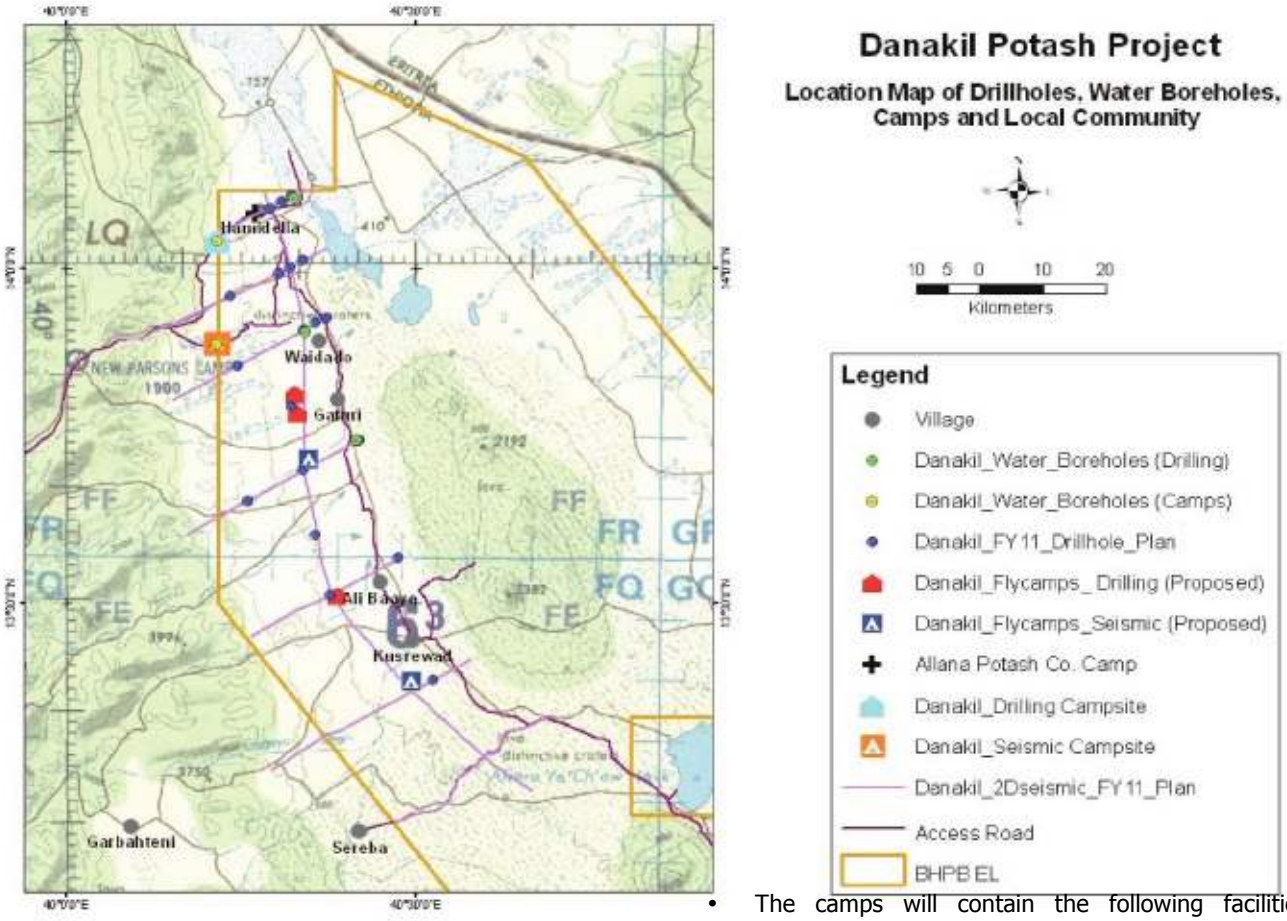


Figure 10: Map of planned drill hole locations in proximity to nearby communities:



Construction of camps, including semi-permanent and mobile structures

The construction of the camp design is summarised below:

- Construction of camps will entail limited clearance of vegetation cover, even though the vegetation cover of potential sites is limited
- The need for asphalting the camp sites will be site dependent.
- The issue of waste management in camps is of paramount importance and requires planning and authorisations
- The camps will contain the following facilities; sleeping and working quarters with amenities, canteen facilities, sanitary facilities, storage, water supply, energy/power supply, fuel station, health facilities, vehicle parking, machinery maintenance, workshops, generators, water purification plant, etc.
- In the semi-permanent camp there may be additional need for other structures such as the establishment of an analytic laboratory for basic logging and sample parameter analysis, storage of earthmoving equipment, project spare parts, hazardous materials, and main store for bulk supplies.

Figure 11: Map highlighting Location of BHP Billiton Exploration Licence in proximity to artisanal salt mining activities

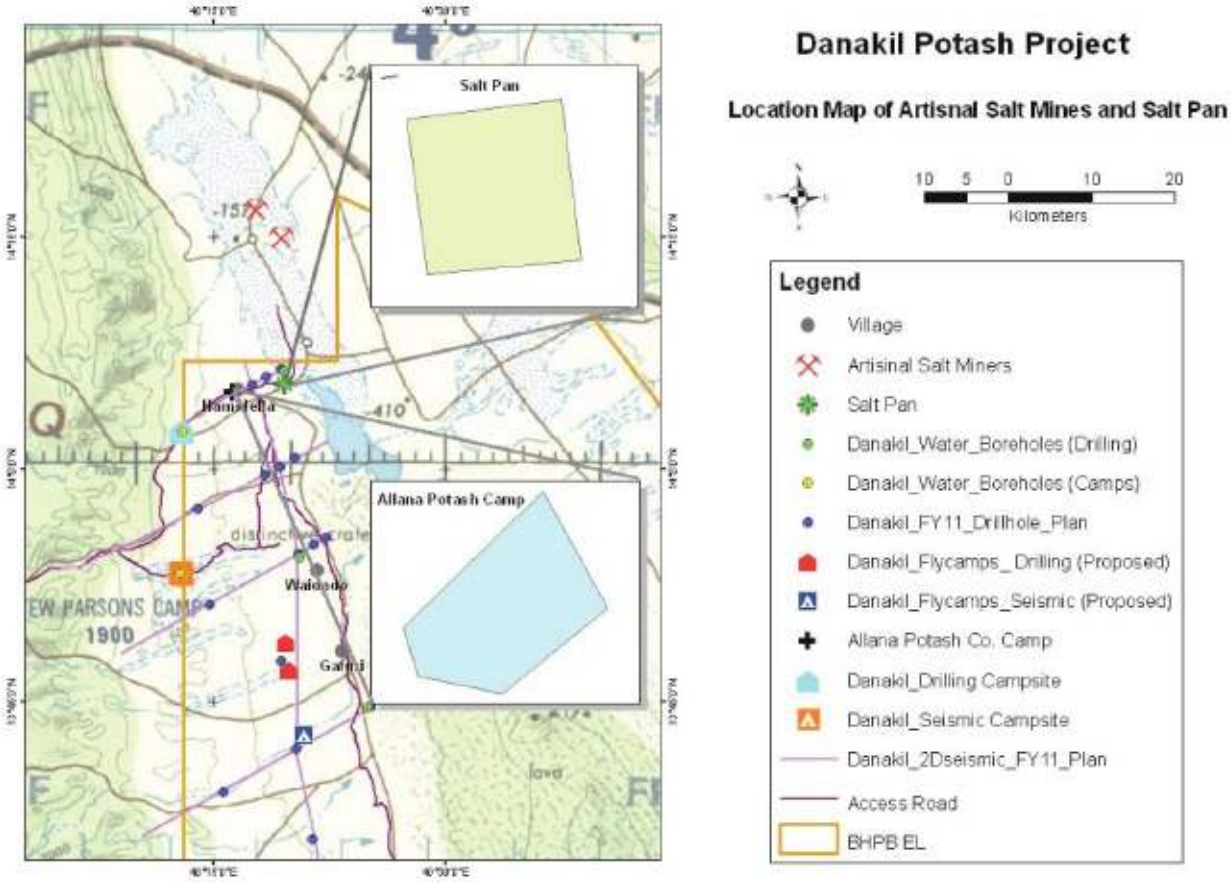
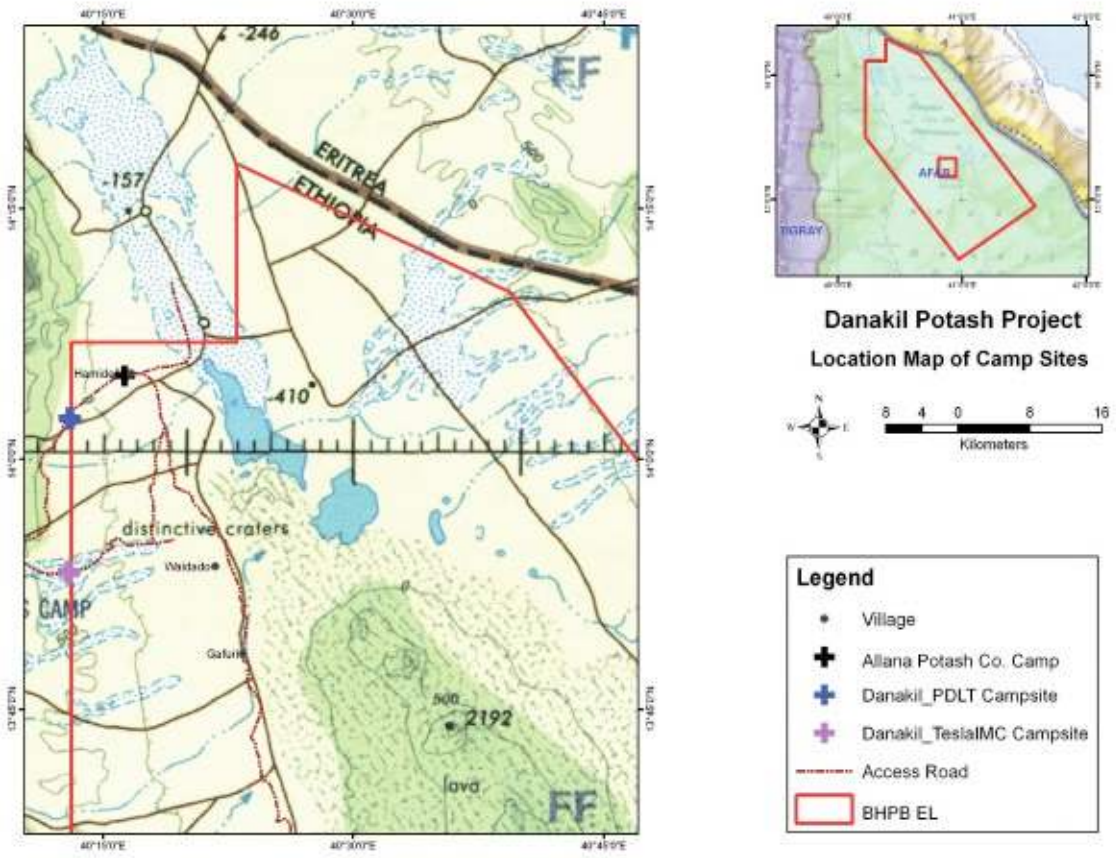


Figure 12: Map highlighting Location of BHP Billiton & Tesla Exploration Camps in context of the exploration licence area



Drilling of freshwater boreholes and extracting brackish water for production drilling

The impacts of this activity may give rise to social issues since the project may be sharing the scarce water resource in these freshwater constrained locations. BHP Billiton will not draw water from local community or commonly shared communal areas if this is likely to deplete communal water resources or compete with local interests.

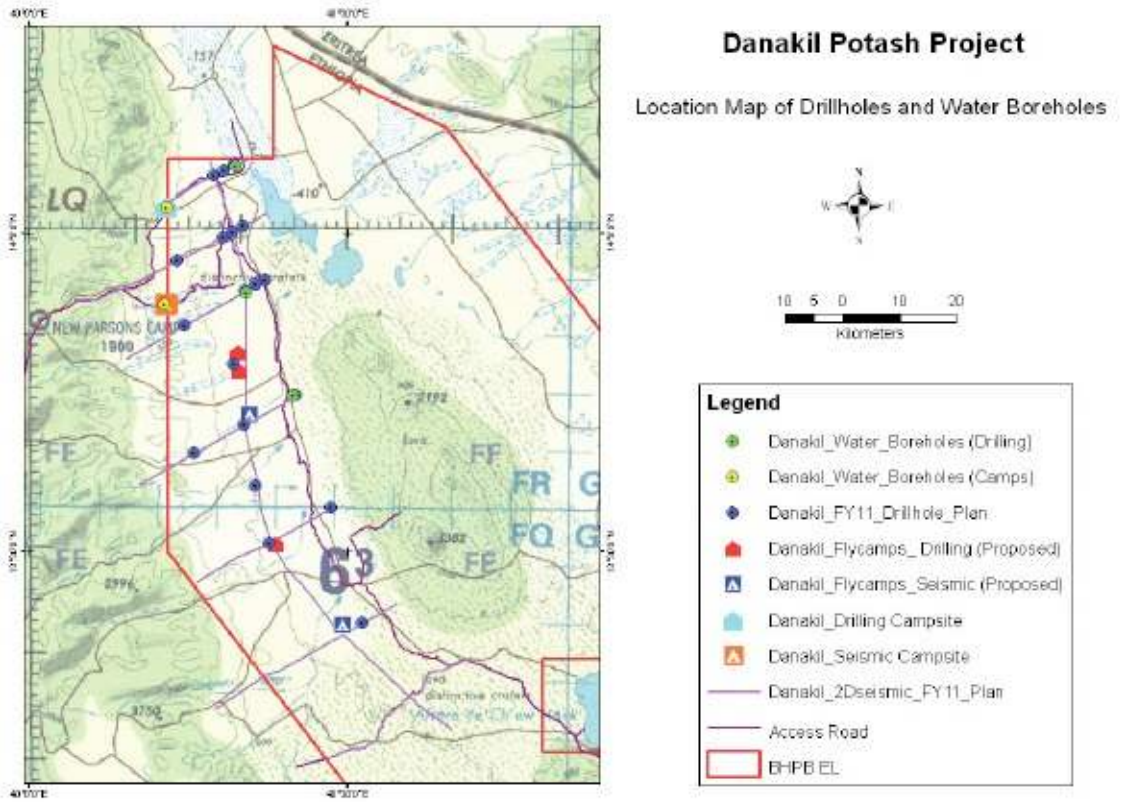
- Extraction of salt or brackish water for use in the drilling process has a potential to degrade equipment due to high salinity and cause health issues if consumed without treatment. The advanced water system to be installed at the main BHP Billiton camp will overcome any unwanted discharges.

- Drilling fluids could have serious negative consequences to the immediate surrounding environment, if they are not properly managed. Careful management of drill fluids will be in accordance with industry best practice for the exploration drill holes. A copy of the MSDS sheets for thedrilling contractors has been included in the Appendix 8.1.

- It is anticipated that there will be no direct impact to current utilised groundwater resources as a result of the exploration program. BHP Billiton will put in place proper management measures where no effluents will be discharged directly into the environment without being impounded and treated. It is proposed that water boreholes be drilled at a depth of between 15 metres – 60 metres to avoid intersecting high levels of saline water.

The map in Figure 13 highlights the proposed drill hole and water borehole locations within the exploration licence area. Further water boreholes may also be required for production purposes. BHP Billiton will obtain all relevant statutory approvals to drill water boreholes from the Ministry of Water and Energy Resources in conformance with Ethiopian Water Resources Management Regulations No. 115/2005, Ethiopian Water Resources Proclamation No 197/2000 and Mining Operations Proclamation 678/2010 Article 33 (1) (b).

Figure 13: Map of proposed drill hole and borehole locations



Solid Waste Management

Improper disposal of solid waste at the new site could impact negatively on the environment. This has been addressed in the EMP. Medical waste will be dealt with appropriately. Sharps will be disposed of in sharp bins, and responsibly destroyed. Contaminated material will be placed in hazardous material bins and sealed and disposed of according to policy, and any other items will be removed from the site and sent to an approved facility.

Social and Environmental Impacts

Beneficial impacts

Improvement on local conditions near camp sites: Impact origin and characteristics

The area is flooded on defined water ways during the rainy season as a result of the rains on the highlands flooding the Depression. The surface flooding and water ponds may create favourable conditions for vector breeding. It is likely that the presence of stagnant water pools can be breeding grounds for disease transmitting vectors such as mosquitoes.

