



TREKKOPJE MINE
Stakeholder Report 2012 - 2013

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Are you a stakeholder?

Stakeholders are all individuals and institutions that influence and are affected in any way by AREVA Namibia. This includes the company's employees and contractors, service providers and customers, the communities of Arandis and Swakopmund and within the !Oe-#Gan traditional authority, and government institutions. The aim of this report is to give our stakeholders an overview of progress made at Trekkopje Mine and feedback on sustainable development initiatives, including community development, environmental management and our contribution to the economy.



Message from the Managing Director

I am pleased to present our stakeholder report for 2012-2013. During this time we successfully completed pilot testing at the MIDI site and produced 440 tons of uranium, thanks to the dedicated efforts of our Operations personnel. We have gained valuable experience that will help us optimise the process in the MAXI phase. The uranium was exported for further processing into nuclear fuel at the converter facility in France and royalties were paid to the Namibian government.

The last two years were challenging for the uranium industry. There is currently an over-supply of uranium on the world market, partly due to Japan's nuclear reactors being stopped, and the spot market price dropping below US\$40 per pound of uranium oxide in mid-2013. This has severely affected new developments in Namibia which generally need higher prices of around US\$60-80 per pound to be viable.

Taking into account the current economic conditions and the

substantial investments yet to be made at the Trekkopje MAXI plant, it was decided to put the project on hold.

The Trekkopje project went into a 'Care and Maintenance' phase from 1 July 2013. This may have created the perception that "the mine has closed down", but I want to emphasise that we are merely in a holding phase with every intention to start up as soon as the economic conditions become more favourable.

During the next few years, the Care and Maintenance team will protect the assets and keep the mine's infrastructure in working condition so that it can be commissioned without delay. We have retained an excellent team of people who will maintain our focus on safety, health and the environment.

We will continue to engage with our stakeholders and remain committed to our social projects in Arandis, Swakopmund and the wider Erongo region. We are, for instance, setting up

a bursary programme for students from the region and are actively supporting local economic development through the Erongo Development Foundation's SME micro-finance scheme.

On 14 August 2013, we signed an initial water supply agreement with NamWater. This agreement is a prelude to a medium-term contract to distribute up to 10 million cubic metres per annum. We are proud that AREVA's Erongo Desalination Plant will contribute to water supply security and help preserve the water reserves of the Erongo region.

I thank you for your continued support and hope that you will find this report informative.

Hilifa Mbako
Managing Director
AREVA Resources Namibia

AREVA group - Action 2016 milestones

AREVA's position remains strong in the global energy and renewable markets. The group experienced a 13% increase in revenue due to nuclear operations for the first half of 2013, despite the decision by the German and Japanese governments to phase out nuclear power. Currently it is involved in 360 of the 440 nuclear reactors being built worldwide.

Given the company's wide installed base, it is able to offer strong opportunities of value-added products and services. The relationship with the French state-owned nuclear power company EDF remains good and fruitful with €17 billion in orders confirmed in September 2012. The provision of new reactors remains challenging; however there are new projects being proposed in Europe, Asia and the Middle East. This is supported by AREVA's robust design and unrivalled experience with European Pressurised Reactors.

In 2012, the AREVA group implemented Action 2016. It is a strategic action plan aimed at improving the company's performance through key priorities that are summarised in the five pillars of our performance.

The AREVA Mining business group has implemented the Action 2016 performance plan across all of its sites and achieved the following milestones in 2013: The **safety** record improved with an accident frequency rate of 1.1 compared to 3.8 in 2005 (number of lost-time injuries per million hours worked).

Some key decisions were made with respect to the different mining **operations**. The Imouraren uranium project in Niger continued under a revised schedule, while a new sulphuric acid plant was launched in Somair, Niger, and the Trekkopje Project was placed under care and maintenance. Major contracts were signed in 2013 between France and state companies i.e. Mongolia (a joint venture with MON-ATOM to develop uranium mines), in UK (to supply nuclear steam), in USA (American utility PSEG Nuclear) and in Japan (Japan Nuclear Fuel Ltd and ATOX for the development of the strategic Franco-Japanese partnership in civil nuclear power).



