Contents

1 Introduction......................................................................................................................................................................................... 3
  1.1 AIM OF THE EMP ........................................................................................................................................................................... 3
  1.2 BACKGROUND............................................................................................................................................................................... 3
  1.3 ENVIRONMENTAL APPROVALS .................................................................................................................................................. 4
  1.4 LEGAL FRAMEWORK .................................................................................................................................................................... 5

2 Project Overview .................................................................................................................................................................................. 6
  2.1 CARE AND MAINTENANCE ............................................................................................................................................................ 6
  2.2 ................................................................................................................................................................................................................. 7
  2.3 OPERATIONS ................................................................................................................................................................................. 9
  2.4 CLOSURE ...................................................................................................................................................................................... 9

3 Environmental Management ................................................................................................................................................................. 10
  3.1 ENVIRONMENT POLICY ............................................................................................................................................................. 10
  3.2 LEGAL COMPLIANCE ................................................................................................................................................................. 11
  3.3 ENVIRONMENTAL MANAGEMENT ............................................................................................................................................ 11
  3.4 ENVIRONMENTAL POLICIES, STRATEGIES AND PROCEDURES .......................................................................................... 12
  3.5 ENVIRONMENTAL OBJECTIVES AND TARGETS .................................................................................................................... 13
  3.6 SOCIAL MANAGEMENT .............................................................................................................................................................. 13

4 Mitigation Tables ...................................................................................................................................................................................... 15

5 Bibliography ........................................................................................................................................................................................... 24

Appendix A – Environmental Clearance Certificates

Figures
Figure 1 – Locality Map for Trekkopje Mine
Figure 2 – Process Description
Figure 3 – Environment Policy
Figure 4 – Social Policy

Tables
Table 4.1 – General mitigation measures to be applied throughout the life-of-mine
Table 4.2 – Activity specific mitigation measures to be applied during operations
Table 4.3 – Mitigation measures relating to social activities to be applied throughout life-of-mine
Table 4.4 – Mitigation measures to be applied during closure operations

DOCUMENT COMPILED BY:

Sandra Müller, Environmental Manager
AREVA Processing Namibia (Pty) Ltd
25 Mandume ya Ndemufayo Street
P O Box 585
Swakopmund, Namibia
## Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARN</td>
<td>AREVA Resources Namibia</td>
</tr>
<tr>
<td>ECC</td>
<td>Environmental Clearance Certificate</td>
</tr>
<tr>
<td>ESIA</td>
<td>Environmental and Social Impact Assessment</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
</tr>
<tr>
<td>EPZ</td>
<td>Export Processing Zone</td>
</tr>
<tr>
<td>GHG</td>
<td>Greenhouse gases</td>
</tr>
<tr>
<td>HLP</td>
<td>Heap leach pad</td>
</tr>
<tr>
<td>HSE</td>
<td>Health, Safety and Environment</td>
</tr>
<tr>
<td>HSE ENV PO</td>
<td>Health, Safety and Environment – Environmental Section - Policy</td>
</tr>
<tr>
<td>HSE ENV PR</td>
<td>Health, Safety and Environment – Environmental Section - Procedure</td>
</tr>
<tr>
<td>HSE ENV ST</td>
<td>Health, Safety and Environment – Environmental Section - Strategy</td>
</tr>
<tr>
<td>km</td>
<td>kilometre</td>
</tr>
<tr>
<td>km/h</td>
<td>kilometre per hour</td>
</tr>
<tr>
<td>km(^2)</td>
<td>square kilometre</td>
</tr>
<tr>
<td>m</td>
<td>metre</td>
</tr>
<tr>
<td>mm</td>
<td>millimetre</td>
</tr>
<tr>
<td>MET:DEA</td>
<td>Ministry of Environment and Tourism: Directorate of Environmental Assessment</td>
</tr>
<tr>
<td>NIMT</td>
<td>Namibian Institute of Mining and Technology</td>
</tr>
<tr>
<td>NHC</td>
<td>National Heritage Council</td>
</tr>
<tr>
<td>NOx</td>
<td>Nitrous oxides (air pollutants)</td>
</tr>
<tr>
<td>NRPA</td>
<td>National Radiation Protection Authority</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protection Equipment</td>
</tr>
<tr>
<td>RMP</td>
<td>Radiation Management Plan</td>
</tr>
<tr>
<td>SOx</td>
<td>Sulphur oxides (air pollutants)</td>
</tr>
<tr>
<td>TLD</td>
<td>Thermoluminescent dosimeter (to measure the gamma radiation dose)</td>
</tr>
<tr>
<td>VOC</td>
<td>Volatile organic carbon (air pollutants)</td>
</tr>
</tbody>
</table>
1 Introduction

1.1 AIM OF THE EMP

The purpose of this Environmental Management Plan (EMP) for Trekkopje mine is to list the actions to be implemented by the project proponent AREVA Resources Namibia (ARN) that will both mitigate and monitor the impacts relating to the care and maintenance, operation and closure phases of the project. This EMP has been developed within the framework of an Environment Policy and is based on the original approved EMP of 2008 and the amended 2013 EMP that is currently in force. Once approved by the Ministry of Environment and Tourism: Directorate of Environmental Assessment, this EMP it will supersede the 2013 EMP.

During construction of the mine with its various heap leach pads, processing plants and associated power lines, contractor management was one of the key factors that determined the environmental impacts of the project. The 2013 amendment replaced the construction-specific mitigation measures in the 2008 EMP with measures that are more applicable to the operational phase and to the current care and maintenance period. The 2016 amendments mainly concern a few mitigation measures that had not been updated in 2013.

1.2 BACKGROUND

The French nuclear energy concern AREVA purchased the Trekkopje uranium project from UraMin Namibia (Pty) Ltd in 2007 and established two local subsidiaries to develop the project, namely AREVA Resources Namibia, as an exploration and mining company and AREVA Processing Namibia (Pty) Ltd, as a mineral processing business with export processing zone (EPZ) status. The EPZ status expired in 2014 and was not renewed. The Erongo Desalination plant was built to guarantee the mine’s water supply. Environmental clearance was first issued for EPL 2218 that was later replaced by the mining licence ML 151.

The Trekkopje project site is located within the Erongo region of Namibia, 70 kilometres (km) north-east of Swakopmund, while the desalination plant is near Wlotzkasbaken, 30 km north of Swakopmund (Figure 1). The mine will exploit a large, low-grade uranium resource using an alkaline leaching process and the project was being developed in three phases. In 2008-2013, two pilot testing phases were completed and the main components of the full-scale processing plant were constructed. However, due to economic uncertainties, AREVA decided in October 2012 to postpone the start-up of the mine and place the Trekkopje project under a care and maintenance programme.

Figure 1 - Location of the Trekkopje Project site
This programme is aimed at maintaining the already constructed facilities in operating order and is likely to result in very few modifications to existing infrastructure. Given that the project is well advanced and installations are ready in place, ARN intends to commence with the operational phase as soon as there is an upturn in the market. The economics of the project will be reassessed annually while implementing this programme. AREVA will maintain its presence in Namibia and continue its community initiatives in the areas of education, healthcare and sustainable economic development.

1.3 ENVIRONMENTAL APPROVALS

A number of environmental approvals between 2006 and 2008 were obtained to initially allow the prospecting and exploration programme to proceed. This was later followed by approvals for the construction and commercial operations of the mine. The earlier environmental documents produced and approved by the Ministry of Environment and Tourism: Directorate of Environmental Assessment (MET:DEA) included:

- Prospecting Environmental Management Plan (EMP), Ferret Mining and Environmental Services, 2006;
- Addendum No. 1 to the EMP and Attachment to EMP Addendum No. 1, Turgis Consulting, May 2007 a & b;
- Addendum No. 2 to the EMP, Turgis Consulting ; and
- Addendum No. 3 to the EMP, Turgis Consulting, January 2008.

Working within the terms of these plans, an extensive prospecting and exploration programme was undertaken. A summary of the activities and resultant environmental impacts (indicated in parenthesis) are listed below:

- Drilling, access roads, exploration camps, drilling sumps (dust generation, permeability);
- Trenching and pitting including four mini pits in the Trekkopje ore body and a trial mine pit in the Klein Trekkopje ore body (surface disturbance, dust generation);
- Haul road 2.7 km long between the heap leach pads and the trial pits (dust generation, surface disturbance);
- Granite quarry (surface disturbance);
- Temporary pipe line from Rössing Terminal Reservoirs to the heap leach pads and a temporary 66 kV power line running out of the trial leach area; and
- ‘Mini’ and ‘Midi’ trial heap leach pads and associated infrastructure (surface disturbance, dust generation, water abstraction).

In 2008, an Environmental and Social Impact Assessment (ESIA)\(^1\) was completed for the construction, operation and ultimately decommissioning of the mine. The ESIA, including an EMP report, was approved by the MET: DEA and a clearance certificate was issued in June 2008. During the same month, the environmental clearance certificate for the Erongo Desalination plant was similarly issued by the MET: DEA based on an approved ESIA and EMP.

The 2008 EMPs for both the Trekkopje mine and Erongo Desalination plant were amended in 2013 to reflect the modifications to current operations due to care and maintenance programme. ARN also used the opportunity to update the EMP documents into a format that is more suitable for later importing into the EMS database as well as reflect the changes to current operations since the EMPs were written in 2008. New clearance certificates were issued in April 2013 for EPL 2218 and EPL 3573, which are valid for three years (see Appendix A). EPL 2218 corresponds to mining licence area ML 151 on which the operation will take place. EPL 3573 has expired in the meantime and not been renewed. Once approved by the Ministry of Environment and Tourism: Directorate of Environmental Assessment, the 2016 amended EMP will supersede the 2013 EMP for ML 151.