Benefit enhancement measures

The presence of the project may pre-empt pond formation if the possible pond establishment areas are near the living quarters of its employees. Benefit will only be sustained in the long term if the drains are properly maintained on a regular and systematic basis. No permanent ponding of water is likely due to hot and dry conditions in the Danakil Depression. Positive impacts of the project on the local community include semi-permanent camps providing local employment, purchase of local produce including livestock. BHP Billiton's preference to purchase locally wherever possible should provide benefit to local business owners.

Potential Adverse Impacts of the Project

The impacts described are physical and biological impacts; the socio-economic impacts are discussed in the EBS. The impacts described comprise potentially the most important impacts as far as the overall impact of the project is concerned. In all cases, there is a relatively high probability of occurrence of these significant impacts if no mitigation measures are adopted.

Noise and Vibration Impacts

Noise and vibration result from construction activities in general but particularly from operation of heavy earth moving and drill rig machinery. Other operations generating significant noise include dozing, clearing and rock excavation. Sustained noise levels during such activities are expected to be much higher than the ambient noise level in the project area. Therefore, to minimize noise disturbance to the population around the sites, even though likely to be very few, it is recommended not to undertake activities producing nuisance noise level at night around residential areas, if any.

Impacts on Wildlife

There are reportedly a number of wildlife species including mammals and bird species naturally inhabiting the project area. There are no rare and endangered wildlife species in the project area that are suspected of extinction or disappearing. No wildlife sanctuaries, parks or reserves or protected sites have been identified on the exploration licence. According to the Ethiopian Wildlife and Natural History Society (EWNHS, 1996), none of the 69 nationally designated Important Bird Areas are found anywhere near the license area.

Fauna and Flora IUCN Red List – Ethiopia

Flora and Fauna

The Project will have not have any significant impact on flora and fauna as the removal of vegetation will be minimal. Ethiopia has a large number of mammalian species listed as critically endangered, endangered and vulnerable to global extinction. The endangered species in Ethiopia can be broken down into three categories; Critically endangered, Endangered, and Vulnerable.

Figure 14: List of critically endangered, endangered and vulnerable mammals

Critically Endangered	Endangered	Vulnerable
Bilen Gerbil	Grevy's Zebra	Large-eared Free-tailed Bat
Black Rhinoceros	Mountain Nyala	Lesser Horseshoe Bat
Ethiopian Wolf	Nubian Ibex	Lion
Guramba Shrew	African Wild Dog	Moorland Shrew
Harenna Shrew	African Elephant	Morris's Bat
MacMillan's Shrew	Ammodile	Mouse-tailed Bat species
Walia Ibex	Bailey's Shrew	Natal Free-Tailed Bat
	Bale Shrew	Nikolaus's Mouse
	Beira Antelope	Red-fronted Gazelle
	Cheetah	Rupp's Mouse
	Dibatag	Scott's Mouse-eared Bat
	Dorcas Gazelle	Soemmerring's Gazelle
		Speke's Gazelle
		Spotted-necked Otter
		Stripe-backed Mouse

Figure 15: List of globally threatened bird species found in Ethiopia

Endangered	Vulnerable	Near Threatened
White-winged Flufftail	Ferruginous Duck	Shoebill
Prince Ruspoli's Turaco*	Great Spotted Eagle	Lesser Flamingo
Sidamo Long-clawed Lark*	Imperial Eagle	Pallid Harrier
Yellow –throated Serin*	Lesser Kestrel	Rouget's Rail*
	Taita Falcon	Little Brown Bustard
	Harwood's Francolin*	Great Snipe
	Wattled Crane	Black-winged Pratincole
	Corn Crake	White-winged Collard Dove
	Degodi Lark*	Friedman's Lark
	White-tailed Swallow*	Abyssinian Longclaw*
	Salvadori's Seedeater	Sombre Rock Chat
	Abyssinian Bush Crow*	Basra Reed Warbler
		Somali Short-billed Crombec
		Cinereous Bunting

Figure 16: List of endangered plant species found in Ethiopia

Name	Family	Description	Status
Wellstedia filtuensis	Boraginaceae	This species is known only from the type collection. It is a shrub that grows on thin soil with calcareous outcrops at the crest of Mt Filtu.	Critically Endangered
Vigna debanensis	Leguminosae	A shrub that grows in grassland and woodland vegetation at 1600-2200 m.	Critically Endangered
Vepris dainellii	Rutaceae	This species is an understorey tree of moist montane forest, growing with Podocarpus or Aningeria at 1000-2500 m	Least Concern
Senecio myriocephalus	Asteraceae	Growing in forest margins at altitudes of 2250-3200 m, this shrub is associated with Hagenia, Erica and Podocarpus	Least Concern
Solanecio gigas	Asteraceae	A shrub that grows in montane forest clearings and on river banks at altitudes of 1750-3350 m. It is grown as a hedge plant.	Least Concern
Senecio myriocephalus	Asteraceae	"Growing in forest margins at altitudes of 2250-3200 m, this shrub is associated with Hagenia, Erica and Podocarpus. It is used as a hedge plant.	Least Concern
Solanecio gigas	Asteraceae	A shrub that grows in montane forest clearings and on river banks at altitudes of 1750-3350 m. It is grown as a hedge plant.	Least Concern
Tinnea somalensis Gurke ex Chiov.	Lamiaceae	"A shrub of open woodland and wooded grassland on calcareous soils, growing at altitudes of 1100-1900 m."	Least Concern
Millettia ferruginea (Hochst.) Bak. subsp. ferruginea	Leguminosae	"A tree of upland forest, riparian forest and coffee plantations, growing at altitudes of 1000-2500 m."	Least Concern
Rhus glutinosa A. Rich. subsp. neoglutinosa (M. Gilbert) M. Gilbert	Anacardiaceae	"A shrub species of forest margins and open bushland on rocky slopes, growing at altitudes of 1800-3000 m."	Least Concern
Leucas abyssinica (Benth.) Briq.	Lamiaceae	"A shrub of mountain bushland, rocky slopes, high grassland and forest edges, found at 1300-2600 m."	Least Concern
Lippia adoensis Hochst. ex Walp.	Verbenaceae	"A shrub that is common in disturbed areas and at forest margins, growing at 1900-2450 m."	Least Concern

As detailed in the baseline study none of the flora and or fauna are recorded from the licence area with the exception of the Lion (Panthera leo) which is listed in the Vulnerable Class. No lions have been observed or reported in the licence area to date.

Impacts on Soil Stability (Soil Erosion Problems)

Running water can destabilize the soil structure following the changes in natural flow regimes and concentrated flow created by diversion structures like culverts and drainage ditches. Access roads that intersect drainage basins generally modify the immediate natural flow of surface waters by concentrating flows to certain points, increasing speed of flows and volume /discharge rates. These changes can contribute to flooding, soil erosion and channel modification. Soil erosion mainly arises from discharges of roadside culverts and drainages collecting the runoff water and discharging.

Impacts associated with construction traffic
Impact origin and characteristics

Construction traffic, mainly related to the haulage of borrow pits and quarry material, is likely to increase total traffic flow considerably, and is likely to be greater in volume than normal flow, especially near to the main construction fronts and with goods/supplies trucked in from Mekele. Overloading will be prevented because of its adverse implications in relation to safety, through increasing the chance of failure of steering and braking mechanisms and reducing stability on cornering, if excessively high loads are being transported. While laden haulage vehicles move relatively slowly, comparatively some vehicles not loaded tend to move relatively fast, and there is a danger of increased hazard to pedestrians, other access road users and livestock. Earthmoving equipment will be demounted from the lowbed trays on difficult corners and steep terrain. Construction traffic may also contribute to congestion in the towns which are present near project area. Driving after dark is not permitted.

Haulage of materials has the potential to generate dust, especially on clay pans and by relatively fast-moving vehicles. This is unlikely to be of great significance as the Danakil is a naturally dusty environment. However, where the access road passes through towns and other settlements, raised dust can cause considerable nuisance and lead to poor road visibility. A range of safety protocols are in place to manage vehicles in between Mekele and the Danakil all designed to prevent worker injury.

Program workforce will be flown in and out of the project as this is believed to be a safer and quicker alternative to driving on the Mekele access road. Light aircraft may be used for transport to the site and to major urban centres in Tigray and elsewhere, including Addis Ababa. Many local residents are not familiar with the possible dangers aircraft landing and takeoff may entail.

Pollution from sanitary and other wastes and spillages
Impact origin and characteristics

Streams, groundwater and springs are used for domestic purposes throughout the project area for drinking, washing and cattle watering. There are also several water courses which are dry for most of the year. Potential sources of surface or ground water pollution close to the base camps or work sites include sanitary and waste facilities, and potential black and grey water spills. Such pollution could adversely affect communities who depend on such water sources.

Base Camp and other Worksite Areas
Impact origin and characteristics

BHP Billiton World Exploration Inc. (Ethiopia) will establish semi-permanent camps as well as smaller satellite fly-camps at other strategic locations. Rehabilitation of these camp locations will be undertaken when they are no longer required.

Impacts due to quarry development

The contractors may require quantities of gravel and possibly crushed stone, mainly for base course construction and surfacing of access roads, especially on the mud-flats. The principal environmental concerns relate to the aesthetic effects of quarrying and the effects of access road construction. There is less concern regarding impacts on locations with sensitive habitat and wildlife, and the effects of development in agricultural lands or close to settlements, since there does not seem to be a high probability of such sites being near to quarry developments and confined agricultural areas. Nevertheless, these aspects need to be considered.

Even though the landscape has only average visual quality, and there are no tourist sites in the immediate vicinity of the project area, new quarries may be developed in elevated parts of the landscape, and scarring by working faces can permanently spoil an otherwise pleasant view. In the event a quarry for exploration activities is considered necessary BHP Billiton will be responsible for rehabilitation.

Spoil disposal areas

Although it is not expected that the project works will generate large quantities of spoil material, it is likely that there will be occasions when unsuitable existing pavement material will need to be removed and disposed of. Similarly areas requiring road width increment may produce excess excavated soil material to be carted away. Such actions can result in the degradation of vegetation in the down slope part and the stimulation of erosion, which ultimately works upslope towards the road. In addition, material eroded from the spoil itself may be deposited in watercourses, with adverse effects on channel
morphology and capacity to convey flood flows.

Impacts due to radioactive devices for the downhole wireline logging tools

Radioactive sources are used as part of density and porosity logging tools as well as in natural gamma calibration systems. The use of these sources slightly increases the lifetime radiation dose of the logging engineer. They are safe if handled correctly. However, strict rules govern their storage, transport and use.

Wireline density and porosity logs are useful to geologists. Density, in particular, is an indicator of rock type and is used as a lithogical inference. Both these measurements are essential to evaluating potash mineralization because of significant and characteristic values for specific potassium bearing minerals. The porosity log (neutron) is used to identify hydrous minerals. The loggers make a remote measurement by exposing the borehole wall to radiation and gauging the drop in count rate at a fixed distance from the source. The radiation source is the key to the measurement but its use introduces some special operational risks and responsibilities to the logging practitioner. There is a health risk if a person is exposed to an excessive uncontrolled dose of radiation.

Isotopes used in logging

Figure 17 lists the radioactive sources that are routinely employed in wireline logging operations around the world. Operating loggers are licensed to store, transport and manage these sources.

The radium source is employed as a gamma ray calibrator. An unstable isotope of Caesium is the most common source used in density logging although Cobalt is considered a good option for through drill pipe or iron ore logging, due to its higher energy (bigger sample volume). The Americium source is mixed with Beryllium. The latter reacts to alpha particles emitted by the Americium and decays, releasing neutrons.

The source

The equipment used in logging comprises a source pellet, encapsulated in a leak-proof container, located in a source holder and transported in a source shield. The holder may be temporarily attached to the bottom of a sonde (logging probe) or fitted inside one. When not attached to a sonde, the source holder is housed in a portable shield. Gamma emitters are shielded by lead and neutron emitters by water extended polyester (WEP).

During logging operations the source is removed from its shield (example shown in Figure 18) so that a sonde may be assembled and calibrated, then placed in a borehole. During this time, the logger will receive a small dose of radiation, so he carries a radiation dosimeter so that his monthly and lifetime dose can be checked and recorded. Normal monthly use of mineral logging equipment results in a dose so low that it is often not detected by the logger's dosimeter.

Figure 17: Radioactive sources routinely employed in wireline logging

Source	Emission	Typical Activity	Half-life
Ra^{221}	Gamma	1µCi / 37 MBq	1600 yr
Cs^{137}	Gamma	150mCi / 5.55GBq	30 yr
$Am^{9}Be^{241}$	Neutron	1Ci / 37GBq	433 yr
Co^{60}	Gamma	150mci / 5.55GBq	5 yr

Mitigating exposure and contamination

A logging engineer is routinely exposed to ionising radiation emitted by his equipment. A dose large enough to represent a health risk is unlikely but can occur if, exposure is increased by failure to shield the source properly. Exposure and contamination will be avoided by applying following rules regarding safe storage of the source:

- The source holder is inscribed with a warning
- The source shield has a warning sign
- The shield is stored and transported locked
- The shield is stored in a locked room/bunker
- The room or bunker is fenced off to prevent external access
- The room has no other purpose
- There is an internal warning sign
- The door to the room carries a warning sign
- Access is restricted to logging personnel only
- The source is periodically checked for leakage

Figure 18: A lead shield containing a gamma source

Figure 19: Source holders

The source holders shown in Figure 19 are both magnetisable and include double bolt fixings (this is more clearly visible on the neutron source holder on the left). Note the source on the left is hard faced because it is used with a side-walled density sonde and is pushed against the borehole wall.

The design of mineral logging equipment will allow the logging engineer to maintain a distance of at least 20cm from the radioactive source holder. This control will act as a barrier to very close contact with the source pellet.

Source Use in the Danakil

BHP Billiton's Danakil exploration strategy includes a programme of wireline logging. The radioactive sources that are expected to be used on site are listed in Figure 20. The small Casesium source is employed as a gamma ray calibrator and will not be transported to the drill sites but will be retained in the storage bunker for calibration processes. Caesium is the most common source used in density logging and this source will be used at Danakil as will the standard AmBe neutron source.

SEMM employ graduate level loggers who are well trained and are competent persons in radio protection. They have standard operating procedures for using radioactive sources and these are checked by BHP Billiton on site.

SEMM use Robertson Geologging equipment so they do not control the design of their tooling. There is no double fixing of the source holder to the sonde. The source fixing is robust and secure.

Radioactive Source Storage

The policy for source storage on site is based on the need to both assure security and comply with Ethiopian regulations as well as international best practice. Storage will comprise a below ground bunker with strong lid, including relevant signage and a surrounding fence, positioned within the BHP Billiton operational base camp at Danakil. This source storage facility will be copied at other field bases if necessary.

The local regulations are being confirmed to determine if the logging truck, parked within a secure fence, can act as a source store overnight at the at the camp base.

Source security is a priority for BHP Billiton. A risk assessment was conducted during recent preparatory meetings in Johannesburg held in the week of 21 March 2011. A series of mitigation measures are discussed below:

Figure 20: Radioactive sources expected to be used on site in the Danakil

Source	Emission	Typical Activity	Half-life
Cs^{137}	Gamma	100µCi / 3.7 MBq	30 yr
Cs^{137}	Gamma	100mCi / 3.7GBq	30 yr
$Am^{9}Be^{241}$	Neutron	2.5 / 37GBq	433 yr

Mitigating Measures

- BHP Billiton and SEMM Logging shall fully comply with Federal Democratic Republic of Ethiopia Radiation Protection Agency (ERPA) importation, authorisation, use and reporting requirements.
- BHP Billiton shall verify that loggers are appropriately trained and experienced in the correct use and handling of the source.
- SEMM Logging's working procedures and management plans shall be reviewed and approved by BHP Billiton before the sources are used in Ethiopia.
- Site based employees and contractors shall be provided with suitable awareness training during site inductions.
- The logging truck shall carry appropriate regulatory warning signs.
- A radiation meter will be carried in the logging truck.
- Physical contact shall be avoided and the source holder will be lifted by the relevant sonde, never by hand. Loggers shall not come into direct contact with the source and maintain a safe working and personal distance from the source of at least 20cm.
- The source shall be clearly labelled and its shield locked in a suitable secured cage or box during transport and storage.
- The source holder will be regularly checked for signs of corrosion and a wipe test will be performed every 12 months.
- Cable heads shall include a weak point to ensure a controlled cable break during fishing operations.
- Assurance and appropriate documentation will be available to confirm the age of the source is within the 15 year maximum lifespan.
- The logger shall wear dosimeters while on duty regardless of whether he is using the radioactive sources.

Mitigating Measures – Operational Use

Operational use of the radioactive sources will comprise four elements.