ACTION 2016

The five pillars for our performance



The group has significantly improved its **economic** position by consolidating its assets and selling its stakes in the Millennium Project, La Mancha Resources and Eramet SA.

Innovation has been shown through partnerships signed with Mitsubishi to carry out exploration in Australia, finalisation of a conceptual study in Mongolia, and partnership with Roche for the development of AREVA Med.

The AREVA group is making **people** skills and career development a priority by increasing internal mobility, identifying experts and making an effort to include more women among the experts and in management. The Action 2016 goals are to have

25% women on management committees and to fill 70% of all key positions with employees who are identified as "talents", 80% of whom should be hired locally.

"I want to congratulate the operational teams at our sites and our staff in the support functions, all of whom have worked very hard to achieve these results. Thanks to everyone's commitment, the Mining business group is in line with the production objectives of the Action 2016 strategic plan and is thus making a positive contribution to the AREVA group's results."

Olivier Wantz
Member of the Executive Board, Senior Executive Vice President Mining



Uranium industry milestones

Saint Alban nuclear power plant, France

Despite the current concerns about nuclear energy generation the world energy situation remains unchanged and the demand for large quantities of reliable and affordable electricity continues to rise. The uranium industry believes that nuclear energy still has strong prospects. This optimism rests on two main factors. The first is Asia's growth, which relies on nuclear power generation, albeit with caution. China plans to build 50 reactors by 2020 and India has 20 nuclear reactors in operation and seven under construction. The second factor relates to fears of global warming.

Milestones for the Namibian uranium industry included the rolling out of the Environmental Regulations and the Radiation Protection Regulations in 2012, the completion of the first annual report on the Strategic Environmental Management Plan (SEMP) by the Ministry of Mines and Energy, the creation of the Namib Ecological Restoration and Monitoring Unit (NERMU) and the Uranium Institute.

In 2013, the Uranium Stewardship Committee, which was mandated under the Chamber of Mines, formed the independent Namibian Uranium Association (NUA) whose main members are AREVA Resources Namibia, Bannerman Mining Resources (Namibia),

Langer Heinrich Uranium, Marenica Energy, Reptile Uranium Namibia, Rio Tinto Rössing Uranium, Swakop Uranium, Valencia Uranium and Zhonghe Resources (Namibia) Development.

The NUA contributes to emerging policy debates affecting the industry, to ensure its safe, efficient and sustainable development and to promote stakeholder and public confidence in the industry. Today, all Namibian uranium mining companies need to plan for and deal with environmental impacts before, during and after mining. Stewardship entails managing products throughout their whole life cycle to ensure that their production, use and disposal are consistent with sustainable development principles.

The Namibian Uranium Institute as a strategic partner provides support and advisory input to its members. It promotes mining practices that comply with global standards on sustainable development, environmental protection and radiological safety. In addition it provides an important forum for operators and stakeholders to meet and discuss critical issues. Members of the public, activists on both sides of the opinion spectrum, visitors and scientists from around the world are welcome to visit the Institute

and attend its training sessions, information events and workshops. A set of mine health, radiation safety and environment standards, as well as guidance documentation has been developed to ensure that good practices are applied at all stages of uranium exploration, mining, and ore milling and processing. The uranium industry accepts corporate social responsibility as a core business interest and the member companies continue to invest directly or indirectly (via the Erongo Development Foundation) in education, training, youth support and economic development of socially disadvantaged Namibians.

A recent statement by His Excellency Hifikepunye Pohamba, President of the Republic of Namibia clearly defines the government's stance with respect to the uranium industry:

"Namibia's mineral resources (including uranium) are to be strategically exploited and optimally benefited, providing equitable opportunities for all Namibians to participate in the industry, while ensuring that environmental impacts are minimised and investments made to develop other sustainable industries and human capital for long-term national development."

Corporate governance



Hilifa Mbako
Managing Director



Angelique Botha
Manager: HR



Tommie Gouws
Manager: Finance



Francois van Dyk
Mine Manager (Acting)



Sandra Müller
Manager: QHSE



Philippe Dubois
Manager: Test Work

AREVA's Namibian subsidiaries are AREVA Resources Namibia as an exploration and mining company and AREVA Processing Namibia as a mineral processing business with export processing zone (EPZ) status. The Board of Directors of AREVA Resources Namibia consists of Martha Namundjebo-Tilahun (Chairperson), John Akwenye, David Bruni (alternate), Thomas Gouws, Hilifa Mbako, Ian McLaren and Andreas Mittler, while the Board directors for AREVA Processing Namibia are, Hilifa Mbako (Chairperson), Thomas Gouws, Ian McLaren, Andreas Mittler and Martha Namundjebo-Tilahun.