\(^1\) Environmental and Social Impact Assessment Plan for the proposed Trekkopje Uranium Project, Turgis Consulting, 2008
1.4 LEGAL FRAMEWORK

There was a requirement for existing listed operations under the Environmental Management Act (No. 7 of 2007), to apply for environmental clearance certificates within one year of the Act coming into force, namely by 5 February 2013. Given that the mine had been operating under an existing Environmental Clearance Certificate (ECC) and was planning to continue operating a new ECC was required and obtained.

The ECC is valid until April 2016 and ARN is therefore applying for renewal. At the same time ARN would like to update the 2013 EMP to reflect the changes to current operations that had been overlooked in the 2013 amendment.

ARN would like to use this opportunity to update the 2013 EMP to reflect changes to the current operations since the last amendment in 2013. In accordance with Section 39 under the Act existing operations are required to comply with the following conditions:

1) *The Environmental Commissioner may amend a condition of an environmental clearance certificate –*
   
a) if the certificate holder consents to or requests for the amendment; or  
b) at the initiative of the Environmental Commissioner, by giving written notice to the holder of the certificate.

2) *The Environmental Commissioner may require the holder of the environmental clearance certificate to make an application in the prescribed form and manner to the Environment Commissioner for the proposed amendment.*

3) *In considering an application to amend an environmental clearance certificate the Environmental Commissioner must have regard to the same matters which he or she was required to consider when deciding the initial application for that environmental clearance certificate.*

4) *The Environmental Commissioner may only amend a condition of the environmental clearance certificate under this section if he or she is satisfied that the –*
   
a) amendment will not have a significant effect on the environment; and  
b) the interests of any other person are not adversely affected.

5) *In amending an environmental clearance certificate the Environmental Commissioner must follow the consultative process referred to in section 44.*

To obtain approved for the updated EMP, an application for an amendment to the ECC, as stipulated under Section 39 1(a) of the Act and Section 19 of the Regulations 2012 is required.

This updated EMP reflects the changes to the process since the 2013, now that the care and maintenance programme has been in place for more than two years.
2 Project Overview

Trekkopje mine aims to exploit a large, low-grade uranium deposit in calcretised fossil river sediments with the main mineralisation covering an area of approximately 14 by 3 km. At a 40 parts per million (ppm) uranium oxide cut-off the global resource at Trekkopje is estimated at 1,130 million tonnes at 95 ppm, which translates into 103,000 tonnes of uranium oxide. Mining will take place in a single shallow open pit with an average depth of 16 metres. The mining process will involve blasting, loading and hauling 100,000 tonnes of ore per day. The ore is to be crushed to a top size of 38 millimetres with subsequent agglomeration of the fines to the coarser fraction. This step is necessary to improve the percolation of leach solution through the heap (see Figure 2 on the next two pages for a more detailed process description).

Mining of this deposit is a technical challenge due to its very low ore content and the alkaline heap leach process to be applied. Given the pioneering nature of the project, AREVA developed the mine in three phases (Mini, Midi and Maxi).

- **Phase one (Mini)** was designed to validate the chemistry of the heap leach process and was completed successfully in 2009. It comprised two small heap leach pads and a pilot plant.
- **Phase two (Midi)** ran until early 2013 and treated three million tonnes of ore to prove the commercial process before scaling up to full production.
- **Phase three (Maxi)** represents the full production stage of the mine which is expected to produce approximately 3,200 tonnes of uranium oxide per annum. The construction of the Maxi leach pad and processing plant was 80% completed by 2013 when the project was placed under care and maintenance.

2.1 CARE AND MAINTENANCE

From the middle of 2013, the Trekkopje project was under care and maintenance. The mine’s infrastructure is being maintained in good working order so that the mine will be able to start production when economic conditions become more favourable. The Erongo Desalination plant continues to supply the mine with water, albeit at a reduced amount of approximately 7000 cubic metres per month. Some of the spare plant capacity is being used to supply desalinated water to NamWater. The amount to be produced is determined by contract with NamWater and the demand of others users in the Erongo region.

The Care and Maintenance team currently consists of 38 people and is divided into the following areas of responsibility:

- **Engineering services** – to ensure the ongoing care and maintenance of infrastructure on site. Equipment is tested and serviced (oiled and greased, treated for rust). A schedule of operations is followed to ensure that the process and equipment remains ready and operational in the event of start-up.
- **Health, safety, radiation and environmental management** – HSE issues of air quality and radiation are monitored on a quarterly basis and annual EMP compliance audits are carried out. All environmental monitoring continues, including the monitoring of the rehabilitation trials, annual biodiversity surveys, groundwater and effluent sampling.
- **Security** – a team of security personnel (contractors) ensures that access to the site is well controlled and that no unauthorised removal of mine property takes place.
- **Financial and general management** – to ensure ongoing general administration and financial management of operations. Their role will also include ongoing liaison with stakeholders and relevant authorities to ensure that AREVA remains an active member of the mining community and continues to support the longer term sustainable growth of the industry in Namibia.
1. **Geology and exploration:** Uranium that is now found at Trekkopje was originally contained in granites and alaskites further to the north-east, for instance around Spitzkoppe. Weathering of these rocks over millions of years in a wetter climate dissolved the uranium and groundwater transported it in a south-westerly direction until evaporation and changes in water chemistry prompted the growth of new uranium minerals in the mine area. The main uranium mineral, bright yellow carnotite, forms coatings around sand and gravel particles and fills cracks in the host rock. The latter is a relatively solid rock type known as calcrete. It consists of limestone cemented sediments filling former river beds (palaeochannels) that existed before the Namib became a desert.

Exploration activities have involved identifying areas of above average radiation using airborne radiometric surveys. This is possible because uranium mineralisation lies close to the surface. These targets have then been mapped and drilled using percussion or reverse circulation drilling methods.

The uranium content in the boreholes is determined using either laboratory analysis or radiometric probing which involves lowering a geophysical probe into the borehole and slowly raising it while measuring the radioactivity emitted by the surrounding rock.

2. **Mining:** The open-cast mine will resemble a strip mine given the very shallow depth of the deposit. Mining will progress from east to west in a single, shallow open pit, to an average depth of 16 m. At full production, mining will involve blasting, loading and hauling 100,000 tonnes of ore per day. The primary loading equipment will be 150 tonnes (t) class excavators working in conjunction with 100 t payload trucks for waste and overburden. For the removal of ore the equipment will be 350 t class excavators and 150 t payload trucks.

Although drilling and blasting will be required for the ore, the overburden above the orebody can be freely excavated. Ore will be delivered to two re-locatable primary crushers situated near the pit edges. Run-of-mine ore stockpiles near the primary crushers provide continuity of ore delivery over short periods. The primary crushers will be moved periodically (in terms of years) to minimise haul truck distances.

AREVA Namibia currently outsources its mining operations, having worked with MCC in the ‘Mini’ and ‘Midi’ phases.

3. **Crushing and stacking (front-end):** The uranium minerals locked in the rock are released through crushing and leaching. Test work determined that crushing the ore to a top size of 38 millimetres resulted in the optimal grain size distribution for this ore type and heap leach process. However, crushing produces a range of particle sizes. Most of the uranium is concentrated in the fine fraction, smaller than 1 millimetre diameter. The success of heap leaching depends on the free flow of leach solution through the heap and fine material unfortunately is not very permeable. It is therefore important to control the grain size of the stacked ore via a process called agglomeration. The ore tumbles in a rotating agglomeration drum where a small amount of water is added to make the finer particles stick to the coarser fraction.

The agglomerated ore was stacked on the Midi pad with a series of conveyors. The Maxi will operate using an on-off heap leach pad using a combined stacker/reclaimer system. The stacker places fresh ore on the pad, advancing from south to north along the western half of the pad, turning around at the top and coming back along the eastern side. Leached material is reclaimed using a bucket wheel excavator and conveyed back into mined-out sections of the open pit. The on-off system will be used instead of the more common single life permanent pad design, as it significantly reduces the mine’s footprint and permits concurrent rehabilitation of the open pit by backfilling the spent ore behind the advancing mining faces.
4. **Alkaline heap leaching:** Trekkopje will be the first mine in Namibia to pioneer a large-scale alkaline heap leach process. At other Namibian mines, uranium is tank leached with either sulphuric acid (Rössing Uranium) or with a heated alkaline solution of sodium carbonate and sodium bicarbonate (Langer Heinrich Uranium). The Maxi pad will extend over an area of 3 km in length and 810 m wide, making it one of the biggest heap leach operations in the world. It will consist of 30 heap leach cells, each containing 1,200,000 tonnes of material.

Ore is firstly irrigated with fresh water to remove salts, mainly chlorides and sulphates, that are present in the ore due to the salinity of the desert soil. This reduces the quantity of reagents needed and prevents the formation of calcium carbonate which would clog the irrigation pipes.

The ore is then irrigated with a leach solution made up of sodium carbonate and sodium bicarbonate. The leach solution is continuously recycled through the heap for 160 days until the uranium concentration is sufficiently high for extraction.

Evaporation and reagent losses during this time are topped up by adding fresh reagent solution to maintain the required volume and strength. The leach solution circulates in a closed loop so that no discharge occurs and the water demand is reduced.

5. **Wet plant (backend):** The concentrated uranium leach solution, also referred to as the ‘pregnant solution’, is passed through the NiMCIX continuous ion exchange plant. This process uses a type of resin specifically developed for the Trekkopje plant to selectively absorb the uranium from solution. This process takes place in the adsorption column until the resin is saturated or ‘loaded’. The remaining solution, which is now known as the ‘barren solution’ returns to the leach process.