1. Equipment testing and calibration at base
2. Transport to and from the drill site
3. Set up and preparation at the drill site
4. Down-hole logging of gamma density and neutron porosity

- The calibration work will be performed at a specially demarcated area next to the source stored at the camp. The logging personnel wear dosimeters and the process does not normally result in a recordable dose. Only SEMM qualified personnel will handle the sources. SEMM will mobilise a radiation meter for testing purposes.
- BHP Billiton's Security Management Plan shall take account of additional security arrangements required during transportation to prevent security related incidents.
- A secure source storage area shall be established on site with relevant signage and safe demarcation distances.
- The operational site source and storage area shall be located on dry open ground within sight of the logging cabin.

Mitigating Measures – Storage

- The source holder shall be inscribed with a warning
- The source shield shall have a warning sign attached
- The shield shall be transported locked in a box or cage
- The shield shall be stored in a locked bunker
- The access door to the storage bunker shall carry an appropriate warning sign

- The bunker will be surrounded by a wire fence with a single gate that carries appropriate signage.
- The storage room shall not be used for any other purpose and shall be fitted with an internal warning sign.
- Access (set of keys) shall be restricted to logging personnel only;
- The source holder shall be periodically checked for leakage

Drilling Waste

Drilling fluids comprising chemicals, surface water, invert mineral oil and salt saturated brines will be used downhole in the drilling program. There is no confirmed estimate of volume of drilled cuttings and fluids that will be used in each hole, however, Figure 22 provides our best present estimate. BHP Billiton World Exploration Inc. (Ethiopia) will undertake the potential stabilisation and then containment of this waste in bags and skips at the drilling site. The waste will then be transported to a central location for storage and potential further treatment, prior to a long term disposal option being implemented, either on site or at an appropriately permitted off-site facility. These controls will be further developed through the Drilling Fluids Environmental Management Plan (internal BHP Billiton document).

Figure 21: Neutron and Density sources contained in shields

Drilling Fluids: Invert Mineral Oil & Salt Saturated Brines

Capital Drilling will be drilling stratigraphic drill-holes to an optimal maximum depth of 1250 metres and possibly 1500 metres. Due to these depths, Capital Drilling will utilise invert mineral oil to assist with drill penetration and preserve the potash mineralogy. Water cannot be used for drill penetration as water will alter or dissolve the potash mineralogy. Boart Longyear will be drilling sonic holes to 300m and may also use invert mineral oil to ensure the potash mineralogy targeted for sample analysis is preserved.

The sonic drill rigs' primary purpose is to drill core in vibratory mode and does not require drilling fluids. If competent core cannot be recovered the drill rig will be switched to conventional core mode. This drilling technique requires drilling fluids. Drilling fluid MSDS documents have been included in Appendix 8.0.

In drill hole geotechnical engineering, drilling fluid is used to drill boreholes into the earth. It is often used when drilling oil and natural gas wells and on exploration drilling rigs. Drilling fluids are also used for drilling water wells. Liquid drilling fluid is often called 'drilling mud.' The three main categories of drilling fluids are water-based muds (which can be dispersed and non-dispersed), non-aqueous muds, usually called invert mineral oils, and gaseous drilling fluid, in which a wide range of gases are infused into the drill fluid.

The main functions of drilling fluids include providing hydrostatic pressure to prevent formation fluids from entering into the well bore, keeping the drill bit cool and clean during drilling, carrying out drill cuttings, and suspending the drill cuttings while drilling is paused and when the drilling assembly is brought in and out of the hole. The drilling fluid used for a particular job is selected to avoid formation damage, limit corrosion, and not alter in situ potash mineralogy. Invert mineral oils will be mixed with synthetic lubricating fluid compiled from a multitude

of specialised biodegradable chemicals. Invert mineral oils are used for many reasons, some being increased lubricity, enhanced shale inhibition, and greater cleaning abilities with less viscosity. Invert mineral oils also withstand greater heat without breaking down. The use of invert mineral oils has special consideration in its application to the Danakil potash program. These include cost and environmental considerations.

On a drilling rig, mud is pumped from the mud pits through the drill string where it sprays out of nozzles on the drill bit, cleaning and cooling the drill bit in the process. The mud then carries the crushed rock ("cuttings") up the annular space ("annulus") between the drill string and the sides of the hole being drilled, up through the surface casing, where it emerges back at the surface. Cuttings
are then filtered out of the recycled mud with a (shale shaker), or the newer shale conveyor technology, and the mud is returned to the mud pits. The mud pits let the drilled "fines" settle; the pits are also where the fluid is treated by adding chemicals and other substances for reuse.

The returning mud can contain natural gases or other flammable materials which will collect in and around the shale shaker / conveyor area or in other work areas. Because of the risk of a fire or an explosion if they ignite, special monitoring sensors and explosion-proof certified equipment is commonly installed, and workers are advised to take safety precautions. The mud is then pumped back down the hole and further re-circulated. After testing, the mud is treated periodically in the mud pits to ensure properties optimize and improve drilling efficiency and borehole stability.

There are several factors BHP Billiton World Exploration Inc. (Ethiopia) must still consider around the use of Invert mineral oils and salt saturated brines in the Danakil exploration program. These include:

- invert mineral based mud chemistry;
- volume of mud required;
- timeframes required to source mud and allow for timely delivery to the Danakil area;
- the proportion of invert mineral oils to be recycled through a mud recycling unit and treatment for final disposal. Volume and consistency (solidus/liquidus) of invert mineral oils for disposal post each hole; understanding the site tank and flow design of mud systems so BHP Billiton World Exploration Inc. (Ethiopia) can establish how it manages potential overflow if a there is a large volume of secondary water downhole;
- Flash and ignition points for invert mineral oil.

It is proposed that Capital Drilling will use Saraline185 drilling fluid or alternatively Escaid 110. Ninety percent (90%) of the mud will be the invert mineral oil and 10 % MgCl2 brine. The Ministry of Mines shall be advised if the Program decides to use an alternative mix of drilling fluids. There will be lime, clay and a small amount of emulsifiers in the mud, but only a very low concentration. A series of mitigating measures is located further in the Environmental Management Plan (EMP) section.

Figure 22: Estimated Waste Disposal per 1200 metre drill hole - Drilling Fluids & Treated Cuttings (can only be verified after commencement of drilling).

Drilling Depth	Volume of Core Recovered	Cuttings Recovered	Oil on Cuttings (%)	Weight of Cuttings for Disposal	Weight of Oil for Disposal
1200m	6.97m3	7.2m3	15%	15 Metric Tonnes	1.38 Metric Tonnes

Water containment in the drill holes

BHP Billiton World Exploration Inc. (Ethiopia) will conduct drilling in locations in close proximity to Assale salt lake which is within and near the water table level. An influx of secondary water in the drill hole must be avoided to prevent unwanted interaction between invert mineral oils and the water table.

Magnesium chloride (MgCl2) is used in several applications to improve efficiency and production in new or existing drill holes. Calcium chloride has many uses in establishing and maintaining oil drill holes, in drilling mud, completion and workover fluids, concrete accelerator and in packer fluids. It helps drill hole fluids to obtain the required consistency, increases density which assists to stabilise shale formations. Magnesium chloride is used in specific layers as a completion and packer fluid, it seals drill hole casings and displaces drilling mud. Calcium chloride is also used as a final processing step to remove haze from various petroleum products.

Release of High Pressure Liquids/Hot Fluids during Drilling

The potential for drill rods to penetrate through hot or high pressure fluids below the surface shall be controlled through use of rotary drilling techniques where the density of the drilling fluid down hole column is believed sufficient to overcome any downhole pressure of a newly penetrated zone. Drill diverters will also be used.

Considerations of Human Resources and Social Issues

Employment Opportunities

The project is expected to have an enhancing impact on the socio-economic state of the project area and the neighboring districts. Direct and indirect employment and training of approximately 250 - 300 local people as full time and casual workers on a daily rate basis in accordance with the Labour Laws of the Federal Democratic Republic of Ethiopia. A large percentage of the required workforce are unskilled or semi-skilled labourers, BHP Billiton World Exploration Inc. (Ethiopia) will try to provide employment opportunity for the local population, and as a result local communities as a whole should benefit. All employees will undertake relevant inductions and on site training as required.

The multiplier and cumulative effect of salaries and additional downstream employment is a positive impact. However, the potential for conflict between different community groups as a result of groups/individual competing for limited job vacancies must be carefuly managed to avoid escalation of tensions. These tensions may also result in dissatisfaction and disenchantment with BHP Billiton World Exploration Inc. (Ethiopia) by some community members. Unrealistic expectations around the perceived creation of mass employment opportunities must also be carefully managed during ongoing stakeholder meetings.

Diseases in the Project Location

Sexually Transmitted Diseases including HIV/AIDS

HIV/AIDS appears to be on the rise in the project area, especially in Afdera localities; and the prevalence of HIV/AIDS in towns is reportedly high[2]. The increase in HIV prevalence was further confirmed by the data provided by two local hospitals within the project area (Aysiata and Dubti) that were visited during the course of the EBS consultations.

The adverse social and economic impacts of HIV/AIDS are known to be major sources of concern in Ethiopia. The disease affects the most productive group impacting the overall economic output. The impact could be larger in some sectors like agriculture, industry and construction due to lost workdays because of sickness, labour loss, and increased health care and insurance costs. All these factors have important implications for the program both during construction and operation with respect to workforce planning.

Major variables and potential causes for the spread of the pandemic in the region include the presence of the high way that runs from Addis Ababa to Djibouti (HRC) (approximately 700-1000 trucks are believed to use the road each day); the salt mining and commercial farming sites (Afdera); and the heavy concentration of mobile military personnel in the region (Ethio-Eriterea border).

During construction, in addition to the local labour force, the project is likely to attract migrant workers and sex workers. Hence, there is a risk of increase in infection rates. The problem will persist for the duration of the construction phase and it is not reversible.

1. *Federal Ministry of Health/ National HIV/AIDS Prevention and Control Office. 2010. Sixth Report.*
2. *ANRS. 2008. Biannual Implementation and progress Report of HIV/AIDS related activities. Hamle 2000 – Tahssas 30, 2001 EFY.*

It is, therefore, necessary to put in place mitigation measures to minimize the risk of acquiring HIV infection and other sexually transmitted diseases. This will be carried out in collaboration with government health officials at various levels.

Potential Impacts on Air Quality and Noise Level

Most impacts are unavoidable because of current construction technology (e.g. earth moving equipment noise) in use. These impacts are related to: (i) dust and emission from plants and equipment used for preparation of construction materials at quarry sites; and (ii) construction activity on the access road. If good practice is adhered to, all such impacts would be temporary.

Potential Impacts on Water Availability and Quality

Impact on water availability (competing with local users) is avoidable since BHP Billiton World Exploration Inc. (Ethiopia) will draw from its own water resource or use water downstream of users in the immediate vicinity without compromising water users further downstream. It will utilize underground and at surface water resources.

Negative impact on water quality through contamination shall be avoided as much as possible. Dust suppression measures may be used by spraying roads with water to reduce dusty conditions. Limiting vehicle speed in the project area will minimise siltation thereby reducing dust levels. Possible contamination of water resources by oil and lubricants will be avoided.

Potential Impacts on Biological Resources

Land disturbance impacts are unavoidable because of the requirement to construct camps, build access roads and drill sites which will have a short term impact on the land utilisation.

Impacts on flora and fauna are expected to be minimal because there is little flora or fauna in the project area. The surviving flora and fauna impact is believed to be minimal.

Transporting equipment which may carry seedlings in tyres or machinery tracks could contaminate the area with foreign species. BHP Billiton World Exploration Inc. (Ethiopia) will ensure equipment is cleaned of mud, dust and clinging vegetation prior to transporting to the Danakil project. Given the hot, dry and saline conditions, germination and spread of species is likely to be low risk, never the less mitigation measures will be applied.

Potential Impacts

The project activities require construction of access roads, establishment of camps, drilling of water boreholes and exploration drill holes and seismic access dozing. Construction of the BHP Billiton and TESLA-IMC base camps have commenced and land disturbance plans have been implemented. There is a need to regularly monitor events and situations occurring on the existing and newly constructed roads. The negative impacts could be on land resources, water resources, air quality, noise level, biological resources,and human resources.

Environmental impacts can be broken down according to their nature, into:

- positive and negative impacts;
- local and widespread impacts;
- temporary and permanent impacts; and
- Short and long-term impacts.

In order to determine the potentially significant environmental impacts, either positive or negative, associated with the environmental aspects identified, a simple rating system was used, as follows:

Environmental impacts of exploration activities

Figure 24 refers to a conceptual exploration project where the impact of each activity is assessed as part of a progressive program.

The level of impacts have been assessed for the Danakil Region with the knowledge BHP Billiton has on the project at this point in time. The impacts are classified for each activity with anticipated impacts classified according to soil, vegetation, fauna, heritage, ground, water, air and noise. The impacts have been classified according to negligible, low, medium and high impacts.

Z - zero to negligible potential environmental impact associated with the aspect.
L - low environmental impact associated with the aspect.
M - medium environmental impact associated with the aspect.
H - high environmental impact associated with the aspect.

Figure 23: Forecast Maximum Water Usage

Use	Per Day Usage	Monthly Use	Annual Use
Camp (60 -120 people including showering, flushing of toilets)	Consumption in camp per day for people – 8400 litres Figure based on estimated use of 90 litres – 120 litres per person per day	252 000 litres	3,024,000 litres
Kitchen	400 litres	12000 litres	144,000 litres
General Use around Camp	1000 litres	30000 litres	360,000 litres
Laundry	300 litres	9000 litres	108,000 litres
Drill Rigs x 2 @ minimum use of 10,000 litres per day to 50,000 litres per rig per day maximum	100,000 litres	3,000,000 litres	108,000 litres
Total estimated water use	110,100 litres	3,303,000 litres	39,636,000 litres

Figure 24: Environmental Impacts during Exploration Phase

	Disturbance			Pollution				
Exploration Activity	Soil	Vegetation	Fauna	Heritage	Ground	Water	Air	Noise
Airborne surveys	Z	Z	L	Z	Z	Z	L	L
Reconn. Geol surveys	L	L	L	L	L	L	L	L
Reconn. Geophysics/geochem.	L	L	L	L	L	L	L	L
Geo-physics	L	L	L	L	L	L	L	L
Survey gridding	L	M	L	L	L	L	L	L
Scout drilling (existing tracks)	L	M	L	L	L	L	L	M
Track construction	M	M	M	L	L	L	L	M
Target drilling	M	M	M	L	L	M	L	M
Camp construction	H	H	H	L	M	M	L	M

Assessments of the environmental impact during the initial exploration phase classifed according to negligible, minimal, medium and high potential impact.

Z - Zero to negligible potential impact;
L - Low to minimal potential impact;
M - Medium potential impact;
H - High potential impact.

Note: The Environmental Management Plan reduces the risks of high potential impact through the development of risk mitigation strategies and measures.

Socio–Economic Environment

This section of the report highlights the potential socio-economic impacts of the Project with particular reference to the Project site and the host community.

Implementation of this Project will:

- Create employment thereby alleviating some poverty levels;
- Create business opportunities for local vendors;
- Contribute to enhancing the nation's economy through taxes;

Negative socio-economic impacts for the area include the potential transfer of HIV / AIDS and other sexually transmitted diseases.

The frequency, duration and severity of any negative socio-economic impacts are considered as being low. HIV/AIDS awareness presentations will be periodically provided to staff as part of ongoing HSEC staff training and awareness initiatives.

SECTION 5 - ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan (EMP) of the Danakil Potash Project

Introduction

General Considerations

When a large variety of activities are to be undertaken for a given project, it becomes necessary to organize scheduling of actions, monitoring performance, analysis of findings and to take decisions on the need for applying interventions. A management plan is a statement of how and by whom these functions would be carried out. Such a statement helps the managers to carry out the total work in a time-efficient and cost-effective manner. The Danakil EMP is tabled in Figure 25.

Environmental management plan specifies mitigation and monitoring actions with time frames, specific responsibilities assigned and follow-up actions defined. Major negative impacts and proposed mitigation measures have been out-lined in the EIA report. Implementations of these measures have to be carried out at different stages of the access road construction and operation phase, as well as during and after the establishment of camps, seismic dozing and drill access activities and drilling of water holes.

Mitigation measures proposed for socio-economic issues shall be managed in accordance with relevant Ethiopian legislation and undertaken in full consultation with the Ministry of Mines and affected parties. No resettlement will be required within the project area during the early exploration phase. Any compensation measures shall be managed in accordance with the Expropriation of Landholdings for Public Purposes and Payment of Compensation Proclamation No 455/2005 and Payment of Compensation for Property Situated on Landholdings Expropriated for Public Purposes (Council of Ministers Regulations No 125/2007).