A new management structure for the care and maintenance phase was announced in June 2013. The management team (see photos) is both based at the corporate office in Swakopmund and the mine site. AREVA Namibia is an equal opportunity employer and complies with the Employment Equity (Affirmative Action) Act of 1998. At the time of writing 96% of the company's employees were Namibians and understudies were identified for the few remaining expatriates.

Rolling out care and maintenance

The Trekkopje project went into a 'Care and Maintenance' phase with every intention to start up as soon as the economic conditions become more favourable. Construction of the Maxi processing plant was progressing well and about 1800 contractors were working on site together with 160 AREVA employees. Construction activities were winding down in early 2013 and at the end of June 2013, Trekkopje mine entered a care and maintenance phase, meaning that 110 employees had to be retrenched. Currently, AREVA Namibia has only 50 employees.

In October 2012, the decision to put the project on hold was first communicated to the management team and on the following day to all employees, shop stewards and suppliers. Senior managers held meetings with each department, followed by one-on-one discussions with the affected employees who could use these sessions to ask questions and voice their concerns. The Human Resources department followed specific programmes to manage the many emotions raised by these events. Management and the Mineworkers' Union of Namibia (MUN) concluded a retrenchment agreement without any dispute and the process was handled in a trustworthy and transparent manner between all. A 'Retrench as Redundant' approach was followed in order to retain critical skills during the ramp-down process of the operations.

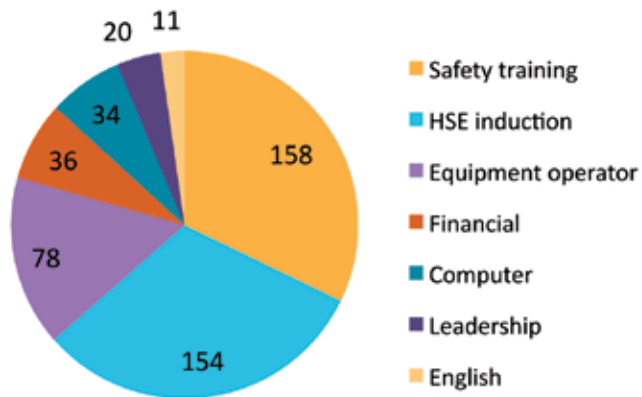
Human Resources counselled the affected employees and arranged for training that would help prepare them for future opportunities. Courses such as "Managing your Finances", "Developing Skills for Moving On", project management and basic computer skills were offered, and financial advice was provided, e.g. on how to invest the retrenchment package. The company made a commitment to its retrenched employees that they would be the first ones to be called upon when the mine starts up again and it was reassuring that most of them indicated that they would like to come back.

AREVA Namibia tried to soften the blow by providing generous retrenchment packages. Some former employees have used this money to start their own businesses, while others are enjoying a well-deserved break before taking up new employment. Others went straight into new jobs, given that the early announcement gave them time to line up good offers.

Training and skills development

Employee development continues during the care and maintenance phase, making use of the reduction in work pressure to enable employees to upgrade their skills or qualifications and to prepare for the future start up. However, retaining qualified and experienced staff could prove to be challenging and the Human Resources department is busy reviewing its employee value proposition strategy.

A wide range of training courses were offered and trainee numbers for 2012 are shown in the pie chart. HSE-related training for all employees included safety and radiation inductions, OSHAS awareness, first aid, fire fighting, defensive driving and risk assessment, and there was special training for safety representatives and peer educators. Technical staff were trained and certified in the operation of equipment, such as forklifts, dozers and cranes, as well as basic mechanical rigging and project management. There were also courses on specific software, i.e. DataShed and Pragma, as well as advanced spreadsheet skills, business English and leadership skills (emotional intelligence).