The loaded resin is transferred to the elution column where the uranium is stripped from the resin using a bicarbonate solution. The concentrated eluate containing uranium is pumped to the precipitation stage. The stripped resin is placed back into the adsorption column ready for the next cycle.

Sodium diuranate (yellow cake) is precipitated at high temperatures using caustic soda in a multistage precipitation process, which is followed by a filter press to remove excess moisture. The yellow cake is dried and then packed into drums for despatch to overseas converters for further processing and enrichment.

Protea Chemicals currently supplies all reagents needed for the process and prepares the required solutions on site.

6. **Nuclear fuel production:** Nuclear fuel must contain a sufficient quantity of fissile material to initiate a chain reaction in a light water reactor. To achieve this, the proportion of uranium-235 must be enriched from its natural level of 0.7% to about 3-5%.

The mine’s final product is shipped to a facility in France where it is first redisolved in nitric acid and heated to over 300°C. Gaseous ammonia is injected into the solution to precipitate a powder, which is then treated with hydrofluoric acid to produce uranium hexafluoride crystals. These have the advantage of turning into a gas at a temperature of 60°C. The various uranium isotopes are separated according to their slightly different atomic mass through ultracentrifugation or gaseous diffusion. A few highly sophisticated and expensive facilities in Canada, China, the UK and USA supply enriched uranium to users around the world.

Enriched uranium in the form of uranium dioxide is pressed into cylindrical pellets that sealed into steel rods. The stainless steel rods are bundles into fuel assemblies that are designed to provide power required by a reactor while adjusting to power variations imposed by the grid and ensuring radiation containment, reliability and cost effectiveness. Assemblies are loaded into nuclear reactors where the heat from the fission reaction of uranium-235 produces steam that drives turbines to generate electricity.
2.3 OPERATIONS

Once the economic conditions become favourable, the mine will begin operating. Figure 2 presents an outline of the process activities to be undertaken during operations, namely geology and exploration, mining, crushing and stacking, alkaline heap leaching, ion exchange, precipitation and sodium diuranate (yellowcake) production (wet plant). Nuclear fuel production, though described here, takes place at AREVA’s facilities in France.

2.4 CLOSURE

Closure is not a one-off exercise. Generally it is a process that commences at the start of a mine and involves multi-stakeholder cooperation to find optimised post-mining environmental and social targets to work towards. Closure plans must be supported by regular risk assessments and reviews. The closure strategy for Trekkopje mine includes the following goals:

- To have a net positive impact on the socio-economic environment;
- To maximise progressive rehabilitation;
- To leave no liabilities at the end of life-of-mine; and
- To achieve cost estimates for closure within a 15% accuracy, five years before closure.

Trekkopje Mine is owned by AREVA, a French parastatal company with a head office in Paris. The mine is situated on state land, which fall under the ownership of the !Oe-#Gan Traditional authority and is within the #Gaiingu Conservancy. The mine’s infrastructure belongs to AREVA but supplementary infrastructure is owned by different companies. NamPower owns the 220 kV power line from the Khan substation to the Trekkopje substation and the 132 kV line from there to the desalination plant via two substations. A desalination plant has been erected at the coast to supply the mine with water. The plant, pipeline, pump stations and service tracks belong to the AREVA, but may be sold to the Namibian government. The current access road to the mine via Arandis is a private gravel road that will remain in place after closure. This road will eventually be tarred and it is expected that the Roads Authority will take over the responsibility and maintenance of this road.

The objective of the closure programme is to ensure the long-term safety of the former mine and public health protection by demolishing all infrastructures built and owned by mine, which will not be required by the future land owner. The following infrastructure will remain and it is assumed will be taken over by the Ministry of Transport and Ministry of Mines and Energy:

- Access road to the mine site from the south via Arandis;
- Structures which are likely to remain, such as the Erongo Desalination plant and pipeline and NamPower’s power lines.

Trekkopje mine initiated its closure planning in 2008 with the focus on the development of a rehabilitation plan and estimating the cost of closing the mine at that time and not at the end of life-of-mine. In December 2010 the first comprehensive closure plan was completed covering both premature and planned closure costs. The costs were revised in 2011, 2012 and 2013. Cost estimates were based on real closure costs using generally accepted accounting principles. Based on these estimates, an accounting provision was made to provide for the closure liabilities. Closure planning was done in accordance with the risk assessment process developed by the International Atomic Energy Agency (IAEA), as well as the Mine Closure Framework of the Namibian Chamber of Mines and the recently promulgated Radiation Protection Act (No. 5 of 2005). The consultation for the plans was internal and did not yet include external stakeholders. However, once the mine goes into full production, ARN intends to develop a detailed closure plan for stakeholder engagement. On commencement of the closure programme, rehabilitation and clean-up activities will commence. These will extend for the estimated decommissioning period and will be followed by ongoing monitoring and aftercare activities.
3 Environmental Management

3.1 ENVIRONMENT POLICY

Environment management at Trekkopje Mine is guided by the environment policy (Figure 3).

Principles:

1. Develop a culture of awareness and shared responsibility for the management of environmental risks.
2. Take a life-cycle approach to each new project or major modification of existing facilities.
3. Reinforce the prevention and control of environmental incidents.
4. Prevent risks linked to the design of installations and accidental spillage.
5. Reduce the environmental footprint of our activities to minimise the impact on biodiversity.
6. Comply with Namibian environmental legislation, international conventions and AREVA standards.

Commitments:

1. Raise awareness of risk prevention related to behaviour and substances that are hazardous to the environment.
2. Share experience and good practices within AREVA and the uranium mining industry.
3. Perform hazard and impact assessments to incorporate risk mitigation measures at an early stage of mine development.
4. Prevent spillages by following AREVA procedures.
5. Maintain and practice emergency response procedures.
6. Implement the environmental management plan to minimise degradation of the environment.
7. Monitor and control air, soil, groundwater and surface water quality.
8. Perform baseline studies and minimise biodiversity impacts, plan ahead for restoration at mine closure.
9. Reduce water and energy consumption, emissions of greenhouse gas, effluent and waste.
10. Anticipate changes in legislation; apply local and international good practice.

“Within the AREVA group, the activities of the Mining business group are subject to a sustainable development approach. Continuous improvement and the application of strict environmental and social standards guide us in our day-to-day actions, taking us towards the achievement of our long-term industrial objectives.”

AREVA Namibia’s uranium mining and processing activities have environmental, as well as social and economic impacts. Our principal objective is to avoid, reduce, mitigate or offset damage to the environment. This policy applies to all activities of AREVA Namibia including our contractors and suppliers.

Hilisa Mbako
Managing Director
April 2014

©HSE DEPARTMENT
3.2 LEGAL COMPLIANCE

The following acts, policies and draft policies are applicable to environmental management at Trekkopje mine:

- Air Quality Act (No. 39 of 2004)
- Atmospheric Pollution Prevention Act (No. 45 of 1965)
- Atomic Energy and Radiation Protection Act (No. 5 of 2005) and Regulations (2012)
- Climate Change Policy (2011)
- Communal Land Act (No. 10 of 2002)
- Communal Land Reform Amendment Act (No. 13 of 2013)
- Community-Based Natural Resource Management (CBNRM) Policy
- Conservation and Biotic Diversity and Habitat Protection Policy
- Environmental Investment Fund of Namibia Act (No. 13 of 2001)
- Environmental Management Act (No. 7 of 2007) and Regulations (2012)
- Forestry Act (No. 12 of 2001) and Forest Amendment Act (No. 13 of 2005)
- Hazardous Substances Ordinance (1974)
- Health Act (No. 21 of 1988)
- Integrated Pollution Control and Waste Management Bill (1999)
- Integrated Water Resource Management and Water Demand Management Policy
- Marine Resources Act (No. 27 of 2000)
- Minerals (Prospecting and Mining) Act (No. 33 of 1992)
- Mining in Protected Areas Policy (2011)
- National Heritage Act (No. 27 of 2004)
- National Land Policy and Land Use Planning Policy
- Nature Conservation Amendment Act (No. 5 of 1996)
- Nature Conservation Ordinance (No. 4 of 1975)
- Nuclear Fuel Cycle Policy (2014)
- Policy on Wildlife Management, Utilisation and Tourism in Communal Areas
- Soil Conservation Act (No. 70 of 1969)
- Traditional Authorities Act (No. 17 of 1995)
- Vocational Education and Training Act (Act No1 of 2008)
- Water and Sanitation Policy 2008
- Water Resources Management Act (No. 11 of 2013)

3.3 ENVIRONMENTAL MANAGEMENT

A set of policies, strategies and procedures have been developed to facilitate the on-site implementation of the environmental policy. The mitigation measures were drawn from AREVA’s guidelines (AREVA, 2006), the Trekkopje Environmental and Socio-Economic Impact Assessment (ESIA) Report (Turgis, 2008), the Trekkopje Exploration EMP (Ferret, 2006) and the addendums to the exploration EMP (Turgis, 2007). They were updated and improved based on experience gained during the operation of the pilot plants.

Actions and monitoring are carried out by the environmental team and the details of these management measures and monitoring results are reported annually. The environmental aspects which are monitored include the following aspects: Air quality (dust fallout and inhalable dust), radiation, land surface (including soil pollution and land use), water quality (surface, groundwater, effluent), biodiversity and social impacts (including traffic, noise, visual and archaeology).