Environmental issues during the operation phase shall be managed by BHP Billiton.

Environmental and EMP Reporting

Reporting in a manner that satisfies BHP Billiton Minerals Exploration, site management, and regulatory requirements. Periodic environmental reporting will be undertaken for the construction, drilling operations and rehabilitation phases of the exploration program. The Ministry of Mines including the ECDU and other stakeholders shall be formally advised of the Company's progress in implementing this EMP and associated environmental aspects relating to the BHP Billiton Danakil Potash Exploration Program as per the following process:

- Internal reporting within BHP Billiton Minerals Exploration with continual tracking of environmental performance.
- BHP Billiton will report its progress and performance against the EMP in the Annual Program Report to the Ministry of Mines and ECDU as part of its exploration licence conditions. BHP Billiton shall also comply with any additional reporting conditions specified by the Ministry of Mines in relation to this EIA approval.
- BHP Billiton shall consult the Ministry of Mines, ECDU and other external stakeholders as required regarding any significant variations to the existing approved work program that may affect the implementation of this EMP. Similarly, BHP Billiton shall consult the Ministry of Mines regarding its exploration program changes, this also applies to its assessment of alternatives documented in the EIA as well as the Drilling Fluids EMP (although the latter is an internal document)
- Local community stakeholders dwelling on or near BHP Billiton's licence area shall be advised of the Company's environmental performance against key aspects of this EMP during regular scheduled meetings (currently once per month - quarterly depending on requirements).

Environmental Management Plan

Aim

The purpose of this Environmental Management Plan (EMP) is to promote responsibility and commitment through the provision of management and mitigation measures that will ensure that potential impacts are minimised.

The EMP is aimed at addressing potential problems pro-actively before they occur. This will limit unnecessary damage to the environment and corrective measures needed during camp construction and field activities. Additional mitigation shall be undertaken throughout the project's life cycle as necessary.

This EMP addresses camp construction, airborne geophysical surveys and drilling phases of the project. The intention is that this EMP must be used as an on-site reference document and management tool, to ensure environmental best practice.

Environmental Management and Monitoring

Roles & Responsibilities

The roles and responsibilities to implement the Environmental Management Plan for the project are described below.

The EMP provides the over arching framework that will be used to translate the commitments and management measures contained in the EIA Report into the planning documents, camp designs, contract documents and the day-to-day operation of the Danakil Potash Exploration Program. BHP Billiton Minerals Exploration's HSEC Management Framework and the regulatory requirements will continue to be used as the mechanisms through which environmental management, monitoring and reporting is implemented for the exploration project.

The EMP will be reviewed and modified as required to ensure that the environmental obligations associated with continuing activities (such as the treatment and disposal of drill cuttings) for the project are adequately and responsibly managed. The EMP shall be updated to take account of the environmental management requirements and controls associated with new and future development options.

BHP Billiton

BHP Billiton shall implement the mitigation measures and standard controls identified within this EIA Report to manage activities that have a potential impact. The EMP measures provide an indication of how the outcome-based commitments will be achieved. These measures may be further refined or amended as a result of improved practices, learned experience operating in the locality or technological advances.

BHP Billiton is ultimately responsible for ensuring that the activities precede according to the requirements of the EMP and all activities are responsibly rehabilitated. BHP Billiton is also liable for restoring the environment in the event of negligence leading to damage to the environment.

BHP Billiton Contractors

Given the scale and wide range of disciplinary expertise and skills required during all phases of the exploration program, BHP Billiton will use contracting arrangements for several components including drilling, seismic surveying, downhole wireline logging and on site logistics.

The EMP will adequately manage these activities that continue to operate under direct BHP Billiton control including administering controls with its contracted partners.

The EMP will be the mechanism used to communicate and regulate environmental obligations, however more detailed documents will be prepared as part of any tender and contract award to ensure contractors are aware of their environmental obligations, and to provide BHP Billiton a mechanism to monitor their performance and compliance.

Where contractors have their own Health, Safety, Environment and Community (HSEC) plans and procedures, these shall compliment and support the BHP Billiton EIA and EMP. The Operations Manager shall review and approve any Contractor HSEC Management plans or procedures before the works/services commence where applicable. The contractor will also be required to communicate HSEC plans (BHP Billiton's, or their own) to all of its employees and sub-contracted employees before performing works and/or services as part of their contract obligations.

Environmental Control Officer (ECO)

BHP Billiton shall appoint an Environmental Control Officer (ECO) for monitoring of the implementation of the EMP. Auditing will be managed by BHP Billiton Minerals Exploration's Environment Specialist and likely to involve use of local environmental consultants. The ECO will form part of the project team and will be involved in all aspects of project planning that can influence environmental conditions on the site. Due to the limited potential impact of the activities, it is proposed that the ECO conduct regular site visits at least once a month until all activities are completed and rehabilitated where required.

As work progresses, Danakil Potash Program shall allocate personnel who are solely responsible for environmental management and monitoring. Options for environmental monitoring include outsourcing through a consultant to regularly monitor dust and water quality and performance against potentially higher impact activities. Additionally BHP Billiton will monitor and manage performance against the EMP.

Exploration activities

This EMP addresses the following exploration activities:

The Planning Phase

The planning phase is the ideal opportunity to incorporate pro-active measures to ensure environmental impacts are avoided and mitigated from the outset. Proper planning during this phase can ensure that the likelihood of certain impacts taking place is minimised.

The locations of the exploration drill holes as well as access routes in terms of slope, vegetation type, soil wetness indicators, existing disturbances, water resources and sensitive features of the area, such as lichens, are of critical importance for the sustainable and effective rehabilitation of the project. Location of the camp and layout of facilities shall always be taken into account during planning phases.

Camp Construction

Exploration activities will be conducted from a semi-permanent camp. This will act as a base camp and will be located close to the area where most of the work will be concentrated in order to provide housing and infrastructure facilities for the staff and visitors to the site.

In the Danakil this semi-permanent camp will cater for approximately 60 - 120 people, in an area of approximately 150 x 50 metres in extent. The camp will include air conditioned accommodation units, kitchen and dining area, first aid office, work offices, storage facilities, ablution facilities, laundry, fuel storage facility, vehicle and equipment maintenance area and drill core and sample storage facilities. The camp facilities are prefabricated units erected upon compacted earth bases, including concrete foundations for larger structures. The camp also includes recreational areas, and has excess space for temporary tented accommodation should the need arise. The entire camp area will be fenced off for protection against any wildlife or security threats.

Drilling Fluids (including Invert Mineral Oils and Salt Saturated Brines)

Drilling is a prime focus for the planned exploration activities and probably poses the highest threat of adverse impact on the environment. Drilling will involve use of water and chemicals and requires large areas of ground to be cleared for drill sites. The cleared areas i.e. the drill sites range in size and are limited to a maximum size area of 25 metres x 25 metres for sonic drilling and up to 80 metres x 80 metres for deep hole drilling. Sumps are usually prepared to store water to be used in drilling where required. Lubricants and fuels are used in the process. The downhole drilling fluids are unlikely to pose an environmental threat. The extent of this activity is dependent on the number of generated targets. Invert mineral oils and salt saturated Brines shall be managed through the Drilling Fluids Environmental Management Plan.

Mitigation

- Applying international best practice to drilling operations, particularly to the management of invert mineral oil use, treatment and disposal. This includes using invert mineral oils with low toxicity chemicals that are less harmful to the environment.
- Options to limit the volume use of invert mineral oils include the use of a mud recycling unit (also known as a shaker) to remediate invert mineral oils and salt saturated brines. The use of a mud recycling unit is discussed in the Drilling Fluids Environmental Management Plan (internal BHP Billiton document)

- The Drilling Fluids Environmental Management Plan has been developed in consultation with industry specialists to guide best practice in the Danakil. This plan is designed to minimise the quantity of waste going to landfill, prevent unsuitable disposal of waste, maximise the re-use of materials and establish acceptable standards for storage, treatment, transfer and disposal of waste materials. Use of any remediation opportunities that can be undertaken are also addressed in this plan.
- A Drillhole Specification Management Plan shall be developed and will take into account the use of specialised drilling fluids during the exploration drilling process.
- The Drilling Fluids Environmental Management Plan was separately submitted to the Ministry of Mines outside the EIA process. It is proposed that an update covering BHP Billiton's performance against the Drilling Fluids Environmental Management Plan be included in formal project updates to the Ministry of Mines.

Note: The Drilling Fluids Environmental Management Plan is an internal Company document and will not be released publicly with the EIA Report due to intellectual property considerations.

Avoiding Secondary Influx of Water

Mitigation

- Magnesium chloride shall be added to the Inverted Mineral Oil mix as a control measure to manage the potential for secondary water influx.
- A secondary control which may be used is "shoeing" which involves capping off sections of the drill hole with cement to prevent secondary water influx and then drilling back through the cement cap.

Avoiding Downward Pressure in the Drillholes

Mitigating Measures

- Specialized vent and diverters will be utilized during the drilling process. This technology is employed in the Oil & Gas industry to prevent blowouts that result in high pressure steam, toxic C02, H2S and other gaseous substances from being released during the exploration process.
- Oil and Gas Engineers and industry specialists will provide input to drilling plans to confirm the measures and apply progressive key learnings.

Management and storage of the radioactive devices for the downhole logging tools

- BHP Billiton and SEMM Logging shall fully comply with Federal Democratic Republic of Ethiopia Radiation Protection Agency (RPA) import, authorisation, use and reporting requirements.
- BHP Billiton shall verify that loggers are appropriately trained and experienced in the correct use and handling of the source.
- SEMM Logging's working procedures and management plans shall be reviewed and approved by BHP Billiton before the sources are used in Ethiopia.
- Site based employees and contractors shall be provided with suitable awareness training during site inductions.
- The logging truck shall carry appropriate warning signs.
- A radiation meter will be carried in the logging truck.
- Physical contact shall be avoided and the source holder will be lifted by the relevant sonde, never by hand. Loggers shall not come into direct contact with the source and maintain a safe working and personal distance from the source of at least 20cm.
- The source shall be clearly labelled and its shield locked in a suitable cage or box during transport and storage.
- The source holder will be regularly checked for signs of corrosion and a wipe test will be performed every 12 months.
- Cable heads shall include a weak point to ensure a controlled cable break during fishing operations.
- Assurance and appropriate documentation will be available to confirm the age of the source is within the 15 year maximum lifespan.
- The logger shall wear dosimeters while on duty regardless of whether he is using the radioactive sources.

Mitigating Measures – Operational Use

Operational use of the radioactive sources will comprise four elements.

1. Equipment testing and calibration at base camp
2. Transport to and from the drill site
3. Set up and preparation at the drill site
4. Down-hole logging of density and neutron

- The calibration work will be performed at a specially demarcated area next to the source stored at the camp. The logging personnel wear dosimeters and the process does not normally result in a recordable dose. SEMM will mobilise a radiation meter for testing purposes.
- BHP Billiton's Security Management Plan shall take account of additional security arrangements required during transportation to prevent security related incidents.
- A secure source storage area shall be established on site with relevant signage and safe demarcation distances.
- The operational site source and storage area shall be located on dry open ground within sight of the logging cabin.

Mitigating Measures – Storage

- The source holder shall be inscribed with a warning
- The source shield shall have a warning sign attached
- The shield shall be transported locked in a secured box or cage
- The shield shall be stored in a locked bunker
- The access door to the storage bunker shall carry an appropriate warning sign
- The bunker will be surrounded by a wire fence with a single gate that carries appropriate signage.
- The storage room shall not be used for any other purpose and shall be fitted with an internal warning sign.
- Access (set of keys) shall be restricted to logging personnel only
- The source holder shall be periodically checked for leakage

Water

Impacts on water quality may be caused by contaminated runoff of petroleum product spillages, leakages from storage areas and heavy vehicles, improper disposal of used oils and from hydraulic fluids which enters the soil
and thereby potentially causing ground water contamination. This water will be stored in tanks, bladders, evaporite ponds or a sump during drilling activities. The chemicals added to the water for drill rig purposes may impact on the immediate groundwater quality. Confirmation of the nature of biodegradable chemicals are defined in the Material Safety Data Sheets (MSDS).

The construction camp requires ablution facilities with suitable controls to prevent contamination of groundwater.

Mitigation

- A waste treatment plant shall operate on site at the camp.
- The chemicals used for water borehole drilling will be biodegradable. Proof of this aspect will be obtained from the drilling companies.
- Controls for invert mineral oil and salt saturated brines are outlined in the Drilling Fluids Environmental Management Plan.
- Precautions will be taken to ensure there is no overflow from tanks and drill sumps, bladders, evaporite ponds and drill sumps.
- Certificates (or invoices from approved disposal service providers) for disposal of hazardous materials needs to be on site at all times and available for inspection.
- Correct disposal of all empty hazardous containers will occur. Due to the separate locality of the camp and exploration site, it is proposed that the containers be kept in a bunded/non-permeable storage area and removed to Mekele for responsible disposal at a Government registered/controlled dumping facility as and when required. Responsible disposal shall be undertaken in accordance with FDRE Solid Waste Management Proclamation (No. 513/2007). If containers are manufactured in Ethiopia options to return them to the producer will be investigated if there is a chance the containers can be recycled.

- Required permits and MSDS sheets of all hazardous substances shall be carried during transportation to and from the exploration site. The driver shall have undergone necessary training to understand the implications of spillages and product specific mitigation measures.
- Every work site shall have a hydrocarbon spillage kit for cleaning and containing any spillages in case a spillage occurs.

Groundwater Usage

Water will be drawn from water boreholes and stored in tanks. Water from the bore will only be used for bathing, flushing of toilets and for kitchen use if boiled or treated via the water treatment plant. Present estimates of 20,000l of water will need to be available in the BHP Billiton and Tesla camps at all times.

The only water tank chemicals to be used, if any, will be chlorine for bacterial control. The water treatment system is a Reverse Osmosis, UV type and treats water within Australian Standards. This system has been adopted because of similar hot desert conditions between Australia and the Danakil environments.

There will be a separate system for black and grey water. All grey water that comes from showers, basins and laundry will be separated to a tank/ pan system. Black water will flow to a separate tank system and will be treated. The tank system will be emptied by a qualified and TNRS accredited contractor if the tanks exceed their capacity. A copy of the water treatment plant specifications is included in Appendix 3.0. Figures in the Appendix assume continuous water use with exploration drilling ongoing over a 12 month period. These figures may be less as the field season is likely to be periodic. The use of water for dust suppression is not included in this calculation.

Water Testing

Initially water shall be tested on a regular and frequent basis. Once the camp is up and running water will be tested on a monthly basis. The water samples will be sent to Mekele or Addis Ababa for testing.

Soil

Potential sources of soil contamination are handling of petroleum products such as oil and diesel during dispensing as well as improper disposal of waste oils, hydraulic fluids, and empty oil drums. Soil disturbance may occur for sampling and mapping purposes and when preparing drilling and camp sites.

Mitigation

- Petroleum products dispensing points shall have drip pans and bund walls.
- Storage of petroleum pollutants such as lubricants, fuel, oil and chemicals shall be done on sealed surfaces to prevent soil contamination.
- Waste oil shall be stored in clearly labelled drums, and will be temporarily kept in a bunded area before final removal to an TNRS disposal facility in Mekele that is authorised to receive and manage hazardous waste. If an appropriately registered facility does not exist in Mekele, waste oil will be transported to the nearest FDRE certified hazardous waste disposal site. The Operations Manager or their delegated site representative shall authorise the chain of custody for the storage, removal and final disposal of waste oil products.
- Certificates for disposal of chemicals and hazardous wastes need to be on site at all times and available for inspection. Only TNRS or FDRE certified waste disposal contractors shall transport hazardous waste from site to the nearest accredited disposal facility.

- Due to the separate locality of the camp and exploration site, it is proposed that the empty waste and chemical containers be kept in a bunded/non-permeable storage area and removed to a certified waste disposal area in Mekele that is authorised by the TNRS to accept hazardous waste. Responsible disposal shall be undertaken in accordance with FDRE Solid Waste Management Proclamation (No. 513/2007).
- The Operations Manager shall be responsible for all waste disposal including drill waste, chemicals and hydrocarbons.
- Required permits and MSDS sheets of all hazardous substances shall be carried during transportation to and from the exploration site. The driver shall have undergone necessary training to understand the implications of spillages and product specific mitigation measures.
- Soil erosion shall be prevented in cleared areas by means of rehabilitation when the drill site or access road is no longer required. During removal of soil for construction purposes, the topsoil horizon shall be stored separately (top 50mm of soil). The soil shall be returned in the same sequence as removed, with replacement topsoil last. This will enable the micro-organisms and seeds to re-establish at a higher growth rate.