Alcohol testing at mine gate



Personal integrated dosimeters for radiation monitoring



Wellness Day at Trekkopje Mine

Safety and occupational health

The safety culture that we share within AREVA helps to reduce risks and prevent accidents. Our commitments to the personnel working on site, both employees and contractors, are the following:

- To strengthen our safety culture
- To remind everyone at every level, from management to workers, of their responsibility regarding safety
- To continue the deployment of safety management systems
- To strengthen the risk prevention and management policy based on the identification and systematic analysis of accidents and near-misses
- To standardise and share best practices
- To continue the safety campaigns
- To monitor our performance

The Trekkopje Operations Department achieved its safety target of zero accidents and obtained OHSAS 18001 certification in 2012. Very sadly however, the Project department experienced a fatal accident on 3 October 2012 when a contractor employee fell from an elevated platform. The accident was fully investigated and measures were implemented to address unsafe conditions and behaviour.

A number of first aid and vehicle damage cases during 2012 and 2013 confirmed that driving remains the highest risk activity at the mine. The main causes of accidents on gravel roads were identified as the condition and roadworthiness of vehicles, incorrect tyre inflation, worn tyres, faulty brakes, and unsuitable shock absorbers. Other factors included the non-adherence to traffic rules, lack of driving skills, and poor road conditions due to corrugations, loose gravel, slippery surfaces, and high sand berms from grading. In response, the following measures were reinforced:

- Site traffic rules - speed limit 70 km/h, signs put up to communicate rules, e.g. wear seatbelt, no cell phones while driving, keep following distance, no overtaking in poor visibility
- Vehicle checklist to be completed daily
- Scheduled vehicle services
- Driver training and attitude
- Monitoring: satellite tracking and speed cameras. Offenders are banned or suspended from driving.
- Regular road maintenance, side berms are removed.



"Safety is central to the Mining BG's operations. The main objectives are: zero fatal accidents and a further decrease in the accident frequency rate with an ultimate objective of zero accidents. We will achieve that objective by respecting the safety rules, but that will not be enough. We must all make a daily commitment to our safety and the safety of others."

Olivier Wantz
Member of the Executive Board, Senior Executive Vice President Mining