### 3.4 ENVIRONMENTAL POLICIES, STRATEGIES AND PROCEDURES

The following table outlines the existing policies, strategies and procedures that relate to environmental management on site. All the environmental mitigation and monitoring actions as described in the ESIA and this updated EMP will continue to be carried out in accordance with the documents listed below.

<table>
<thead>
<tr>
<th>Title</th>
<th>Reference No.</th>
<th>Application date</th>
<th>Latest revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental policy</td>
<td>HSE ENV PO 01</td>
<td>1 Jul 2009</td>
<td>1 Mar 2014</td>
</tr>
<tr>
<td>Sustainable development policy (now in Env. pol.)</td>
<td>HSE ENV PO 02</td>
<td>1 Jul 2009</td>
<td>Cancelled</td>
</tr>
<tr>
<td>Social policy</td>
<td>HSE ENV PO 03</td>
<td>1 Jul 2009</td>
<td>1 Mar 2014</td>
</tr>
<tr>
<td>Strategies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air quality strategy</td>
<td>HSE ENV ST 01</td>
<td>1 Dec 2009</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Biodiversity strategy</td>
<td>HSE ENV ST 02</td>
<td>1 Dec 2009</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Closure strategy</td>
<td>HSE ENV ST 03</td>
<td>1 Jun 2010</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Construction camp strategy</td>
<td>HSE ENV ST 04</td>
<td>1 Dec 2009</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Environmental strategy</td>
<td>HSE ENV ST 05</td>
<td>1 Jun 2009</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Hazardous materials strategy</td>
<td>HSE ENV ST 06</td>
<td>1 Dec 2009</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Noise and vibration strategy</td>
<td>HSE ENV ST 07</td>
<td>1 Dec 2009</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Sustainable development strategy</td>
<td>HSE ENV ST 08</td>
<td>1 Jul 2009</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Water strategy</td>
<td>HSE ENV ST 09</td>
<td>1 Oct 2011</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Public health strategy</td>
<td>HSE ENV ST 10</td>
<td>1 Oct 2011</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Waste management strategy</td>
<td>HSE ENV ST 11</td>
<td>1 Oct 2011</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Radiation management strategy</td>
<td>HSE ENV ST 12</td>
<td>1 Oct 2011</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Mineral waste management strategy</td>
<td>HSE ENV ST 14</td>
<td>1 Oct 2011</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Visual impact management strategy</td>
<td>HSE ENV ST 15</td>
<td>1 Mar 2013</td>
<td>1 Dec 2014</td>
</tr>
<tr>
<td>Procedures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dust monitoring</td>
<td>HSE ENV PR 01</td>
<td>1 Apr 2010</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Dust control</td>
<td>HSE ENV PR 02</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Environmental auditing</td>
<td>HSE ENV PR 03</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Environmental incidents</td>
<td>HSE ENV PR 04</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Flora protection and rescue</td>
<td>HSE ENV PR 05</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Ground disturbance</td>
<td>HSE ENV PR 06</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Historical sites</td>
<td>HSE ENV PR 07</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Management of EMP compliance (Code of practice)</td>
<td>HSE ENV PR 08</td>
<td>1 Dec 2009</td>
<td>Cancelled</td>
</tr>
<tr>
<td>Off-road driving and track rehabilitation</td>
<td>HSE ENV PR 09</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Oil/diesel spill clean-up</td>
<td>HSE ENV PR 10</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Hazardous materials management</td>
<td>HSE ENV PR 11</td>
<td>1 Jul 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Wildlife interactions</td>
<td>HSE ENV PR 12</td>
<td>1 Jul 2012</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Environmental aspects of road construction</td>
<td>HSE ENV PR 13</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Road material selection</td>
<td>HSE ENV PR 14</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Topsoil handling</td>
<td>HSE ENV PR 15</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Vegetation monitoring</td>
<td>HSE ENV PR 16</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Bird interactions</td>
<td>HSE ENV PR 17</td>
<td>1 Oct 2011</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Waste dump guidelines (Mineral waste strategy)</td>
<td>HSE ENV PR 18</td>
<td>1 Dec 2009</td>
<td>Cancelled</td>
</tr>
<tr>
<td>Waste management</td>
<td>HSE ENV PR 19</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Water quality management</td>
<td>HSE ENV PR 20</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Water quality monitoring</td>
<td>HSE ENV PR 21</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Water supply management</td>
<td>HSE ENV PR 22</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Weather monitoring</td>
<td>HSE ENV PR 23</td>
<td>1 Jan 2010</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Groundwater supply monitoring</td>
<td>HSE ENV PR 24</td>
<td>1 Dec 2009</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Environmental monitoring</td>
<td>HSE ENV PR 25</td>
<td>1 Feb 2010</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Environmental code of practice</td>
<td>HSE ENV PR 26</td>
<td>1 Mar 2010</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Bioremediation</td>
<td>HSE ENV PR 27</td>
<td>1 Feb 2010</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Noise monitoring</td>
<td>HSE ENV PR 28</td>
<td>In draft</td>
<td></td>
</tr>
<tr>
<td>Environmental indicators (STAR)</td>
<td>HSE ENV PR 29</td>
<td>1 Oct 2011</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Soil monitoring</td>
<td>HSE ENV PR 30</td>
<td>1 Oct 2011</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Legal audit (environment)</td>
<td>HSE ENV PR 31</td>
<td>1 Oct 2011</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Gas monitoring</td>
<td>HSE ENV PR 32</td>
<td>1 Oct 2011</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Radiation monitoring</td>
<td>HSE ENV PR 33</td>
<td>1 Oct 2011</td>
<td>1 Feb 2015</td>
</tr>
<tr>
<td>Rehabilitation area monitoring</td>
<td>HSE ENV PR 34</td>
<td>1 Oct 2011</td>
<td>1 Feb 2015</td>
</tr>
</tbody>
</table>
3.5 ENVIRONMENTAL OBJECTIVES AND TARGETS

AREVA head office has set environmental objectives and targets for its Mining business group that have been included in the AREVA Resources Namibia EMP’s mitigation tables in addition to the mitigation measures identified in the ESIA. The objectives and targets are also documented in the Environmental Strategy HSE ENV ST 05.

3.6 SOCIAL MANAGEMENT

ARN will continue its social management commitments as outlined in the Social Policy HSE ENV PO 03 (Figure 4)
ARN will continue to fund and support its community initiatives during the care and maintenance period the areas of sustainable economic development, education, health and support to vulnerable children, e.g. bursary schemes, micro-financing credit scheme, St Gabriel’s Ambulance trust, to name a few. Any initiatives in progress will be continued and if required and deemed appropriate, new projects will be funded. The criteria by which projects are evaluated are as follows:

- **Sustainable economic development** – Create employment opportunities and support projects that become self-sustaining.
- **Education** – Reduce illiteracy, allow access to education and support students from modest backgrounds through bursaries.
- **Healthcare** – Fight HIV/AIDS, TB, improve health services (e.g. ambulances) and improve employee wellness.
- **Vulnerable children** – Support children with handicaps and children from underprivileged areas.
- **Sport and culture** – Improve wellness and social cohesion through sport, support cultural and heritage-related activities.

ARN will maintain internationally approved standards of employee and public health, safety and environmental protection. It will continue to work closely with the Namibian Chamber of Mines and its Uranium Stewardship Committee to uphold mining practices in Namibia to ensure the highest standards and to ensure the positive development of Namibia’s reputation as a mining nation.
The social and environmental mitigation tables included herewith outline the mitigation measures to address the environmental and social impacts during operations, care and maintenance and closure, as well as monitoring and care after closure.