Vegetation

The EBS indicates there will be no impact on the limited vegetation in the project area. However, the following measures shall apply if vegetation is present in areas of planned land disturbance.

Mitigation

- Pre-existing access roads will be used where possible;
- Previously disturbed areas shall be preferred for constructing access roads, upgrades will be made where required;
- Landform rehabilitation which may include contouring of landscape if required.

Air

The impact from the project on the air quality will be negligible.

Mitigation

- The consumption of fuel for vehicles, generators and drilling rigs will be restricted to the minimum necessary to minimise air pollution.
- The vehicles, earthmoving, heavy duty trucks, generators and drilling rigs must be kept in good mechanical condition to minimise fuel consumption which in turn minimises the air pollution.
- Roads will be watered down and/or driving speeds minimised to lower the potential for dust generation.

Noise

The impact from the project on the noise levels within the area will be negligible. Drill rig operators and other field workers near the drill rig and earth moving equipment will be exposed locally to elevated noise levels. Careful consideration near dwellings will be undertaken.

Mitigation

- The running of vehicles, generators and drilling rigs will be restricted to the minimum necessary to minimise any possible disturbances from noise.
- The vehicles, generators, earth moving equipment and drilling rigs must be kept in good condition to minimize the noise levels.
- Field workers operating near elevated noise must wear proper ear protection.

Impacts of Camp

Construction of the camp will not require clearance of vegetation. Waste will be produced at the camps including sewage, refuse and waste oil. The potential impacts are significant and negative if not managed responsibly.

Mitigation

- The camps are positioned in locations deemed suitable for use after consideration of all the associated environmental impacts.

- Waste management measures shall be put in place.
- Good waste management practice will be enforced.
- Petroleum products shall be stored in tanks with bunded walls. Waste oil shall be stored in drums in a secure and impermeable area and disposed of responsibly
- Non-biodegradable refuse such as glass and plastic bottles, plastic bags, metal scrap, etc, shall be stored in a container at a collection point and collected on a regular basis and disposed of at a recognised disposal facility.
- The camp shall remain closed to unauthorised visitors and restricted to employees only.

Atmospheric emissions associated with camps

Atmospheric emissions from vehicles and camp establishment activities include dust and particulate emissions. Of these, dust is likely to be the most significant (specifically if drilling takes place during the dry season). The purpose of the plan is to ensure these aspects are effectively managed during construction and ongoing exploration activities.

Air quality recording is non existent and is not common practice nation wide, hence there is no information regarding the air quality of the project area. Since the project area is in a remote rural location, there is no source of air pollution from alternative industries. The major source of air pollution is wind laden dust, and to a very limited extent biomass burning for domestic energy. Although very limited, one additional source of air pollution is emission from vehicles used by tourists visiting the area in the cooler season. In view of the absence of major industries, and the relatively low traffic volumes on the existing portion of the public access road, it is assumed that the base line local air quality fulfils an acceptable standard.

The plan is made up of the following components:

- Dust;
- Motor vehicle and generator emissions.

Management and mitigation

Dust

Objectives

To ensure that dust emissions from the exploration program and camp establishment activities do not result in adverse health or other negative effects.

Method statements

- Routinely spray unpaved site and access roads with water;
- Limiting vehicle-entrained dust from unpaved roads through traffic control measures e.g. limiting vehicle speeds and restricting traffic volumes;
- Where applicable, re-vegetate land disturbed areas immediately after use;
- Cover vehicle loads to reduce dust dispersion during transportation;
- If required, segregate camp construction areas that generate dust, or cover with temporary shade-cloth or plastic sheeting to minimise the transfer of dust.
- Appropriate dust suppression measures include: spraying or dampening with water, using a commercial dust binder (such as Hydropam or Dustex), rotovating straw bales, planting of open cleared space and the scheduling of dust generating activities.
- Moistening of gravel haul and access roads with water. Special attention shall be given to roads close to villages and dwellings. The maximum allowable speed on any site access road will be 30km/ph
- Where absolutely necessary, topsoil will be stripped for construction purposes and must be limited in area. Land Disturbance will only be undertaken after the Project Manager's approval via the Land Disturbance Form.

Motor vehicle, drill rig and generator emissions

Objectives

To ensure that atmospheric emissions from road and drill site construction, drilling, camp establishment and operational activities.

Targets

No complaints to emissions from vehicles, earth moving machinery, drill rigs and camp generators.

Method statements

- Motor vehicles and plant to be mechanically maintained; and
- Vehicles, earth moving machinery and camp generators to have no visible emissions from their exhausts.

Fire Control and Emergency Preparedness

Purpose

The purpose of this plan is to ensure that fire and other emergencies have been properly considered and adequately planned to undertake the exploration program especially as it relates to potential fires in the camp and drill sites.

Components

The plan is made up of the following components:

- Fire risk management; and,
- General emergency preparedness.

Management and mitigation

Fire risk management

Objectives

Minimize the risk of the outbreak of fire.

Targets

No open fires or other emergencies during the drilling programme;

Method statements

- All necessary precautions must be taken to minimise the risk of fire on the site (camp, earth moving equipment, vehicles, drill rigs and surrounds);
- No open fires shall be permitted on or off site;
- No on-site burning of any waste materials, vegetation, litter or refuse shall be permitted unless specifically authorised by the Operations Manager;
- Smoking shall not be permitted in those areas where there is a fire hazard. Such areas shall include the workshop and fuel storage areas and any areas where the vegetation or other material is such as to support the rapid spread of an initial flame;
- Smoking shall not be permitted in bedrooms or vehicles or near invert mineral oils (this includes containment and mixing areas).
- All necessary precautions to prevent fires or spills at any on site fuelling stations and at places where flammable materials are stored. Specifically, smoking will not be allowed in any such area;
- Adequate and appropriate fire-fighting equipment must be provided at all places where flammable materials are stored, handled or used;
- Basic fire-fighting equipment shall be available on work sites at all times. This shall include at least rubber beaters when working in natural areas, and at least one fire extinguisher of the appropriate type mounted on all light and earth moving machinery and when welding or other "hot" activities are undertaken;
- All exploration personnel must be made aware of the procedures to be followed in the event of a fire;
- Any fires that occur shall be reported to the Operations Manager immediately and in turn reported to the Program Manager and relevant authority.

General emergency preparedness

Objectives

Ensure that incidents are effectively contained and negative environmental impacts minimised.

Targets

No injuries or uncontrolled releases to the environment as a result of emerging conditions.

Method statements

- Emergency procedures shall include, but shall not be limited to, fire, flooding, storm events, incidents caused by use of hazardous substances and others that may be relevant;
- Procedures must conform to those detailed in the relevant sections of the Hazardous Chemical Substances Regulations, extracted from Ethiopian legislation.
- Material Safety Data Sheets (MSDS) must be provided for all hazardous materials that are brought on to site and the necessary provisions made for the safe handling, storage and use of the same together with the necessary emergency preparedness in the event of a spill or other incident;
- Contractors must ensure compliance with all of the above and ensure that provision is made for fire control and emergency situations;
- Emergency procedures, including the names of responsible personnel, contact details of emergency services, etc. shall be made available to all the relevant personnel and shall be clearly demarcated at the relevant locations around the exploration camps;
- Telephone numbers & contact details of emergency services, shall be posted conspicuously in the camp office near the telephone. If no land lines exist and a permanent cell phone is not available, then a satellite phone will be made available for emergency use.
- Contractors shall advise the Operations Manager immediately of any emergencies on site, together with a record of the immediate actions taken. Contractors will submit a full report on the handling of the emergency as soon as possible (i.e. within 5 working days).

Materials Handling And Storage

Purpose

A variety of materials may be brought onto the site for use in the drilling programme, some of which may be potentially hazardous. Cement and concrete, for example, are regarded as potentially hazardous to the natural environment on account of their very high pH and the chemicals contained therein. The purpose of this component of the EMP is to ensure that of the materials that are brought onto site, those that are hazardous are identified, approved, their hazard properties understood and suitable provision made to ensure that there are no impacts as a result of the presence on site of such materials.

Components

The plan is made up of the following components:

- Material safety; and
- Vehicle and plant refuelling

Management and mitigation

Material safety
Objectives

Ensure materials are safely handled to minimize risk to employee's health.

Targets

No injuries or potential health effects as a result of uncontrolled exposure of hazardous materials.

Method statements

- Contractors shall comply with all applicable Ethiopian legislation and/or best practice guidelines. These specifically include the Environmental Pollution Control Proclamation (No. 300/2002) and the Solid Waste Management Proclamation (No. 513/2007). Local waste disposal legislation and requirements for the Afar National Regional State have yet yet to be confirmed but may also apply. Hazardous chemical substances (as defined in the Regulations for Hazardous Chemical Substances) used during construction shall be stored in secondary containers;
- Prior to bringing any Hazardous chemical substances to site, the Operations Manager must approve this chemical;
- The relevant Material Safety Data Sheets (MSDS) shall be available on site. Procedures detailed in the MSDS's shall be followed in the event of an emergency situation;
- Contractors shall ensure the training and education of all personnel on site who will be handling hazardous materials about their proper use, handling and disposal;
- Contractors shall ensure that lubricants, oil, petrol, diesel and other hazardous substances are not spilled onto the ground;
- As far as possible loading and unloading of materials shall occur in bunded areas to contain any spillage which may occur;
- Materials handling equipment shall be properly maintained and serviced regularly to ensure the proper functioning of the systems designed to minimize dust, fugitive emissions and spillages;
- All applicable local, regional and national by-laws with regard to road safety and the transport of materials, especially hazardous and/or toxic materials must be complied with;
- Further measures to minimise the risk of spillage during transportation include: Use of appropriate vehicles and load labelling; limiting the transportation of hazardous loads to off-peak periods; and, facilitating proper driver training to minimise the risk of traffic incident leading to materials spills; no after dark driving when visibility is poor.
- All material storage areas and stockpiles shall be designed and managed so as to reduce the risk of spillages, contamination of soils, groundwater, surface water and stormwater or damage to materials as a result of strong wind;
  Tanks containing fuels shall have lids and shall remain firmly shut. Only clean, empty tanks may be stored on the bare ground. Fuel stores shall be placed on a bunded sealed base;
- The bund will accommodate 110% of the total volume for single tanks;
- Where two or more tanks are installed within the same bund, the bund shall accommodate 110% of the largest tank or 25% of the total capacity of all tanks, whichever is the greater; and,
- Used oil shall be stored in a safe temporary storage area that is properly bunded and protected from rain water ingress, pending its removal from site for safe disposal/recycling

Vehicle and Plant Refuelling

Objectives

Ensure that oil and fuel products are managed to minimise the risk of a spillage/uncontrolled discharge.

Targets

No evidence of spillages of oils and fuel products; and,

Soaps, oil and grease 2.5 mg/l in stormwater runoff from site.

Method statements

- If petrol, diesel or oil refuelling is to take place in the camp site or within the cleared drilling site then the surface under the refuelling area shall be protected against pollution/spills;
- Materials shall be appropriately secured to ensure safe passage between destinations.

Leak And Spill Management

Purpose

Although addressed to some extent already in preceding sections, particular attention must be paid to minimising the risks of leakages of hazardous materials or spills. The purpose of this plan is to ensure that the necessary provisions are in place to reduce or prevent impacts on the environment as a result of leakages or spills of potentially hazardous materials.

Components

The plan is made up of the following components:

- Leak and/or spillage prevention;
- Refuelling; and,
- Leak and/or spillage remediation.

Management and mitigation
Leak and/or spillage prevention

Objectives

To ensure that leaks or spillages are managed in such a way as to prevent negative environmental impacts and to ensure rapid and effective containment and clean-up actions.

Targets

No on site evidence of leaks or spillages of any hazardous materials.

Method statements

- Contractors shall ensure that any workshop and other equipment maintenance facilities do not result in contamination of the soil or vegetation and this includes emergency equipment maintenance;
- Workshops shall have a smooth impermeable (concrete or thick plastic covered with sand) floor. The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages;
- Pumps and other machinery requiring petroleum products (oil diesel) to remain in one position for longer than two days shall be placed on drip trays. The drip trays shall be emptied regularly and the contaminated water disposed of off-site at a facility capable of handling such wastewater.
- Drip trays shall be cleaned before any possible rain events that may result in the drip trays overflowing and before long weekends and holidays.
- All vehicles and equipment shall be kept in good mechanical working order and serviced regularly. All equipment that leaks onto the ground shall be repaired immediately or removed; If servicing and fuelling of vehicles and equipment takes place on site, this shall

occur at dedicated and properly equipped facilities as defined by the Operations Manager in consultation with the Environment Control Officer. When servicing equipment, drip trays shall be used to collect the waste oil and other lubricants. Drip trays shall also be provided within the camp area for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders, vehicles);

- Oil and lubricant changes may occur in workshops that contain the necessary protection to prevent uncontrolled spillage of oils or fuel products onto bare soil or vegetation;
- If there is a breakdown or an emergency repair that is done away from the regular workshop area then provision must be made to ensure that there is no spillage of oil or fuel products (absorbent materials (or equivalent) and/or drip trays available to collect any oil, fluid, etc). Such emergency repairs must be reported to the Operations Manager so that the area can be inspected afterwards to ensure that there have been no spillages;

Refuelling

Objectives

To ensure that the process of refuelling does not result in uncontrolled spillage of hazardous materials.

Targets

- No on site evidence of leaks or spillages of any hazardous materials; and,
- Soaps, oils and grease < 5.5 mg/l in discharge water (the appropriate World Bank value for oil and grease is 10mg/l).

Method statements

- Plant shall be refuelled at a designated re-fuelling area/depot or at a workshop area within the camp as applicable, unless impractical;
- If this is not reasonably practical (i.e refuelling drill rigs at the drill site) then the surface under the refuelling area shall be protected and appropriately bunded to prevent contamination to the reasonable satisfaction of the Operations Manager prior to any refuelling activities;
- A drip-tray may be used provided it is clean, does not leak and that any spillages into the tray are immediately recovered thereafter for disposal;
- If fuel is dispensed from 200 litre drums, the proper dispensing equipment shall be used, and the drum shall not be tipped in order to dispense fuel;
- The Contractor shall ensure that the appropriate fire-fighting equipment is present during refuelling operations;
- The refilling of storage tanks shall be done in a manner that prevents spillage onto bare soil – all refilling is to occur over a hard surfaced and bunded area;
- Any spillages must be reported immediately to the Operations Manager together with a description of how the incident occurred, what has been done to ameliorate the incident, disposal of contaminated material, and what will be done to prevent a reoccurrence.

Leak and/or spillage remediation

Objectives

To ensure that leaks or spillages are managed for effective containment and effective clean-up actions.

Targets

No on site evidence of leaks or spillages of any hazardous materials.

Method statements

- Emergency procedures shall be developed and communicated to all personnel such that they are aware of the procedures to be followed for dealing with spills and leaks. The procedures shall include identification of responsible personnel and reporting procedures, contact details of emergency services, etc.
- Procedures detailed in the Material Safety Data Sheets (MSDS) for hazardous materials shall be followed in the event of an emergency situation;
- Contractors shall ensure that the necessary materials and equipment for dealing with spills and leaks is available on site at all times;
- Contractors shall ensure that there is always a supply of absorbent material readily available to absorb/ breakdown or where possible, be designed to encapsulate minor hydrocarbon spillages. The quantities of such materials shall be able to handle a minimum of 200l of hydrocarbon liquid spill;
- Any wastewater or spilled fuel collected within the bund around the refuelling area shall be disposed of as hazardous waste;
- Contractors shall remove all oil, petrol, and diesel-soaked sand or other product immediately and shall arrange for it to be disposed of as hazardous waste by an appropriately qualified hazardous waste contractor;
- Treatment and remediation of the spill areas shall be undertaken to the reasonable satisfaction of the Operations Manager; and
- In the event of a hydrocarbon spill, the source of the spillage shall be isolated and the spillage contained. The area shall be cordoned off and secured.

Noise

Purpose

Noise can be a ubiquitous issue on any drilling programme and to lesser extent within a field camp. The effects of noise are mostly nuisance related, but in extreme cases can lead to hearing loss. The purpose of this plan is to ensure that noise is effectively managed during the exploration program. In many cases, drilling noise will be less of an issue due to the lack of sensitive receptor points and the remote rural nature of the target area surrounds.