Transferring yellowcake into the dryer



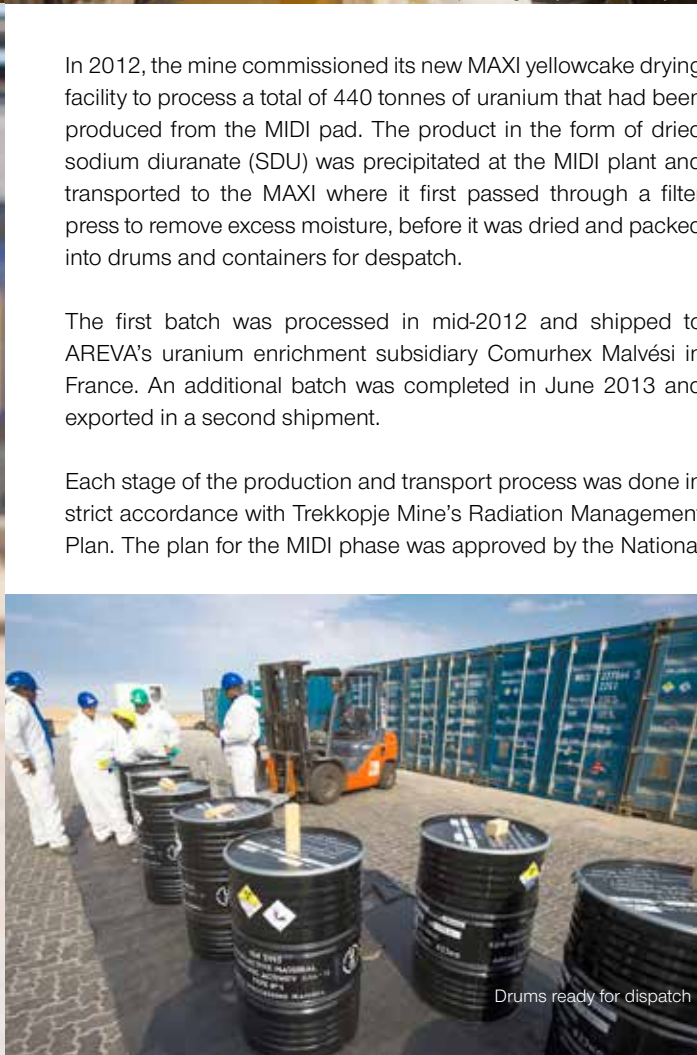
Operating the yellowcake dryer



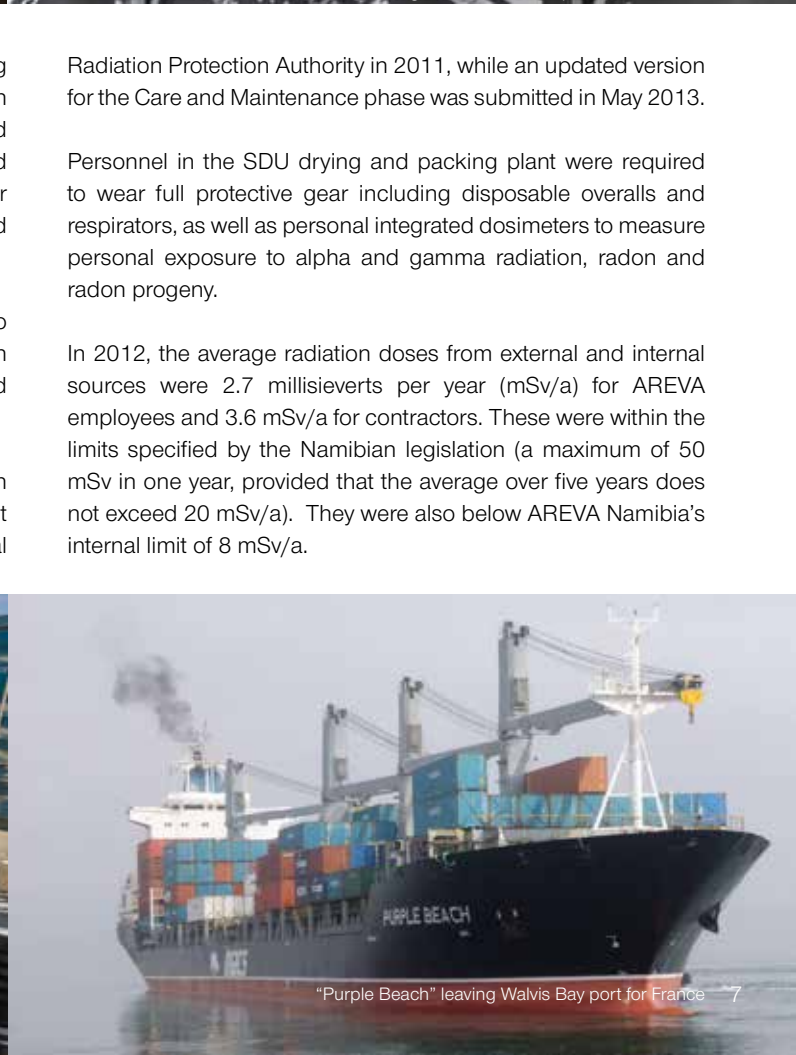
Loading drums with dried product into containers



Scanning the drums for radiation



Drums ready for dispatch



"Purple Beach" leaving Walvis Bay port for France

In 2012, the mine commissioned its new MAXI yellowcake drying facility to process a total of 440 tonnes of uranium that had been produced from the MIDI pad. The product in the form of dried sodium diuranate (SDU) was precipitated at the MIDI plant and transported to the MAXI where it first passed through a filter press to remove excess moisture, before it was dried and packed into drums and containers for despatch.

The first batch was processed in mid-2012 and shipped to AREVA's uranium enrichment subsidiary Comurhex Malvési in France. An additional batch was completed in June 2013 and exported in a second shipment.

Each stage of the production and transport process was done in strict accordance with Trekkopje Mine's Radiation Management Plan. The plan for the MIDI phase was approved by the National

Radiation Protection Authority in 2011, while an updated version for the Care and Maintenance phase was submitted in May 2013.

Personnel in the SDU drying and packing plant were required to wear full protective gear including disposable overalls and respirators, as well as personal integrated dosimeters to measure personal exposure to alpha and gamma radiation, radon and radon progeny.