Table 4.1 General mitigation measures to be applied throughout the life-of-mine

<table>
<thead>
<tr>
<th>ID</th>
<th>Activity</th>
<th>Aspect</th>
<th>Impact</th>
<th>Mitigation</th>
<th>Procedure</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>All</td>
<td>Environmental management system</td>
<td>Legal compliance</td>
<td>Local regulations and AREVA directives are enforced and potential modifications are anticipated. A legal register is maintained when the mine is in operation (i.e. not during care and maintenance).</td>
<td>HSE ENV PR 26 Environmental code of practice</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Environment conservation</td>
<td>Significant environmental aspects and risks associated with each activity are identified, assessed and prioritized. Environmental impact assessments are carried out for new activities, risk assessments are conducted and remedial actions are identified and implemented.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>EMP compliance</td>
<td>A consolidated environmental action plan is drawn up and each action is monitored quarterly.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Environment conservation</td>
<td>Introduce environmental sign-off on project designs with a significant environmental impact to ensure that environmental criteria are taken into account when decisions are made.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Environmental awareness</td>
<td>Environment conservation, EMP compliance</td>
<td>All new hires (AREVA employees and contractors) attend an environmental induction to alert them to significant environmental aspects and risks associated with the mine’s activities. Appropriate environmental guidelines are provided for different contractors.</td>
<td>HSE ENV PR 26 Environmental code of practice</td>
<td>QHSE Manager, all managers</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>EMP compliance</td>
<td>The environment is discussed at meetings to ensure everybody is trained in good environmental practices. Environmental issues are included in shift start talks and discussed at monthly HSE meetings.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>EMP compliance</td>
<td>Managers at all levels carry out participatory environmental inspections as part of HSE inspections.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Internal Communication</td>
<td>EMP compliance</td>
<td>The environmental policy, objectives and indicators are explained, updated and posted. All incidents are investigated and employees are informed of the corrective or preventive action taken. Improvement ideas and good practices are recorded and exchanged between business units.</td>
<td>HSE ENV ST 13 Community relations strategy</td>
<td>Communication &amp; Community Specialist, QHSE Manager</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>External Communication</td>
<td>Public perception</td>
<td>Publish an annual environmental and social report and distribute to stakeholders. Interact with the public. Maintain complaints register and address complaints from members of the public.</td>
<td>HSE ENV ST 13 Community relations strategy</td>
<td>Communication &amp; Community Specialist, QHSE Manager</td>
</tr>
<tr>
<td>10</td>
<td>Biodiversity</td>
<td>Loss of biodiversity</td>
<td>A fauna and flora inventory is drawn up; steps are taken to protect the local wildlife.</td>
<td></td>
<td>HSE ENV ST 02 Biodiversity</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>ID</td>
<td>Activity</td>
<td>Aspect</td>
<td>Impact</td>
<td>Mitigation</td>
<td>Procedure Description</td>
<td>Responsibility</td>
</tr>
<tr>
<td>----</td>
<td>---------------------------</td>
<td>------------------------------------------</td>
<td>----------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Loss of vegetation</td>
<td>Restrict removal of vegetation, leave rootstock if possible. Plants rescued from disturbed sites to be relocated to suitable sites, namely habitats where the species to be transplanted already occur naturally. Eradicate alien invasive species. Incorporate unique habitats and features into the mine layout by using them as protected islands or as components of the mine rehabilitation plan. No clearing of vegetation outside mining area, no firewood collection, rescue important species, collect seeds for use in future restoration.</td>
<td>strategy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Loss of fauna and flora</td>
<td>Avoid siting excavations and infrastructure in sensitive habitats such as rocky ridges, drainage lines or unique vegetation zones.</td>
<td>HSE ENV PR 06 Ground disturbance permit</td>
<td>QHSE Manager</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Fauna impacts</td>
<td>Avoid restriction of fauna movement due to fences. Only fence hazardous areas, pit, camps, process areas and offices. Prohibit killing or injuring animals, e.g. poaching, setting of snares. Take precautions to reduce road kill (speed limits, limitations on night driving). No unnecessary disturbance of animals, preserve small mammal, reptile and bird nesting sites.</td>
<td>HSE ENV ST 02 Biodiversity strategy, HSE ENV PR 09 Water strategy</td>
<td>QHSE Manager</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td>Avoid the presence of open water as this could attract wildlife and insects. Any leaks should be fixed promptly. Any process and water storage ponds should be fenced to keep animals out and for ponds with elevated concentrations of toxic substances, floating covers should be considered to reduce bird and insect contact with solutions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Chemical accident risks</td>
<td>A hazard study is carried out and a schedule is drawn up to implement the conclusions. HAZID and/or HAZOP risk analyses are carried out prior to the launch of projects or major upgrades of facilities.</td>
<td>HSE ENV PR 26 Environmental code of practice</td>
<td>Mine Manager</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>Chemical health risks</td>
<td>The AREVA group directives concerning asbestos, legionnaire’s disease and CMR substances are enforced.</td>
<td>QHSE Manager</td>
<td>QHSE Manager</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>Hazardous materials risks</td>
<td>Chemicals to be stored in closed or bunded areas. Periodic checks for leaks from storage tanks or containers to be carried out.</td>
<td>HSE ENV ST 06 Hazardous materials strategy</td>
<td>Mine Manager</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>Hydrocarbon pollution of soil and water</td>
<td>Pollution control measures include regular inspection, data evaluation, trend analysis, and continuous improvement policy.</td>
<td>HSE ENV PR 26 Code of practice</td>
<td>QHSE Manager</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td>Store hydrocarbons in bunded areas, check tanks for leaks, install oil separation systems in wash bays. Vehicles to be regularly serviced to reduce oil leaks, drip trays must be used when vehicles are repaired in the field. Used solvents, oils and grease to be kept in sealed containers and recycled or disposed of at hazardous waste site. Contain and clean up hydrocarbon spills, train minimum of 10 employees in spill response, emergency spill kits to be kept at each site where hydrocarbons are used.</td>
<td>HSE ENV ST 06 Hazardous materials management strategy, HSE ENV PR 11 Hazardous substances and HSE ENV PR 10 Diesel/oil spill response procedures</td>
<td>Mine Manager</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Radiation risks</td>
<td>Remove contaminated soil to an approved facility or treat on site by bioremediation.</td>
<td>HSE ENV PR 27 Bioremediation procedure</td>
<td>QHSE Manager</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>Public health impact from radiation</td>
<td>Carry out studies to determine rehabilitation requirements of the spent leach piles (backfill) and any remaining stockpiles. Should there be a risk of public exposure due to elevated radon emanations a compacted soil covering of sufficient</td>
<td>Closure plan, radiation management plan (RMP)</td>
<td>QHSE Manager</td>
<td></td>
</tr>
<tr>
<td>ID</td>
<td>Activity</td>
<td>Aspect</td>
<td>Impact</td>
<td>Mitigation</td>
<td>Procedure</td>
<td>Responsibility</td>
</tr>
<tr>
<td>----</td>
<td>-----------------------</td>
<td>--------------------------------</td>
<td>-------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>thickness to allow radon and its progeny to decay before reaching the surface has to be emplaced.</td>
<td></td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td>Limit the radiation exposure of workers on the mine plant and waste areas to as low as reasonably achievable. Ensure that the requirements of the RMP are implemented and exposures are kept below the dose limits set by the NRPA.</td>
<td></td>
<td>RMP</td>
</tr>
<tr>
<td>24</td>
<td>Soil and groundwater</td>
<td>Soil and groundwater pollution</td>
<td>Establish baseline conditions before exploration or production work begins. If applicable, assess pre-existing pollution prior to acquisition. Compile a plan to reduce the risk of pollution and potential impacts.</td>
<td></td>
<td>HSE ENV ST 06 Hazardous materials management strategy</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>25</td>
<td>Soil pollution</td>
<td></td>
<td></td>
<td>Train employees in spill response (every three years) and provide clean-up material.</td>
<td></td>
<td>HSE ENV PR 10 Diesel/oil spill response procedure</td>
</tr>
<tr>
<td>26</td>
<td>Groundwater pollution</td>
<td></td>
<td></td>
<td>Carry out regular groundwater quality monitoring to assess the mine’s impact.</td>
<td></td>
<td>HSE ENV PR 21 Water quality monitoring procedure</td>
</tr>
<tr>
<td>27</td>
<td>Groundwater pollution</td>
<td></td>
<td></td>
<td>Establish a network of monitoring boreholes and carry out regular water quality sampling. Install boreholes around the HLP and monitor groundwater for any accidental seepage due to spills or damaged liners.</td>
<td></td>
<td>HSE ENV PR 20 Water quality management</td>
</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td>Pollution control measures should include proper storage and bunding of areas that contain chemicals and oils. Regular inspection and maintenance of containers, bunding, storage tanks, and oil separation systems must be undertaken.</td>
<td></td>
<td>HSE ENV ST 06 Hazardous materials management strategy</td>
</tr>
<tr>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td>A risk assessment should be completed to identify potential leakage pathways. From this a monitoring and emergency response plan should be developed.</td>
<td></td>
<td>HSE ENV PR 20 Water quality management</td>
</tr>
<tr>
<td>30</td>
<td>All</td>
<td>Monitoring</td>
<td>Pollution</td>
<td>Set up a plan for radiological, chemical and biological monitoring of the air, water, soil and food chain.</td>
<td></td>
<td>HSE ENV PR 26 Environmental code of practice</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Radiological: TLDs, alpha dosimeters and personal dosimeters</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Air quality: gases, dust emission, climate</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Water: groundwater, potable water, sewage quality, water consumption</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Soil (only during mine operation): radionuclide and heavy metal deposition from dust fallout</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Food chain (only during mine operation): radionuclides in vegetation and wildlife (if available)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td></td>
<td>Closure planning</td>
<td>Long-term impacts, land use</td>
<td>Compile a decommissioning plan for exploration and production sites, provide sufficient budget for closure and aftercare. Consult stakeholders about future land use options and expectations. Consider retrenchment plan and sustainable development issues.</td>
<td></td>
<td>HSE ENV ST 03 Closure strategy</td>
</tr>
<tr>
<td>32</td>
<td></td>
<td>Resource use and emissions</td>
<td>Water and energy consumption, air pollution</td>
<td>During mine operation plan to reduce the consumption of non-renewable resources. Measure and publish consumption and emission data. Set targets to reduce water and fossil energy use, and GHG (SOx, NOx, and VOC) emissions.</td>
<td></td>
<td>HSE ENV PR 26 Environmental code of practice</td>
</tr>
<tr>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td>Ensure that the ‘reduce, reuse and recycle’ philosophy is applied to minimise wastage of limited water resources. All options for water demand reduction should be investigated, e.g. if possible the heap leach wash water should be recycled as this will reduce net water consumption.</td>
<td></td>
<td>HSE ENV ST 09 Water strategy</td>
</tr>
<tr>
<td>34</td>
<td>Waste management</td>
<td>Waste reduction</td>
<td></td>
<td>Wastes generated are identified and quantified. During mine operation multi-annual targets are set for reducing wastes at source and optimizing recycling. The waste hierarchy is applied in order of preference i.e. waste avoidance, waste recycling and disposal.</td>
<td></td>
<td>HSE ENV ST 11 Waste management strategy</td>
</tr>
<tr>
<td>ID</td>
<td>Activity</td>
<td>Aspect</td>
<td>Impact</td>
<td>Mitigation</td>
<td>Procedure</td>
<td>Responsibility</td>
</tr>
<tr>
<td>----</td>
<td>----------</td>
<td>--------</td>
<td>--------</td>
<td>------------</td>
<td>-----------</td>
<td>----------------</td>
</tr>
<tr>
<td>35</td>
<td>Innovation</td>
<td>Improved environmental performance</td>
<td>Waste management</td>
<td>Except for construction rubble, waste may not be buried on site but must be removed to an approved disposal site (Swakopmund or Walvis Bay, not Arandis).</td>
<td>HSE ENV PR 19 Waste management procedure</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>36</td>
<td>Visual impact management</td>
<td>Visual intrusion</td>
<td>Visual impact management strategy</td>
<td>Develop advanced technologies for the treatment of waste and effluent, e.g. reuse heap leach effluent in a closed loop to minimize effluent discharge. Rinse spent ore to recover reagents and reduce environmental impact. Improve modelling in terms of long-term contaminant behaviour and transport of contaminants from backfilled tailings.</td>
<td>HSE ENV ST 05 Environmental strategy</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>37</td>
<td>Visual impact management</td>
<td>Visual intrusion</td>
<td>Visual impact management strategy</td>
<td>Ensure that structures are sited close to each other, located away from areas which are visually exposed, set as low as possible and kept below the height restriction of 35 m above mean ground level.</td>
<td>HSE ENV ST 15 Visual impact management strategy</td>
<td>Managing Director, Mine Manager</td>
</tr>
<tr>
<td>38</td>
<td>Visual impact management</td>
<td>Visual intrusion</td>
<td>Visual impact management strategy</td>
<td>Paint colours should be muted earth tones or in the case of large surfaces such as roofs and storage tanks medium grey. Bright colours should only be used for safety markings. Keep outside paint jobs in good condition.</td>
<td>HSE ENV ST 15 Visual impact management strategy</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>39</td>
<td>Visual impact management</td>
<td>Visual intrusion</td>
<td>Visual impact management strategy</td>
<td>Height of dumps and pit backfill should not exceed 7.5 metres. The slope angles should be flattened at mine closure to less than 18 degrees.</td>
<td>HSE ENV ST 14 Mineral waste strategy</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>40</td>
<td>Visual impact management</td>
<td>Visual intrusion</td>
<td>Visual impact management strategy</td>
<td>Light pollution should be avoided by making use of directional lighting directed to work areas, avoiding high mast lighting and provision of shutters to limit light scatter. Use yellow light to limit attraction of night-flying insects.</td>
<td>HSE ENV ST 15 Visual impact management strategy</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>41</td>
<td>Archaeological management</td>
<td>Impact on historical sites</td>
<td>Archaeological management strategy</td>
<td>Undertake external monitoring of the visual impact as part of the Environmental Control Officer’s audit (external EMP audit).</td>
<td>HSE ENV ST 15 Visual impact management strategy</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>42</td>
<td>Archaeological management</td>
<td>Impact on historical sites</td>
<td>Archaeological management strategy</td>
<td>Provide guidelines to all contractors and personnel specifying restrictions associated with the old workings of the Annaberg Tin Mine and other heritage sites. In the event that any historical areas need to be disturbed, a permit must be obtained from NHC prior to any disturbance.</td>
<td>HSE ENV PR 07 Historical sites</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>43</td>
<td>Traffic management</td>
<td>Increased traffic on the B2 and gravel roads</td>
<td>Traffic management strategy</td>
<td>Ensure that all drivers are competent, licensed and take care when overtaking and keeping to the speed limit. On-going driver training should be offered to employees and contractors. All vehicles should travel with their headlights on and no driver may drive under the influence. Ensure adequate communication systems and safety provisions in the event of breakdown or accidents.</td>
<td>HSE SAF PR 18 Vehicles and driving</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>44</td>
<td>Traffic management</td>
<td>Increased traffic on the B2 and gravel roads</td>
<td>Traffic management strategy</td>
<td>Ensure that all gravel roads are well maintained, so that drivers do not take short cuts and keep to established gravel roads. Keep the number of new roads to a minimum. For new roads adequate provision of signage, delineation should be made. Any road no longer in use should be rehabilitated.</td>
<td>HSE ENV PR 13 Road construction and HSE ENV PR 14 Road material selection procedures</td>
<td>Engineering Manager</td>
</tr>
<tr>
<td>45</td>
<td>Impact on fauna and flora</td>
<td>Impact on fauna and flora</td>
<td>Impact on fauna and flora</td>
<td>Ensure that all drivers keep to the speed limit to prevent excess dust generation. Along main access routes the limit should be 70 km/h whilst along haul roads the limit should be 50 km/h. On-going watering of access routes should be applied to limit dust generation. Any new access roads should avoid sensitive habitats; all endemic species should be removed and relocated.</td>
<td>HSE SAF PR 18 Vehicles and driving, HSE ENV PR 02 Dust control, HSE ENV PR 06 Ground disturbance permit</td>
<td>Engineering Manager, QHSE Manager</td>
</tr>
</tbody>
</table>
Table 4.2 Activity-specific mitigation measures to be applied during operations