The purpose of this section is to ensure that the drilling program does not result in nuisance effects or disturbance to communities or dwellings within and bordering the target/exploration lease areas & the workforce – [please note that this EMP is intended to augment any occupational guidelines (related to, for instance, the use of hearing protection) & only provides limited information in this respect].

Data regarding ambient noise levels in the Danakil is not available and is difficult to indicate the condition in the project area. However, in view of the low level of traffic load in the area and absence of a road in a substantive portion of the project it can reasonably be assumed that ambient noise levels near to the road are below the widely accepted guideline level i.e. (Leq) of 65 dBA, above which significant noise nuisance may be experienced.

Management and mitigation

Camp Construction & operational (drilling activities) noise management

Objectives

To ensure that noise generated during the project does not cause a nuisance or result in adverse health effects.

Targets

As a minimum, ambient noise levels emanating from the camp and drilling activities must not exceed 70 dBA at the site boundary;

Method statements

- Adhere to any local noise regulations as appropriate.
- The contractor shall take precautions to minimise noise generated including drill sites, in camp locations and when using earth moving equipment where possible (e.g. install and maintain silencers on machinery as appropriate); The contractor will comply with the following requirements:
- All equipment shall be kept in good working order.
- Equipment shall be operated within specifications and capacity (eg. No overloading of machines);

- Regular maintenance of equipment will be undertaken particularly with regards to lubrication;
- Equipment shall be operated in a diversified manner over time as possible (i.e. if possible, spread operation of equipment throughout working periods rather than operating several times simultaneously). Rotate operators.
- Equipment shall be turned off when not in use;
- Pumps, generators, compressors and saws shall be positioned in sheltered locations;
- Drilling activities must not result in the generation of excessive noise viz. exceeding 70 dBA beyond 100m of the drill site perimeter;
- Appropriate directional and intensity settings are to be maintained on all hooters and sirens.

Waste Management

Purpose

A variety of wastes are anticipated to be generated during the project. The purpose of this plan is to ensure that waste is effectively managed, upholding in that effort the principles of waste prevention, minimisation and recycling and the creation of opportunities (in the safe disposal and possible re-use of waste) for local qualified contractors from Mekele as appropriate. These provisions should be seen as complementary to BHP Billiton Minerals Exploration Success Through Safety (STS) procedures or standards relating to waste management and disposal.

Objectives

- To maximise the internal and external recycling of materials;
- To stimulate and support local contractors' development through recycling opportunities; and
- To minimise the volume of solid waste requiring disposal by landfill.

Targets

- No improperly managed waste on site;
- Confirmation through inspections of proper segregation and storage prior to offsite disposal;

Method Statements

Indicate management endpoints such as recycling or disposal destinations of each individual waste stream and drive a continuous improvement programme in waste minimisation which is based on the following waste management hierarchy:

- Minimise the generation of waste
- Re-use the waste during camp development and habitation;
- Re-use or recycle waste streams to other users at other locations;
- Dispose of unusable waste streams at permitted waste disposal facilities;
- Consider returning containers to Ethiopian manufacturers for recycling e.g. bottled water.
- A separate waste disposal area shall be designated at the camp, drill or construction site, which contains clearly demarcated skips and bins to allow different types of waste to be separated at source: domestic, metal scrap, used oil, paper, hazardous wastes etc. In addition, separation of potential re-use and recycling opportunities shall be undertaken.
- Contractors must ensure that sufficient bins are provided with lids to store the solid waste produced on a daily basis. Bins shall not be allowed to become overfull and shall be emptied prior to becoming full;
- No on-site burning, burying or dumping of any waste materials, vegetation, litter or refuse will be permitted;
- Contractors must seek to minimise the amount of waste sent to landfill by investigating opportunities for recycling or re-use of waste. This investigation shall include potential treatment options which would increase the recyclability and re-usability of these waste streams.
- Contractors must ensure that disposal facilities and waste contractors (whether landfill, or processing plants) have the necessary qualifications and permits required in order to process the waste received from the site and must ensure they obtain the necessary documentation certifying the legal disposal of their waste.

- Excess food and food scraps will be separated from general waste.
- Paper, plastic and tin/metal waste to be separated in suitable containers that are provided.
- The enclosure will be surrounded by a well ventilated fly screen to prevent the attraction of flies, mosquitoes or any insects that could spread disease. The access point will be closed by a door that can be closed and secured to prevent entry by rodents wild animals and birds.
- Kitchen waste, anything that is related to food, by-products will be placed in bags and sealed to avoid attracting flies, insects and rodents.
- Two clearly identifiable areas will be established for general waste and kitchen waste. General waste will be separated from kitchen waste (swill/by-products of food/organic waste).
- General waste that is generated in the camp will be dealt with in the appropriate manner. Garbage bins with bin liners will be placed at strategic points in the camp and emptied on a daily basis. A facility has been provided for in the camp which will serve as a centralised point where daily waste will be accumulated.

Kitchen Structure

The kitchen structure will have the following:

- A cement or similar hard floor with a run off drain for cleaning.
- A roof of suitable material to protect the area from the elements.
- Once a week (or as required) if there is a need for an increase in collection, the garbage will be removed and disposed of by an TNRS accredited waste management consultant.
- The waste management consultant will be compliant with regard to garbage removal and the legislation of the region. At the time of final EIA Report submission, confirmation from the local administration in Semera regarding specific local waste disposal laws remains pending. The requirements of Solid Waste Management Proclamation (No. 513/2007) shall also be observed. Disposal of waste must be done at an approved dumping ground which can facilitate the necessary garbage that will be generated at the camps.

Rodent Control

Objectives

To ensure that rodents do not proliferate in the camp areas as a result of waste;

Targets

No evidence of rodents in key waste storage areas.

Method statements

- Contractors must implement measures to monitor and manage rodent activities within site camps and work areas;
- Tamper-proof rodent bait-stations must be strategically placed in identified areas.
- Excess food and scraps will be separated from general waste.
- Paper, plastic and tin/metal waste to be separated in suitable containers that are provided.
- The enclosure will be surrounded by a well ventilated fly screen to prevent the attraction of flies, mosquitoes or any insects that could spread disease. The access point will be closed by a door that can be closed and secured to prevent entry by rodents, wild animals and birds.
- Kitchen waste and anything that is related to food, by-products will be placed in bags and sealed to avoid attracting flies and insects and rodents.
- Two clearly identifiable areas, general waste and kitchen waste. General waste will be separated from kitchen waste (Swill/by-products of food/organic waste).

Wildlife Management

Some wildlife is present in the project area. This section highlights the mitigating strategies to ensure there is no adverse impact on the local wildlife population.

Objectives

- To avoid any adverse impacts on local wildlife in the project area.
- Ensure a process is adopted to report any known or suspected poaching and illegal hunting in the area.

Targets

- No wildlife threatened or killed as a result of project operations

Method Statement

- Staff and contractors to monitor and be alert to any signs of illegal hunting and poaching in the wildlife areas and report them to the relevant administrative authorities.
- The site Traffic Management Plan shall incorporate steps and actions to limit harm to local wildlife. Signs shall be erected at critical points if wildlife poses a continuing concern in certain areas. Speed limits to be observed.
- Local wildlife (hyenas) and camel train presentation is to be included in the induction process and discussed at regular production meetings. This shall include a description of the wildlife in the area and camel behaviours. The presentation shall reinforce that trade on wildlife is internationally forbidden and enforce the dangers of wildlife such as wild dogs and hyenas.
- Employees to be advised to avoid becoming involved in illegal hunting, poaching or encroaching into wildlife habitat, or in the killing of wild animals. This includes trading, transporting and endangering wild fauna.
- "Bushmeat" will be banned from the project site. Catering staff must avoid purchasing local meat where origin and quality cannot be guaranteed.
- Where night time operations may apply, BHP Billiton shall make drivers and machine operators aware of precautionary measures to protect nocturnal species and protect themselves from dangerous wild animals (including wild dogs and hyenas). This may include giving priorities for road crossing nocturnal animals and turning off lights if some nocturnal species are in the area.
- The project will develop a Wildlife Management Plan in line with BHP Billiton standards where an increase in human-wildlife interactions becomes evident or problematic (not deemed required at this stage).
- Staff and contractors are encouraged not to feed wild animals.

Haulage Vehicle Movements

Mitigation measures

A site Traffic Management Plan will include steps to minimize the impacts of haulage traffic, including but not limited to the regular watering of non-surfaced sections to suppress dust and the speed limits which will be imposed.

In the case of major towns, the contractor shall ascertain from the local authorities their preferences regarding feasible routes to be taken by haulage traffic, and shall use roads other than the main road if so directed.

Driving is only permitted during daylight, no after dark or night driving is permitted.

Aviation

Standard civil aviation rules and regulations will be routinely applied for the management of air traffic. Local communities will be made aware of possible risks associated with aircraft landing and takeoff.

- The project shall make use of existing air strips.
- The need for caution around camel trains in the vicinity of Hamadela Airstrip is acknowledged.
- An airport monitoring crew will clear the runway before the aircraft lands during routine flights to the exploration area. Anyone in the vicinity of the runway will be asked to leave the area.
- BHP Billiton Aviation Journey Management plans cover a range of risks relating to aviation safety. A pre-flight checklist must be completed before each flight and occupants and luggage re-weighed prior to take-off.

- The program may consider fencing the runway area if the risk of people transgressing the runway becomes problematic (there is a risk however animals could become trapped within the airstrip because of the fence)

Soil Impacts

Even though there is very little soil cover in most of the project area, the soil erosion impacts due to concentrated flows, if any, can be mitigated as follows:

- Flow speed control measures including grassing (no introduction of foreign species is permitted), riprap and other devices, riprap and other devices in channels, as well as flow dispersal structures in main drains; diversion towards many drains /ditches prevent the accumulation of runoff in a single ditch;
- Control of the volume of water flow in the vicinity of exposed soils and slopes;
- Cut-off drains to catch water before it reaches critical areas, and diverting drains, which avoid excessive concentration of flows;
- Concrete dissipation structures designed to slow fast running storm water in drains, and hence reduce its downstream erosive potential; and
- Careful consideration of flash flooding is a real risk to drill sites and camp areas during seasonal rains.

Cultural Heritage Impacts

A Cultural Heritage Management Plan has been developed in accordance with Ethiopian Legislation on Preservation of Cultural Heritage (Proclamation No. 209/2000). The Cultural Heritage Management Plan outlines the process for identifying, recording and protecting cultural heritage sites and objects in the Danakil exploration licence area. This CHMP is also aligned to the protection of our host community's cultural heritage as defined in BHP Billiton's Health, Safety, Environment and Community (HSEC) Standards.

Land disturbance within the project area represents a higher risk to the disturbance of cultural heritage sites and objects. This includes land clearance during seismic surveying, development of tracks and access roads, drill sites and camp clearance and construction.

Cultural Heritage assessments as part of the formal Land Disturbance Approval must be undertaken to ensure that BHP Billiton World Exploration Inc. (Ethiopia) conducts all activities in line with BHP Billiton's Sustainable Development Policy which affirms that we respect and value the traditional rights and cultural heritage of the local Afar community. In accordance with this policy it is expected that all program staff will respect cultural diversity and respect Ethiopia's cultural heritage at all times.

The Cultural Heritage Management Plan is consistent with the way BHP Billiton routinely manages cultural heritage issues and potential impacts in other parts of its business. BHP Billiton Iron Ore and Nickel West have well established and embedded management procedures for protecting cultural heritage during all stages of exploration drilling, mining and development

The Ministry of Mines will be provided with a copy of the Cultural Heritage Management Plan once the final version has been approved by BHP Billiton.

Occupational Health Hazards

All equipment will be mechanically sound to prevent noise pollution and discharge of fugitive emissions which can be detrimental to the health of employees, the environment and local communities. Good house keeping practices are key to minimizing losses and preventing fugitive emissions. Such losses and emissions will be minimized by enclosed buildings, covered or enclosed transfer points, and dust collection equipment.

Self Auditing and Incident Reporting

The process of continual improvement, through checking, reviewing and auditing is incorporated within the BHP Billiton Group HSEC system. In accordance with Article 8/2i of the Environmental Impact Assessment Proclamation No. 299/2002. The EMP shall be audited and reviewed internally within BHP Billiton and externally through:

- Internal and self-assessment audits
- Corporate-level audits (BHP Billiton Minerals Exploration Success Through Safety audits, BHP Billiton Group HSEC Management Standards)
- Verification audits, which are external audits required by BHP Billiton for the implementation of internal HSEC Management Standards or sustainability reporting.
- Environmental compliance audits (i.e. internal and external audits focusing on legal/regulator matters)
- Assessments and approvals for particular components of the EMP by regulators.

The environmental commitments outlined in the EMP and in this report will be audited as part of the existing internal and external audit process.

In accordance with BHP Billiton Minerals Exploration and Group HSEC Management Standards, incidents including near misses, spills and community complaints are investigated, analyzed and documented. Information gathered from the incident investigations is analyzed to identify and monitor trends and to develop prevention programs which include correction and preventative actions taken to eliminate the causes of the incidents. All employees, contractors and sub contractors are required to adhere to both BHP Billiton Minerals Exploration HSEC Standards and any project specific corrective action systems that may be implemented by the Program in Ethiopia. BHP Billiton will also comply with its statutory incident reporting obligations.

Budget

An estimated budget of USD $500,000 will be allocated to rehabilitate impacts of the initial exploration program activities outlined in this document. These will include rehabilitation of camp and storage areas, road access, drill sites and seismic lines. The budget is additional to the estimated costs for drill cutting treatment and final waste disposal. BHP Billiton will consult the relevant local authority to seek guidance and to relinquish official future liability should community or local stakeholders request the access roads remain. All water boreholes and drill holes will be capped during the rehabilitation process.

Figure 25: Danakil Environmental Management Plan Table

Phase of Development	Activity / Impact / Issue	Action	Responsible Party	Frequency of Action
Planning	Review and approval of the EMP	The final EMP shall include considerations as deemed necessary and relevant by the relevant authority and concerned parties.	BHP Billiton	Once off
Planning	Legal & Statutory Compliance	The BHP Billiton Ethiopia Legal & Statutory Compliance Register shall be referenced in order to determine applicable host country laws regarding mining and exploration activities. All required statutory approvals shall be obtained before relevant work is undertaken. BHP Billiton World Exploration Inc (Ethiopia) shall comply with all legal and statutory requirements relating to exploration activities in Ethiopia. BHP Billiton will seek legal counsel should legal legislation and Proclamations not be clear.	Program Manager	Continuous
Planning	BHP Billiton Standards	All employees and contractors shall be inducted and onboarded in accordance with BHP Billiton standards including MinEx Success Through Safety Standards and Procedures. All employees and contractors shall comply with MinEx Success Through Safety Standards and Procedures and other BHP Billiton's HSEC policies and procedures as required. Self-managing contractors who undertake activities independently of BHP Billiton shall be required to develop suitable HSEC Management Plans including EMPs which must be formally approved by the Program Manager or assigned delegate before work shall commence.	Program Manager	Continuous
Planning	Environmental Incidents	BHP Billiton shall take corrective action to mitigate an incident appropriate to the nature and scale of the incident and must also rehabilitate any residual environmental damage caused by the incident or by the mitigation measures themselves.	Operations Manager	Continuous
Planning	Recruitment of labour	The Program Manager shall make use of local labour where possible in order to stimulate the local economy and provide opportunities for local skills training.	Operations Manager	Continuous

Phase of Development	Activity / Impact / Issue	Action	Responsible Party	Frequency of Action
Planning	Layout of sites and roads	Previously disturbed areas shall be the preferred road access with additional preference for areas without vegetation and cultural sites and heritage objects. New access roads will be constructed where there is no road access.	Operations Manager	Continuous
Planning	Seasonal aspects	Drilling shall be done primarily during the dry season in order to limit disturbance to the soil and manage the erosion potential. Where drilling may be required during seasonal rains appropriate management plans shall be used to minimize environmental impacts.	Operations Manager	Continuous
Planning	Interaction with affected parties	The success of the project depends mainly on the good relations with the affected landowner(s) communities, locally employed staff and regional stakeholders. It is therefore required that the ECO and the Operations Manager shall establish good relations with all the affected parties on or near the license area. All negotiations for any reason shall be between the Community Liaison Officer (CLO) the affected parties and BHP Billtion. No verbal agreements shall be made. All agreements shall be recorded in writing and all parties shall co-sign the documentation. Minutes of formal meetings shall be taken and distributed. The affected parties shall always be kept informed about any changes to the construction and exploration program. If the CLO is not on site the Operations Manager shall keep the affected parties informed. The contact numbers of the Operations Manager and the CLO shall be made available to the affected parties. Any unresolvable issues may be raised to a higher level with the BHP Billiton Program Manager by either party. This will ensure open channels of communication and prompt response to queries and claims. The rights of the affected parties shall be respected at all times.	Community Liaison Officer (CLO)	Ongoing