<table>
<thead>
<tr>
<th>ID</th>
<th>Activity</th>
<th>Aspect</th>
<th>Impact</th>
<th>Mitigation</th>
<th>Procedure</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mining and construction</td>
<td>Land surface - disturbance</td>
<td>Habitat loss</td>
<td>Apply strict access control. Have manned security checkpoints on the main entry roads (near Arandis and on the pipeline road).</td>
<td>HSE ENV PR 26 Code of practice</td>
<td>Mine Manager</td>
</tr>
<tr>
<td>2</td>
<td>Mining and construction</td>
<td>Land surface - disturbance</td>
<td>Habitat loss</td>
<td>Minimise mining footprint through careful planning and scheduling. Minimise impact of access roads, borrow pits and turning points. Only remove or disturb soil and vegetation in the dedicated mining area, restrict substrate disruption to the minimum. Avoid placing waste rock dumps, stockpiles and associated infrastructure in sensitive areas such as in or close to drainage lines, rocky ridges or lichen fields and preferably place heaps on areas previously cleared.</td>
<td>HSE ENV PR 06 Ground disturbance permit procedure</td>
<td>Mining Manager</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>Backfilling of pits and restoration of surface should be undertaken on a progressive basis to keep pace with the rate of advance of mining (refer to closure phase). Backfilling slopes should achieve a maximum gradient of not more than 18 degrees. Backfilled pits, waste ore rock dumps and disturbed areas must be stabilised to allow re-vegetation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mining and construction</td>
<td>Loss of soil fertility</td>
<td>Strip top ±10 cm of soil, stockpiles should be kept to a maximum height of 2 m and clearly demarcated. Use for rehabilitation as soon as possible, avoid rehandling. Ensure that subsoil with high salinity and sodium adsorption ratio is not mixed with topsoil as this may affect plant growth. If soil is not used within a year of stripping, let the stockpiles re-seed naturally to maintain microbiological processes. Rehabilitated soil should be watered to assist with germination and reestablishment of vegetation.</td>
<td></td>
<td>HSE ENV PR 15 Topsoil management procedure</td>
<td>Mining Manager, QHSE Manager</td>
</tr>
<tr>
<td>5</td>
<td>Mining and construction</td>
<td>Soil compaction</td>
<td>Control off-road driving; avoid one-off movements across undisturbed surfaces.</td>
<td></td>
<td>HSE ENV PR 09 Off road driving procedure</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>6</td>
<td>Mining and construction</td>
<td>Soil erosion</td>
<td>Construct bunding around pits to control water erosion.</td>
<td></td>
<td>Mining procedure (no number)</td>
<td>Mining Manager</td>
</tr>
<tr>
<td>7</td>
<td>Mining and construction</td>
<td>Biodiversity – loss</td>
<td>Loss of vegetation (see 4.1)</td>
<td>Restrict removal of vegetation, leave rootstock if possible. Plants rescued from disturbed sites to be relocated to suitable sites, namely habitats where the species to be transplanted already occur naturally. Eradicate alien invasive species. Incorporate unique habitats and features into the mine layout by using them as protected islands or as components of the mine rehabilitation plan. No clearing of vegetation outside mining area, no firewood collection, rescue important species, collect seeds for use in future restoration.</td>
<td>HSE ENV ST 02 Biodiversity strategy</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>8</td>
<td>Mining and construction</td>
<td>Loss of fauna (see 4.1)</td>
<td>Avoid siting excavations and infrastructure in sensitive habitats such as rocky ridges, drainage lines or unique vegetation zones.</td>
<td></td>
<td>HSE ENV PR 06 Ground disturbance permit</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>9</td>
<td>Mining and construction</td>
<td>Loss of fauna (see 4.1)</td>
<td>Avoid restriction of fauna movement due to fences. Only fence hazardous areas, pit, camps, process areas and offices. Prohibit killing or injuring animals, e.g. poaching, setting of snares. Take precautions to reduce road kill (speed limits, limitations on night driving). No unnecessary disturbance of animals, preserve small mammal, reptile and bird nesting sites.</td>
<td></td>
<td>HSE ENV ST 02 Biodiversity strategy</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>10</td>
<td>Mining and construction</td>
<td>Air quality – dust</td>
<td>Soil, flora and fauna impacts</td>
<td>Draw up a project-wide dust control plan.</td>
<td>HSE ENV ST 01 Air quality strategy</td>
<td>Managing Director</td>
</tr>
<tr>
<td>ID</td>
<td>Activity</td>
<td>Aspect</td>
<td>Impact</td>
<td>Mitigation</td>
<td>Procedure</td>
<td>Responsibility</td>
</tr>
<tr>
<td>----</td>
<td>----------</td>
<td>--------</td>
<td>--------</td>
<td>------------</td>
<td>-----------</td>
<td>----------------</td>
</tr>
<tr>
<td>11</td>
<td>Investigate use of environment-friendly surfactants. Minimise fugitive dust emission from mining activities (spray water on roads, control speeds.)</td>
<td>Dust control</td>
<td>Mining Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Restrict vehicular access to temporary surfaces during periods of inactivity.</td>
<td>Mining procedure (no number)</td>
<td>QHSE Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Determine if fauna and flora on site will be affected.</td>
<td>HSE ENV ST 02 Biodiversity strategy</td>
<td>QHSE Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Ensure that equipment is properly maintained and fitted with the necessary silencers and mufflers.</td>
<td>Mining procedure (no number)</td>
<td>Mining Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Minimise fugitive dust emission from hauling and loading activities (spray water on roads, control speeds). Use hard, unfriable materials for haul roads and investigate the use of environment-friendly surfactants. Haul truck bins must be designed to minimise spillage, maintain sufficient freeboard when loading. Minimise the height that material will free fall during loading and dumping and enclosing where possible transfer points and storage facilities. Use water sprays on muck piles and either dry collectors or wet scrubbers at bulk transfer points.</td>
<td>HSE ENV PR 02 Dust control procedure</td>
<td>Mining Manager, Metallurgy Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Monitor gas emissions to assess impact. Ensure diesel engines are well maintained.</td>
<td>HSE ENV PR 25 Environmental monitoring</td>
<td>QHSE Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Ensure that dust suppression/extraction equipment is fitted at all material transfer points between crushers and heap leach process. Where necessary conveyors will be covered (rising sections).</td>
<td>HSE ENV PR 02 Dust control procedure</td>
<td>Metallurgy Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Develop a comprehensive water management and monitoring plan for the HLP, inspect pads for early seepage detection, and repair damaged liner.</td>
<td>HSE ENV PR 21 Water quality management</td>
<td>QHSE Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Before the start of operation, establish monitoring boreholes around heap leach pads, determine water quality regularly.</td>
<td>HSE ENV PR 21 Water quality management</td>
<td>Met Manager, QHSE Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Limit the radiation exposure of workers to ALARA in accordance with the RMP (use radiation detection equipment and individual monitors, impose strict personal hygiene standards for workers handling uranium oxide concentrate).</td>
<td>RMP</td>
<td>Metallurgy Manager, QHSE Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Safety signage to be displayed and all IAEA requirements regarding transport of yellowcake to be met, in accordance with procedures outlined in the RMP.</td>
<td>RMP</td>
<td>QHSE Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Determine groundwater protection requirements, e.g. lining of the pit, runoff control and capping of the backfill.</td>
<td>Closure plan</td>
<td>QHSE Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 4.3 Mitigation measures relating to social activities to be applied throughout the life-of-mine

<table>
<thead>
<tr>
<th>ID</th>
<th>Activity</th>
<th>Aspect</th>
<th>Impact</th>
<th>Mitigation</th>
<th>Procedure</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Employment and retrenchment</td>
<td>Local employment</td>
<td>Benefits for local communities</td>
<td>Abide by the conditions stipulated in the Labour Act (No. 6 of 1992) and the Affirmative Action (Employment) Act No. 29 of 1998.</td>
<td>HR PO 16 Employment equity policy</td>
<td>HR Manager</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>High rate of unemployment</td>
<td>Develop a recruitment strategy that prioritises employment from communities in Arandis and the #Gaingu Conservancy, and ensure equitable employment opportunities for marginalised groups.</td>
<td>HR PO 01 Employment policy</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Inward migration of job seekers</td>
<td></td>
<td>Benefits for local communities</td>
<td>Advertise recruitment processes, avoid use of casual labour, advise local authorities of employment needs and get their help in identifying local candidates.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>Sustainability of local economy</td>
<td>Implement mechanisms to promote local procurement, use of local service providers and assist where capacity is lacking, promote the incorporation of women into the local economy and facilitate funding for SMEs.</td>
<td>HSE ENV ST 13 Community relations strategy</td>
<td>Community &amp; Communication Specialist</td>
</tr>
<tr>
<td>5</td>
<td>Local economic development</td>
<td>Sustainability of local economy</td>
<td>Benefits for local communities</td>
<td>Implement mechanisms to promote local procurement, use of local service providers and assist where capacity is lacking, promote the incorporation of women into the local economy and facilitate funding for SMEs.</td>
<td>HSE ENV ST 13 Community relations strategy</td>
<td>Community &amp; Communication Specialist</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Dependence on mining</td>
<td>Benefits for local communities</td>
<td>Implement mechanisms to promote local procurement, use of local service providers and assist where capacity is lacking, promote the incorporation of women into the local economy and facilitate funding for SMEs.</td>
<td>HSE ENV ST 13 Community relations strategy</td>
<td>Community &amp; Communication Specialist</td>
</tr>
<tr>
<td>7</td>
<td>Education and training</td>
<td>Education and skills development</td>
<td>School capacities over-loaded</td>
<td>Assist education authorities to upgrade the capacity of schools at the coast and encourage cooperation between different mines to manage the shortage of classrooms.</td>
<td>HR PO 23 Human resources development policy</td>
<td>HR Manager</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>Benefits for local communities</td>
<td>Implement programmes to promote education and skills development and make available to all employees.</td>
<td>HR PO 23 Human resources development policy</td>
<td>HR Manager</td>
</tr>
<tr>
<td>9</td>
<td>Training of local communities</td>
<td></td>
<td>Benefits for local communities</td>
<td>Implement programmes to promote education and skills development and make available to all employees.</td>
<td>HR PO 23 Human resources development policy</td>
<td>HR Manager</td>
</tr>
<tr>
<td>10</td>
<td>Accommodation</td>
<td>Housing for workers</td>
<td>Lack of suitable housing</td>
<td>Promote home ownership and structure employee benefits such that they can afford decent housing (housing benefits to be added at start of operation).</td>
<td>HR Remuneration policy</td>
<td>HR Manager</td>
</tr>
<tr>
<td>11</td>
<td>Health and welfare</td>
<td>Health and radiation awareness</td>
<td>Employee wellness</td>
<td>Implement a comprehensive employee wellness programme, including HIV/AIDS and TB awareness and testing, wellness initiatives, maternal health awareness. (Refer to OH&amp;S policy for occupational health and safety matters.)</td>
<td>HR PO 20 Employee wellness policy</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>12</td>
<td>Radiation fears</td>
<td></td>
<td>Benefits for local communities</td>
<td>Implement a comprehensive employee wellness programme, including HIV/AIDS and TB awareness and testing, wellness initiatives, maternal health awareness. (Refer to OH&amp;S policy for occupational health and safety matters.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mitigation measures relating to social activities to be applied throughout the life-of-mine**

- Regular monitoring of levels and geochemical analysis of groundwater around the pit and down gradient must be undertaken to determine the impact of tailings backfilling on groundwater.
- Provide runoff control on backfilled tailings or capping to ensure that soil in downstream area is not degraded.

**Procedure**

- HSE ENV PR 21 Water quality management
- Closure plan
<table>
<thead>
<tr>
<th>ID</th>
<th>Activity</th>
<th>Aspect</th>
<th>Impact</th>
<th>Mitigation</th>
<th>Procedure</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Economic development</td>
<td>Support for local authorities</td>
<td>Upgrading of local services</td>
<td>Support improved service delivery in Arandis and sustainable economic developments in consultation with the Town Council.</td>
<td>HSE ENV ST 13 Community relations strategy</td>
<td>Community &amp; Communication Specialist</td>
</tr>
<tr>
<td>14</td>
<td>Create employment and reduce poverty in #Gaingu Conservancy</td>
<td>Loss of access and grazing</td>
<td>Equitable recompense not based on monetary compensation but rather on needs should be negotiated with the !Oe #Gan Traditional Authority. Assist in funding and supporting the implementation of measures outlined in the economic development plan for the #Gaingu Conservancy.</td>
<td>Procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Create tourism opportunities in #Gaingu Conservancy</td>
<td>No alternative sources of income</td>
<td>Assist and support the #Gaingu Conservancy to implement its conservancy management plan, provide training in aspects of environmental stewardship and management, assist with game counting and anti-poaching drives, facilitate future inclusion of the former Annaberg tin mine in a proposed tourist route.</td>
<td>Procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Closure planning</td>
<td>Ensure sustainability on closure</td>
<td>Economic decline of local communities</td>
<td>Complete a closure plan that considers the long-term sustainability of communities. Plan should include KPIs for monitoring, support alternative development initiatives, collaborate with other mining companies and authorities to ensure that activities are aligned, and support sustainability and skill retention.</td>
<td>Closure plan</td>
<td>QHSE Manager, Community &amp; Communication Specialist</td>
</tr>
<tr>
<td>17</td>
<td>Community and stakeholder relations</td>
<td>Promote transparency and build relationships</td>
<td>Lack of trust</td>
<td>Implement the stakeholder engagement strategy, monitor relations with stakeholders and partnerships; keep regular contact with all groups. Communications can be in the form of reports, open days, newsletters and other forms of media.</td>
<td>HSE ENV ST 13 Community Relations Strategy</td>
<td>Community &amp; Communication Specialist, QHSE Manager</td>
</tr>
<tr>
<td>18</td>
<td>Stakeholder concerns</td>
<td>Stakeholder concerns</td>
<td>Keep a register of public complaints, address and follow up complaints by responding promptly to members of the public. The register is kept at the AREVA office in Swakopmund under the authority of the Community &amp; Communication Specialist.</td>
<td>Procedure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.4 Mitigation measures to be applied during closure operations