Phase of Development	Activity / Impact / Issue	Action	Responsible Party	Frequency of Action
Exploration Work (Camp Construction, airborne geophysics Drilling)	Physical drilling site	On completion of any exploration activity, the Operations Manager shall instruct contractors to clear away and remove from the site all temporary equipment, fixtures and waste materials. Landforms will be rehabilitated to restore the ground to its original profile as near as practicable before topsoil replacement and revegetation if required. Confirmation of biodegradable status of chemicals used during drilling shall be obtained. The Material Safety Data Sheets (MSDS) of each product shall also be available on site during drilling for reference in case of incidents. The water source, as well as quantity of water required for drilling needs to be continually confirmed, and recorded daily once drilling and other operations commence. Workers exposed to elevated noise levels must wear proper ear protection. Employees and contractors shall comply with the site Cultural and Heritage Management Plan and procedures to avoid any damage to archaeological or culturally significant sites (including burial mounds).	Operations Manager	Once off, as required
Exploration Work (Camp Construction, airborne geophysics Drilling)	Avoiding Downward Pressure in the Drill Holes	Specialized vent and diverters will be utilized during the drilling process. This technology is employed in the Oil & Gas industry to prevent blowouts that result in high pressure steam, toxic C02, H2S and other gaseous substances from being released during the exploration process. Oil and Gas Engineers and industry specialists will provide input to drilling plans to confirm issues.	Operations Manager	Ongoing

Phase of Development	Activity / Impact / Issue	Action	Responsible Party	Frequency of Action
Exploration Work (Camp Construction, airborne geophysics Drilling)	Safe Management, Storage & Operation of Radioactive Devices used for downhole logging tools	BHP Billiton and SEMM Logging shall fully comply with FDRE Protection Agency (ERPA) importation, authorisation, use and reporting requirements. BHP Billiton shall verify that loggers are appropriately trained and experienced in the correct use and handling of the radioactive sources. SEMM Logging's working procedures and management plans shall be reviewed and approved by BHP Billiton before the sources are used in Ethiopia (the sources are already in country). Site based employees and contractors shall be provided with suitable awareness during site inductions. The logging truck shall carry appropriate regulatory warning signs. A radiation meter will be carried in the logging truck. Physical contact shall be avoided and the source holder will be lifted by the relevant sonde, never by hand. Loggers shall not come into direct contact with the source and maintain a safe working and personal distance from the source of at least 20cm. The source shall be clearly labeled and its shield locked in a secure cage or box during transport and storage. The source holder will be regularly checked for signs of corrosion and a wipe test will be performed every 12 months. Cable heads shall include a weak point to ensure a controlled cable break during fishing operations. Assurance and appropriate documentation will be available to confirm the age of the source is within the 15 year maximum lifespan. The logger shall wear dosimeters while on duty regardless of whether he is using the radioactive sources.	Operations Manager Operating Practioner	Ongoing

Phase of Development	Activity / Impact / Issue	Action	Responsible Party	Frequency of Action
Exploration Work (Camp Construction, airborne geophysics Drilling)	Safe Management, Storage & Operation of Radioactive Devices used for downhole logging tools	Operational Use of the Source The calibration work will be performed at a specially demarcated area next to the source stored at the camp. The logging personnel must wear dosimeters and the process does not normally result in a recordable dose. SEMM will mobilise a radiation meter for testing purposes. BHP Billiton's Security Management Plan shall take account of additional security arrangements required during transportation to prevent security related incidents. A secure radiation source storage area shall be established on site with relevant signage and safe demarcation distances. The operational site source and storage area shall be located on dry open ground within sight of the logging cabin. Mitigating Measures – Storage The source holder shall be inscribed with a warning. The source shield shall have a warning sign attached. The shield shall be transported locked in a secured box or cage. The shield shall be stored in a locked bunker. The access door to the storage bunker shall carry an appropriate warning sign. The bunker will be surrounded by a wire fence with a single gate that carries appropriate signage. The storage room shall not be used for any other purpose and shall be fitted with an internal warning sign. Access (set of keys) shall be restricted to logging personnel only. The source holder shall be periodically checked for leakage.	Operations Manager Operating Practioner	Ongoing

Phase of Development	Activity / Impact / Issue	Action	Responsible Party	Frequency of Action
Exploration Work (Camp Construction, airborne geophysics Drilling)	Avoiding a Secondary Influx of Water	Magnesium chloride shall be added to the Inverted Mineral Oil mix as a control measure to manage the potential for secondary water influx. A secondary control which may be used is "shoeing" which involves capping off sections of the drill hole with cement to prevent secondary water influx and drilling back through the cement cap.	Operations Manager Drilling Coordinator	Ongoing
Exploration Work (Camp Construction, airborne geophysics Drilling)	Management of Drilling Fluids	Applying international best practice to drilling operations, particularly to the management of invert mineral oil use, treatment and disposal. This includes using invert mineral oils with low toxicity chemicals that are less harmful to the environment. Options to limit the volume use of invert mineral oils include the use of a mud recycling unit (also known as a shaker) to remediate invert mineral oils and salt saturated brines. The use of a mud recycling unit is discussed in the Drilling Fluids Environmental Management Plan (internal BHP Billiton document) A Drilling Fluids Environmental Management Plan has been developed in consultation with industry specialists to guide best practice in the Danakil. This plan is designed to minimise the quantity of waste going to landfill, prevent unsuitable disposal of waste, maximise the re-use of materials and establish acceptable standards for storage, treatment, transfer and disposal of waste materials. Use of any remediation opportunities that can be undertaken are also addressed in this plan. A Drillhole Specification Management Plan shall be developed and will take into account the use of specialised drilling fluids during the exploration drilling process. The Drilling Fluids Environmental Management Plan was separately submitted to the Ministry of Mines outside the EIA process. It is proposed that an update covering BHP Billiton's performance against the Drilling Fluids Environmental Management Plan be included in formal project updates to the Ministry of Mines.		

Phase of Development	Activity / Impact / Issue	Action	Responsible Party	Frequency of Action
Exploration Work (Camp Construction, airborne geophysics Drilling)	Ablution facilities at site	A waste treatment plant shall be used at the main camp in order to minimise the risk of water contamination. Waste Treatment Plants will be installed to minimize greywater waste. Pit latrines required at the exploration fly camp shall be located away from water reservoirs and natural water sources. The pit latrine site shall be backfilled and rehabilitated where necessary. Pit latrines shall be kept in a hygienic state with water and toilet paper supplied.	Operations Manager	Ongoing
Exploration Work (Camp Construction, airborne geophysics Drilling)	Emergencies	Emergency procedures must be produced and communicated to all the residents and visitors on site. This will ensure that incidents are responded to appropriately and the impacts thereof are minimised. This will also ensure that potential liabilities and damage to life and the environment are avoided. The nearest emergency service provider must be identified as well as its capacity and the magnitude of incidents it will be able to handle. The contact details of this emergency centre, as well as the police and ambulance services must be available at a prominent location at the camp and in vehicles. The Operations Manager will have a basic spill control kit available at the camp. The spill control kits must include absorptive material that can handle all forms of hydrocarbon. The Project manager shall ensure that one person is always delegated the responsibility and have received formal training in the use of the spill control kit. Prior to an airborne survey being flown, people in the affected areas will be informed of the times the plane will be in operation and sensitised as to exactly what the survey will entail (major survey already completed no further plans at this stage). Only suitably trained personnel must operate vehicles or equipment.	Operations Manager	Ongoing

Phase of Development	Activity / Impact / Issue	Action	Responsible Party	Frequency of Action
Exploration Work (Camp Construction, airborne geophysics Drilling)	Emergencies	Ensure that the vehicles are under the control of competent personnel and are in good mechanical working order. The handling of equipment and materials is supervised and adequately instructed. Ensure that material safety data sheets are kept up to date, detailing all hazardous substances stored on site. Ensure that any archaeological or cultural site found is demarcated and that no more work is done at that particular site. Undertake reporting and recording as per Cultural Heritage Management Plan and procedure. Ensure that wildlife, domestic animals including camel trains are not disturbed and that no 'Human – Wildlife conflicts occur. This will be included in the site induction. Minimise the risk for fires to occur within the license area. Minimise the risk for transfer of HIV / AIDS and other sexual transmitted diseases.	Operations Manager	Ongoing
Exploration Work (Camp Construction, airborne geophysics Drilling)	Aviation Management	The project shall make use of existing air strips. An airport monitoring crew will clear the runway before the aircraft lands during routine flights to the exploration area. Anyone in the vicinity of the runway will be asked to leave the area. BHP Billiton Aviation Journey Management plans cover a range of risks relating to aviation safety. A pre-flight checklist must be completed before each flight and occupants and luggage re-weighed prior to take-off. The program may consider fencing the runway area if the risk of people transgressing the runway becomes problematic (there is a risk however animals could become trapped within the airstrip because of the fence).	Operations Manager	Ongoing

Phase of Development	Activity / Impact / Issue	Action	Responsible Party	Frequency of Action
Exploration Work (Camp Construction, airborne geophysics Drilling)	Transport of equipment	All equipment moved on or off site during a project is subject to the legal requirements as well as the exploration permit holder's specifications for the transport of such equipment. Oil filled equipment has specific safety requirements regarding their handling, transport and storage. The Operations Manager shall meet these safety requirements under all circumstances. All equipment transported shall be clearly labeled as to their potential hazards according to specifications. All the required safety labeling on the containers and trucks used shall be in place. The Project manager shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken in the event of an incident and shall supply a method statement to that effect.	Operations Manager, ECO	Ongoing
Exploration Work (Camp Construction, airborne geophysics Drilling)	Workshop and Equipment Storage Areas	Activities must be limited to the area as demarcated by the Operations Manager. Petroleum products dispensing points shall have drip pans and bund walls. Storage of petroleum pollutants such as lubricants, fuel, oil and chemicals shall be done on sealed surfaces to prevent soil contamination. Waste oil shall be stored in clearly labelled drums, and will be temporarily kept in a bunded area before final removal to an TNRS registered disposal facility in Mekele that is authorised to receive and manage hazardous waste. If an appropriately registered facility does not exist in Mekele, waste oil will be transported to the nearest TNRS or FDRE certified hazardous waste disposal site. The Operations Manager or their delegated site representative shall authorise the chain of custody for the storage, removal and final disposal of waste oil products.	ECO, Operations Manager	Once off, monitor weekly

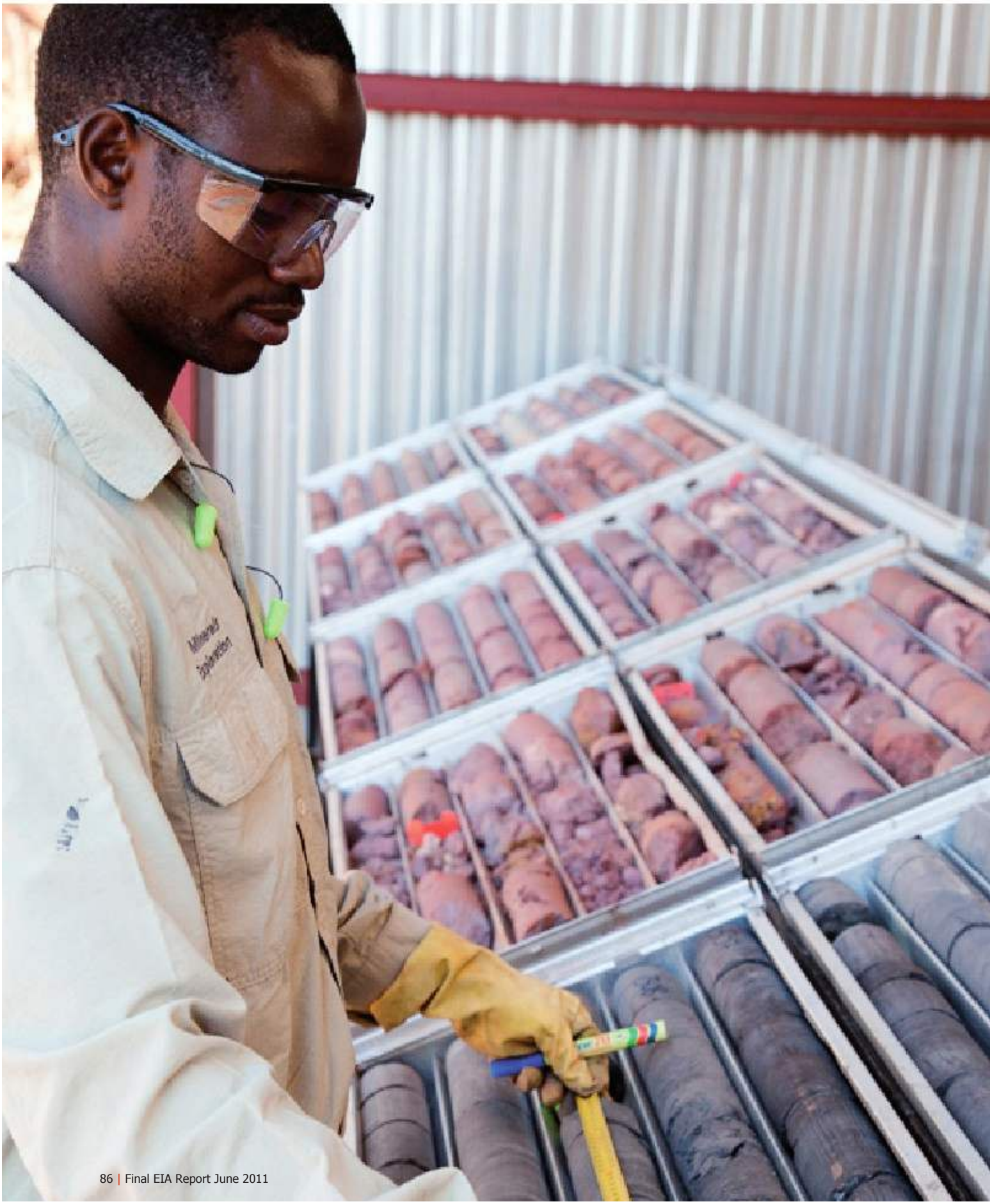
Phase of Development	Activity / Impact / Issue	Action	Responsible Party	Frequency of Action
Exploration Work (Camp Construction, airborne geophysics Drilling)	Workshop and Equipment Storage Areas	Certificates for disposal of chemicals and hazardous wastes need to be on site at all times and available for inspection. Only TNRS or FDRE certified waste disposal contractors shall transport hazardous waste from site to the nearest accredited disposal facility. Due to the separate locality of the camp and exploration site, it is proposed that the empty waste and chemical containers be kept in a bunded/non-permeable storage area and removed to a certified waste disposal area in Mekele that is authorised by the TNRS to accept hazardous waste. Responsible disposal shall be undertaken in accordance with FDRE Solid Waste Management Proclamation (No. 513/2007). The Operations Manager shall be responsible for all waste disposal including drill waste, chemicals and hydrocarbons. Required permits and MSDS sheets of all hazardous substances shall be carried during transportation to and from the exploration site. The driver shall have undergone necessary training to understand the implications of spillages and product specific mitigation measures. Soil erosion shall be prevented in cleared areas by means of rehabilitation when the drill site is no longer required. During removal of soil for construction of sump, the topsoil horizon shall be stored separately (top 50mm of soil). The soil shall be returned in the same sequence as removed, with replacement topsoil last. This will enable the micro-organisms and seeds to re-establish at a higher growth rate. All maintenance of vehicles and equipment shall take place in a dedicated area. During servicing of vehicles or equipment, a suitable drip tray shall be used to prevent carbon spills onto the soil, especially where emergency repairs are effected outside the workshop area.	ECO, Operations Manager	Once off, monitor weekly Once off, as required

Phase of Development	Activity / Impact / Issue	Action	Responsible Party	Frequency of Action
Exploration Work (Camp Construction, airborne geophysics Drilling)	Workshop and Equipment Storage Areas	Leaking equipment shall be repaired immediately. All potentially hazardous and non-degradable waste shall be collected and removed to a registered waste site at Mekele. A method statement is required from the project manager to show procedures (Emergency Response Plan) for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillages. The Operations Manager shall be in possession of an emergency spill kit that must be complete and available at all times on site.	ECO, Operations Manager	Once off, as required
	Storage of hazardous substances	Hazardous substances shall be stored in suitable containers and storage areas shall be bunded and if required stored on top of impermeable products/layers. This includes all carbon substances like fuel, oil, herbicides, drilling fluids and battery acid. A register shall be kept on all substances and be available for inspection at all times. Areas shall be monitored for spills and any spills shall be contained, cleaned and rehabilitated immediately. Soil will be removed and stored and disposed of responsibly. Any leaking containers shall be repaired or removed from site. Storage areas shall display the required safety signs depicting "No smoking", "No naked lights" and "Danger". The Operations Manager must provide sufficient potable water and washing facilities on site at all times. Care shall be taken that water points do not turn into mud baths or form open pools of standing water. To prevent the deterioration of surface and/or ground water quality, the Operations Manager must provide adequate ablution facilities. Every effort must be made to prevent the contamination of surface or groundwater. Toilets shall be kept in a hygienic state with water and toilet paper supplied.	Operations Manager	Ongoing

Phase of Development	Activity / Impact / Issue	Action	Responsible Party	Frequency of Action
	Storage of hazardous substances	No open fires shall be allowed on site unless in controlled environment with specific authorization from Operations Manager. All cooking shall be done in demarcated areas that are safe and cannot cause runaway fires. The Operations Manager shall have operational fire-fighting equipment available on site. Heavy smoke may not be released into the air.	Operations Manager ECO	Ongoing
	Road clearance	The removal of vegetation must be minimised by keeping the width of the road at a minimum.	Operations Manager, ECO	Ongoing
	Road clearance	Roads shall be made to allow for the natural flow of water where required. All areas susceptible to erosion shall be monitored and protected with suitable erosion control measures.	Operations Manager, ECO	Once off, monitor weekly
	Waste Management	The construction site must be kept in a clean and orderly state at all times. Ensure that no litter, refuse, wastes, rubbish, rubble, debris and any other wastes generated on the premises be placed, dumped or deposited outside the designated classified waste bins. An educational litter program shall be introduced. Aspects of littering shall be included in the regular project meetings. Ensure that no refuse wastes are burnt on the premises. A waste management plant will be used at the camp in order to minimize the risk of water contamination. Certificates for disposal of chemicals needs to be on site at all times and available for inspection.	Operations Manager	Ongoing

Phase of Development	Activity / Impact / Issue	Action	Responsible Party	Frequency of Action
	Waste Management	Due to the remote geographic locality of the camp and exploration site, it is proposed that the containers be kept in a bunded/non-permeable storage area and removed to Mekele as and when required (by a qualified contractor) and disposed of at a TNRS/FDRE registered disposal site. Required permits and MSDS sheets of all hazardous substances shall be carried during transportation to and from the exploration site. The driver shall have undergone necessary training to understand the implications of spillages and product specific mitigation measures.	Operations Manager	Ongoing
Decommissioning	Rehabilitation	All temporary access roads and land disturbed areas to be rehabilitated by means of ripping the compacted soil. Where applicable, during removal of soil for construction of camp base, drill site, drill sump or access road, the topsoil shall be stockpiled separately (top 50mm of soil). The soil shall be returned in the same sequence as being removed, with replacement of topsoil last. This will enable the micro-organisms and seeds to re-establish at a faster growth rate. Re-seed where required. Rehabilitation efforts shall start immediately after the drill site has has been finished with. All soil shall be stockpiled adjacent to the cleared area, outside of natural drainage slopes. Cemented and capping of exploration drill holes and capping water boreholes (not cemented) is part of the rehabilitation process.	ECO	Decommissioning phase

SECTION 6 - CONCLUSION



Assessment Of Alternatives

This section of the report includes an assessment of the identified alternatives in relation to their potential environmental impacts, social acceptability and costs where relevant.

No Project Option

If the project was not to go ahead (the so called zero option), both positive and negative impacts would arise.

Positive:
None of the potentially detrimental impacts, relating to loss of soil, and flora and potential surface and ground water pollution would occur (note: the impact assessment determined that these impacts would not be significant).

Negative:
Not implementing the exploration programme would entail that there would be no creation of employment for the people that are supposed to be involved in the work. In addition the discovery of a viable potash orebody would not be possible resulting in a zero sum gain for all stakeholders.

Overall, the assessment of this initial review is that the negative aspects of the zero option far outweigh the positive.

Work Program

BHP Billiton may amend the Year 2 work program outlined in this report depending on initial seismic survey outcome and early stage drilling results. The terms of the exploration work program are driven by step by step success of the exploration program.

Year 3 Work Program and Beyond

BHP Billiton will continue to submit formal work plans beyond Year 2 to the Ministry of Mines for approval as required. The exploration activities in Year 3, however, will still be consistent with the current exploration methods and process outlined in this EIA Report (drilling, seismic surveying, camp access road and drill site construction as required). No additional adverse impacts beyond those stated in this EIA Report are expected. The Company expects that an increase in exploration activity will result in positive impacts including increase in local employment opportunites and potentially a potash resource discovery. Any major variance in activity or change in exploration methods will be formally raised during the Work Program approval process with the Ministry of Mines.

Additional Drill Rigs

BHP Billiton may opt to use additional drill rigs during Year 3 and Year 4 of the Danakil exploration program. This may also lead to an increase in mobile camps to support drilling activities if the drilling program proves successful and is accelerated. An increase in drill rigs will result in additional employment opportunities. The mitigation measures contained in the EMP will apply to all BHP Billiton controlled camps and drilling activities to ensure environmental impacts are well managed to BHP Billiton Standards, FDRE legislation and exploration license requirements, and industry leading standards.

BHP Billiton will, as a matter of course, continue to engage with the Ministry of Mines and other key stakeholders in the region regarding existing and changing exploration plans. These updates will occur during scheduled meetings and statutory compliance reports to the Ministry of Mines as stipulated in BHP Billiton's exploration license conditions.

Use of Explosives During Seismic Survey

BHP Billiton and its seismic contractor may need to use explosives during the later stages of the seismic survey process. Any future decision to use explosives would be fully assessed taking into account operational needs and forecast environmental impacts. This option has not been formally considered at this early stage of exploration. In addition, the terrain in the Danakil is generally not ideal for explosives use. This may result in BHP Billiton deciding not to pursue the use of explosives any further. The Ministry of Mines and ECDU will be engaged should BHP Billiton propose to use explosives on the project. BHP Billiton shall, as a matter of procedure, obtain any national and regional approvals relating to explosive transport, storage and use.

Change of Access Routes

As work progresses southwards on the exploration licence BHP Billiton may decide to switch road access for supply of deliveries from Mekele to the current BHP Billiton camp location near Hamadela air strip. Alternative access may be from Semera /Adfera and on to the operational site. This change may result in improved access and improved supply routes from the south.

Drill locations

Final drill locations may change subject to the interpretation of the individual seismic survey lines. These locations are not expected to vary by more than 1km from the current locations defined in this report. The interpretations of basin structure from the seismic data ultimately guides the final position of drill site locations. Also the final locations of the seismic lines after considering access constraints will determine the final location of boreholes, since the boreholes must lie on the seismic lines.

Helicopter Use

BHP Billiton may decide to use helicopters at a later stage to access remote locations within the exploration licence area. Some areas within the licence areas are inaccessible by fixed wing aircraft or are difficult to access by vehicle on the ground.

Environmental Monitoring Plan

A series of environmental variables that are to be monitored during the exploration program are listed below. Monitoring results will be collected and compared to the objectives and targets stated in the EMP. Where the target values are not being met, further mitigatory action will be pursued. The following parameters will be monitored by BHP Billiton's environmental consultants during the exploration program:

- Dust
- Air Quality
- Erosion
- Water runoff and water use through water sampling
- Hydro carbon use and monitoring
- Groundwater Quality
- Soil Quality

Conclusion

The development of this project will undoubtedly bring economic benefits if an economic potash resource is discovered and will create other business opportunities for local Danakil people. In designing the project, BHP Billiton believes it has considered all potential negative environmental impacts likely to arise from this undertaking and has proposed mitigating measures. All relevant pieces of legislation will be adhered so as to enhance BHP Billiton's social and environmental practices on the Danakil Project.

Appendix Items

1.0 BHP Billiton Danakil Project Environmental Baseline Study (EBS)

2.0 BHP Billiton Corporate Information

2.1 BHP Billiton Charter
2.2 BHP Billiton Sustainable Development Policy
2.3 BHP Billiton Company Profile

3.0 BHP Billiton Minerals Exploration HSEC Information

3.1 MinEx Way Document List

4.0 BHP Billiton World Exploration Inc. (Ethiopia) Project Camp Related Documents

4.1 Camp Design Map - Danakil
4.2 BHP Billiton Camp Design and Layout
4.3 Purion Water Treatment Plant Brochure
4.4 Purion Waste Management Plant Brochure
4.5 Euro Cargo Brochure
4.6 Transtank Fuel Storage Facility Brochure
4.7 Mobile Fuel Tank Design – BHP Billiton Zambia

5.0 BHP Billiton World Exploration Inc. (Ethiopia) HSEC Documents

5.1 Community and Stakeholder Engagement Plan

6.0 Boart Longyear Information

6.1 Information Fact Sheets
6.2 Sonic Drilling Material Safety Data Sheets
6.3 Material Safety Data Sheets

7.0 TESLA-IMC Exploration Documents

7.1 Material Safety Data Sheets

8.0 Capital Drilling Documents

8.1 Material Safety Data Sheets

BHP Billiton locations

Petroleum

Ref	Country	Asset		Description	Ownership
1	Algeria	Ohanet	◆	Joint operator with Sonatrach of wet gas development	45%
2	Algeria	ROD Integrated Development	◆	Onshore oil development (non-operated)	38%
3	Australia	Bass Strait	◆	Producer of oil, condensate, LPG, natural gas and ethane (non-operated)	50%
4	Australia	Minerva	■	Operator of Minerva gas field development in the Otway Basin of Victoria	90%
5	Australia	North West Shelf	◆	One of Australia's largest resource projects, producing liquids, LNG and domestic gas (non-operated)	8.33–16.67%
6	Australia	Pyrenees	■	Operator of Pyrenees floating, production, storage and offloading vessel, which produces oil in Western Australia	71.43%
7	Australia	Stybarrow	■	Operator of Stybarrow floating, production, storage and offloading vessel, which produces oil in Western Australia	50%
8	Pakistan	Zamzama	■	Operator of onshore gas development in Sindh province	38.5%
9	Trinidad and Tobago	Angostura	■	Operator of oil field located offshore east Trinidad	45%
10	UK	Bruce/Keith	◆	Oil and gas production in the UK North Sea	Bruce – 16% Keith – 31.83%
11	UK	Liverpool Bay	■	Operator of oil and gas developments in the Irish Sea	46.1%
12	US	Gulf of Mexico	◆ ■	Interests in several producing assets, including deepwater oil and gas production at: - Atlantis (44%) - Mad Dog (23.9%) - Shenzi (44%) - Neptune (35%) Additional other interests in producing assets and a significant exploration acreage position (4.95–100%)	4.95–100%

Aluminium

Ref	Country	Asset		Description	Ownership
13	Australia	Worsley	■	Integrated alumina refinery and bauxite mine in Western Australia	86%
14	Brazil	Alumar	◆	Integrated alumina refinery and aluminium smelter	36–40%
15	Brazil	MRN	◆	Bauxite mine	14.8%
16	Mozambique	Mozal	■	Aluminium smelter near Maputo	47.1%
17	South Africa	Aluminium South Africa	■	Two aluminium smelters at Richards Bay	100%

Base Metals

Ref	Country	Asset		Description	Ownership
18	Australia	Cannington	■	Silver, lead and zinc mine in northwest Queensland	100%
19	Chile	Pampa Norte	■	Integration of Cerro Colorado and Spence open-cut mines producing copper cathode in Atacama Desert, northern Chile	100%
20	Chile	Escondida	■	The world's largest copper mine, located in northern Chile	57.5%
21	Peru	Antamina	▲	Copper and zinc mine located in the Andes, north-central Peru	33.75%
22	US	Pinto Valley	■	Copper mine located in State of Arizona	100%

Uranium [1]

Ref	Country	Asset		Description	Ownership
23	Australia	Olympic Dam	■	The largest poly-metallic orebody in the world and Australia's biggest underground mine, producing uranium, copper and gold	100%

[1] *Uranium forms part of the Base Metals Customer Sector Group.*

BHP Billiton office locations

Ref	Country	Office Location	Business Area
40	Australia	Adelaide	Shared Services Centre Uranium Head Office Marketing
41	Australia	Brisbane	Metallurgical Coal Head Office Project Hub Marketing
42	Australia	Melbourne	**Global Headquarters**
43	Australia	Newcastle	Marketing
44	Australia	Perth	Iron Ore Head Office Project Hub Stainless Steel Materials Head Office Marketing
45	Australia	Sydney	Energy Coal Head Office
46	Belgium	Antwerp	Marketing
47	Brazil	Rio de Janeiro	Marketing
48	Canada	Vancouver	Diamonds and Specialty Products Head Office Project Hub
49	Chile	Santiago	Base Metals Head Office Marketing Project Hub Shared Services Centre
50	China	Shanghai	Marketing
51	India	New Delhi	Marketing
52	Japan	Tokyo	Marketing
53	Malaysia	Kuala Lumpur	**Global Shared Services Centre**
54	Netherlands	The Hague	Marketing
55	Pakistan	Islamabad	Marketing
56	Singapore	Singapore	Corporate Centre Marketing Minerals Exploration
57	South Africa	Johannesburg	Manganese Head Office Marketing
58	South Africa	Richards Bay	Marketing
59	South Korea	Seoul	Marketing
60	Switzerland	Baar	Marketing
61	UK	London	Aluminium Head Office Corporate Centre
62	US	Houston	Petroleum Head Office Project Hub Shared Services Centre Marketing
63	US	Pittsburgh	Marketing

Diamonds and Specialty Products

Ref	Country	Asset		Description	Ownership
24	Canada	EKATI	■	Diamond mines in the Northwest Territories of Canada	80%
25	South Africa	Richards Bay Minerals	◆	Integrated titanium smelter and mineral sands mine	37%

Stainless Steel Materials

Ref	Country	Asset		Description	Ownership
26	Australia	Nickel West	■	Sulphide nickel assets including Mt Keith and Leinster nickel operations, Kalgoorlie nickel smelter and Kambalda nickel concentrator and the Kwinana nickel refinery	100%
27	Colombia	Cerro Matoso	■	Integrated laterite ferronickel mining and smelting complex in northern Colombia	99.94%

Iron Ore

Ref	Country	Asset		Description	Ownership
28	Australia	Western Australia Iron Ore	■	Integrated iron ore mines, rail and port operations in the Pilbara	85–100%
29	Brazil	Samarco	◆	An efficient low-cost producer of iron ore pellets in southeast Brazil	50%

Manganese

Ref	Country	Asset		Description	Ownership
30	Australia	GEMCO	■	Producer of manganese ore in the Northern Territory	60%
31	Australia	TEMCO	■	Producer of manganese alloys in Tasmania	60%
32	South Africa	Samancor Manganese	■	Integrated producer of manganese ore (Hotazel Manganese Mines) and alloy (Metalloys)	60%

Metallurgical Coal

Ref	Country	Asset		Description	Ownership
33	Australia	Illawarra Coal	■	Underground coal mines (West Cliff, Dendrobium, Appin) in southern NSW, with access to rail and port facilities	100%
34	Australia	BHP Billiton Mitsubishi Alliance	■	Integrated mine, rail and port operations, including a loading terminal at Hay Point, in the Bowen Basin, Central Queensland	50%
35	Australia	BHP Mitsui Coal	■	Two open-cut coal mines in the Bowen Basin, Central Queensland	80%

Energy Coal

Ref	Country	Asset		Description	Ownership
36	Australia	NSW Energy Coal	■	Open-cut coal mine that supplies thermal coal to export markets and for domestic electricity generation	100%
37	Colombia	Cerrejón	◆	Largest thermal coal exporter in Colombia, with integrated rail and port facilities	33.3%
38	South Africa	BHP Billiton Energy Coal South Africa	■	One of the largest producers and exporters of thermal coal in South Africa	50–100%
39	US	New Mexico Coal	■	Two mines in New Mexico supplying energy coal to adjacent power stations	100%

Projects

Ref	Country	Asset		Description	Ownership
64	Guinea	Guinea Alumina Project	◆	Integrated bauxite mine and alumina refinery (currently undertaking feasibility study)	33.3%
65	Canada	Potash	■	Greenfield potash projects near Saskatoon, Saskatchewan	100%
66	Borneo	IndoMet Coal Project	■	A large, high-quality metallurgical coal deposit in East and Central Kalimantan, Indonesia	75%