<table>
<thead>
<tr>
<th>ID</th>
<th>Activity</th>
<th>Aspect</th>
<th>Impact</th>
<th>Mitigation</th>
<th>Procedure</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Infrastructure removal</td>
<td>Land surface – disturbance</td>
<td>Habitat loss</td>
<td>All infrastructure will be removed, unless an alternative use for it has been identified and agreed with the land owners and future user(s).</td>
<td>Closure plan</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>2</td>
<td>Air quality – dust</td>
<td>Soil, flora and fauna impacts</td>
<td>Dust control measures must be applied during demolition and restoration work.</td>
<td>HSE ENV PR 02 Dust control procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Non-hazardous waste management</td>
<td>Pollution</td>
<td>Steel and reusable non-hazardous material to be salvaged and sold. Non-hazardous waste that cannot be recycled to be taken to municipal landfills. Concrete foundations &gt;1 m below the ground may be left in place, all others to be removed. Pipes buried below 0.5 m may remain. Building rubble to be backfilled into excavations to restore the original site profile.</td>
<td>Closure plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Hazardous waste management</td>
<td>Pollution</td>
<td>Demolition sites to be inspected for hydrocarbons and chemicals. Any hazardous materials and chemicals will be either returned to suppliers or taken to the hazardous waste facility in Walvis Bay. Remediate all soil pollution.</td>
<td>HSE ENV PR 11 Hazardous substances procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Radioactive waste management</td>
<td>Health – radiation</td>
<td>All demolition sites to be inspected and cleared for radioactivity. Radioactive materials will be disposed of in the open pit or granite quarry. The pit/quarry will be prepared as a low-level radioactive waste site by lining and/or capping.</td>
<td>Closure plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ID</td>
<td>Activity</td>
<td>Aspect</td>
<td>Impact</td>
<td>Mitigation</td>
<td>Procedure</td>
<td>Responsibility</td>
</tr>
<tr>
<td>----</td>
<td>--------------------------------</td>
<td>-------------------------</td>
<td>--------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>-----------</td>
<td>----------------</td>
</tr>
<tr>
<td>6</td>
<td>Site rehabilitation</td>
<td>Land surface – disturbance</td>
<td>Habitat loss</td>
<td>Landscape all areas to resemble the original landscape as closely as possible, including drainage lines, and restore ecological function. Use stockpiled topsoil.</td>
<td></td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Land surface – pollution</td>
<td>Long-term contamination</td>
<td>Remediate all soil pollution, remove or control residual hazardous and radioactive waste materials. Compacted contaminated areas must be ripped and contaminated soil removed and treated or removed to the open pit.</td>
<td></td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Soils</td>
<td>Loss of flora and fauna</td>
<td>Apply stockpiled topsoil and treat surface for reseeding. In small areas lightly compact soil, rake, reseed and maintain optimal moisture regime to ensure germination. Apply stored seeds of indigenous vegetation; if necessary replant indigenous vegetation taking care not to introduce weeds or pests.</td>
<td></td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Archaeology</td>
<td>Loss of heritage</td>
<td>During rehabilitation works, abide by restrictions associated with the old workings of the Annaberg tin mine. Public access from the road that passes through the workings should be prevented.</td>
<td></td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>10</td>
<td>Pits and pads rehabilitation</td>
<td>Land Surface - disturbance</td>
<td>Visual intrusion</td>
<td>Waste rock will be returned to pit except for a few external waste rock dumps. Height of pit backfill and dumps will be less than 7.5 m above surface and they will be profiled into stable forms to minimise erosion. Slope angles should be less than 18 degrees with a convex crest and concave slope.</td>
<td></td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Mineral waste management</td>
<td>Public health impact – radiation</td>
<td>Soluble uranium and other radionuclides in spent heap leach tailings may present a risk. It is intended to dismantle leach pads rather than leave them in situ and dispose of the leached material in the pit. If necessary, the pit will be lined prior to backfilling with tailings or the surface will be capped to reduce radon gas emanation. Groundwater and air quality will be monitored.</td>
<td>Closure plan</td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Surface and groundwater</td>
<td>Formation of pit lakes</td>
<td>Pits should be backfilled and shaped to prevent water accumulation. If pit lakes develop after rain they are likely to disappear due to high evaporation rates.</td>
<td></td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>13</td>
<td>Roads and servitudes</td>
<td>Land surface – disturbance</td>
<td>Soil, flora and fauna impacts</td>
<td>Water and power supply lines (except for NamPower lines) must be removed and the disturbed areas rehabilitated.</td>
<td></td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td>Roads, except for those agreed to remain, must be ripped and re-contoured and the disturbed areas rehabilitated.</td>
<td></td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>15</td>
<td>Socio-economic</td>
<td>Closure and retrenchments</td>
<td>Socio-economic impacts</td>
<td>A detailed closure impact management plan must be developed which looks at retrenchment impacts and alternative livelihood options. Early engagement with workforce, labour union and local authorities to determine the most appropriate management measures.</td>
<td></td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td>The town office and accommodation in Swakopmund will be sold. Similarly warehouses in Walvis Bay, the Erongo desalination plant, and any infrastructure in Arandis will be sold.</td>
<td></td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>17</td>
<td>Aftercare</td>
<td>Land surface and biodiversity</td>
<td>Effective restoration</td>
<td>Rehabilitated areas should be monitored to confirm that they are self-sustaining. Monitor site stability and effectiveness of restoration measures, as well as ecological functioning over several years after closure.</td>
<td></td>
<td>QHSE Manager</td>
</tr>
<tr>
<td>18</td>
<td>Relinquishment</td>
<td>Land use</td>
<td>Restore beneficial use</td>
<td>Make the site safe for public use and hand back to the original owners with the fewest possible restrictions on the use of the land.</td>
<td></td>
<td>QHSE Manager</td>
</tr>
</tbody>
</table>
5 Bibliography

- Addendum No. 1 to the EMP, Turgis Consulting, May 2007a.
- Attachment to the EMP Addendum No. 1, Turgis Consulting, May 2007b.
- Addendum No. 2 to the EMP, Turgis Consulting.
- Addendum No. 3 to the EMP, Turgis Consulting January 2008.
APPENDIX A – ENVIRONMENTAL CLEARANCE CERTIFICATES

MINISTRY OF ENVIRONMENT AND TOURISM

OFFICE OF THE ENVIRONMENTAL COMMISSIONER

The Managing Director
Area Resources Namibia (Pty) Ltd
P.O. Box 30
Windhoek, Namibia

Dear Sir or Madam

SUBJECT: ENVIRONMENTAL CLEARANCE FOR THE ENVIRONMENTAL MANAGEMENT PLAN FOR THE TREKKOPJE PROJECT EXCLUSIVE PROSPECTING LICENCE 2218 SITUATED IN ERONGO REGION, NAMIBIA.

The Environmental Management Plan (EMIP) submitted is sufficient as it made an adequate provision of the environmental management for the proposed change in operation for the above mentioned project. From this perspective regular environmental monitoring and evaluations on environmental performance should be conducted. Targets for improvements should be established and monitored throughout this process.

In view of the fact that your project is located in an environmentally sensitive area, this Ministry reserves the right to attach further legislative and regulatory conditions during the operational phase of the project. From this perspective, I issue this clearance with the following condition: Communication should be maintained with all key stakeholders and written consent obtained prior to the implementation of this amendment.

On the basis of the above, this letter serves as an environmental clearance for the proposed change in operation to be implemented. However, this clearance letter does not in anyway hold the Ministry of Environment and Tourism accountable of any wrong doing, for insufficient information, nor any adverse effects that may arise from this project activity. Instead, all accountability rests with the proponent and his/her consultants.

This environmental clearance is valid for a period of 3 (three) years, unless withdrawn by this office.

Yours sincerely,

Teofila Nghita
ENVIRONMENTAL COMMISSIONER

All official correspondence must be addressed to the Permanent Secretary
OFFICE OF THE ENVIRONMENTAL COMMISSIONER

The Managing Director
Areva Resources Namibia (Pty) Ltd
P.O. Box 30
Windhoek, Namibia.

Dear Sir or Madam,

SUBJECT: ENVIRONMENTAL CLEARANCE FOR THE ENVIRONMENTAL MANAGEMENT PLAN FOR THE TREKKOPJE PROJECT EXCLUSIVE PROSPECTING LICENCE 3573 SITUATED IN ERONGO REGION, NAMIBIA

The Environmental Management Plan (EMP) submitted is sufficient as it made an adequate provision of the environmental management for the proposed change in operation for the above mentioned project. From this perspective regular environmental monitoring and evaluations on environmental performance should be carried. Targets for improvements should be established and monitored throughout this process.

In view of the fact that your project is located in an environmentally sensitive area, this Ministry reserves the right to attach further legislative and regulatory conditions during the operational phase of the project. From this perspective, I issue this clearance with the following condition: Communication should be maintained with all key stakeholders and written consent obtained prior to the implementation of this amendment.

On the basis of the above, this letter serves as an environmental clearance for the proposed change in operation to be implemented. However, this clearance letter does not in anyway lapse the Ministry of Environment and Tourism accountable of any wrong doing, for insufficient information, nor any adverse affect that may arise from this project activity. Instead, full accountability rests with the proponent and his/her consultants.

This environmental clearance is valid for a period of 3 (three) years, unless withdrawn by this office.

Yours sincerely,

[Signature]

Theofilius Nahuhua
ENVIRONMENTAL COMMISSIONER

All official correspondence must be addressed to the Permanent Secretary