In 2012, the average radiation doses from external and internal sources were 2.7 millisieverts per year (mSv/a) for AREVA employees and 3.6 mSv/a for contractors. These were within the limits specified by the Namibian legislation (a maximum of 50 mSv in one year, provided that the average over five years does not exceed 20 mSv/a). They were also below AREVA Namibia's internal limit of 8 mSv/a.

Care and maintenance



During care and maintenance (C&M) the MIDI and MAXI infrastructure will be kept in working condition so that it can be commissioned when required and at minimal cost. The C&M team consists of 23 people working according to maintenance schedules that have been captured on the Pragma software program.

The Pragma database contains all structures and equipment with the manufacturers' specifications and maintenance requirements. The system generates job cards, schedules, work in progress and produces monthly reports, e.g. on maintenance statistics, labour hour distribution or completion of schedules.

General C&M tasks include proper storage, lubrication, corrosion protection and functionality checks. An example of such a schedule would be the following for pumping equipment:

Pumps (general)

- 2 weeks – bimonthly inspect pump body
- 4 weeks – check pump foundations are in good condition. Operate pumps and check for noise problems

Pulleys and safety guards

- 4 weeks – check condition, alignment and tension of v-belts
- 4 weeks – check that safety guards are in place and in good condition

Bearings

- 12 weeks – grease bearings, check oil, and top up if required
- 48 weeks – change bearing assembly oil
- 96 weeks – overhaul bearing assembly

Motors

- 4 weeks – record motor load amps
- 12 weeks – check and clean motor
- 24 weeks – grease motor bearings and inspect motor for corrosion

Similar maintenance schedules have been created and implemented for the vibrating screens, silos, crushers, safety equipment, apron feeders, agglomeration drum, compressors, alternators, reverse osmosis plant and sewage plants.

Metallurgical test work

"We have a chance to develop a technology to enhance the future of Trekkopje Mine as soon as the economic conditions become more favourable. We are not here to watch the assets in the desert but to develop a process that will reduce the cost of production and in doing so save us money. The company trusts us in this important endeavour and we have a responsibility to them to ensure that the work is done to a high standard. I believe I have a talented and motivated team to achieve this goal."

Philippe Dubois
Test Work Manager

AREVA Mining's department for Research, Processes and Analyses (Service d'Etudes de Procédés et Analyses - SEPA) was created in 1980 with the main purpose of carrying out chemical, radiological and environmental analyses at various stages of the mining cycle. A Process Engineer from SEPA at Bessines in France, was seconded to Trekkopje mine to create a local team and is the driving force behind the current research and testing activities with the aim of optimising the uranium recovery process.

The first phase of the study was carried out in collaboration with the team in Bessines who did bench-scale tests, while the site team completed a programme using 40 columns, each 9 m high and filled with 750 kg of ore. The study ran for 12 months until June 2013, with the Bessines team looking at the back-end of the process (loading of the uranium onto resin, elution and precipitation of uranium oxide) and the Trekkopje team investigating the front-end (ore crushing and heap leaching).

The site team recently got the go-ahead to proceed with the second phase, namely a box testing facility to be constructed at the MINI plant. Various existing equipment and structures are being modified to incorporate two leach boxes that will be 11 metres high and 3 metres wide. Each box will hold 100 tonnes of ore and will undergo the typical process cycle of agglomeration, stacking, washing, leaching and rinsing. In addition, a small pilot processing plant will be built to confirm the Bessines bench-scale results and the NIMCIX ion exchange experience acquired during the MIDI stage. The second phase will be completed by the end of 2014.

Back row, left to right: Michael Okamaru, Elkana Garoeb, Philippe Dubois, Paul Rhode
Front row, left to right: Daniel Kalambi, Eric Mukena, Nafatalie Ruhumba, Gerson Geingob



Community involvement

AREVA Namibia is supporting initiatives in the Erongo region that promote economic development, education, sport and culture. One of our main partners is the Erongo Development Foundation (EDF), a charitable development trust chaired by the Honourable Asser Kapere who is also the chairman of the National Council. AREVA Namibia serves on the board of the EDF together with other stakeholders.

In 2012, AREVA contributed to local economic development by co-funding EDF's micro-finance credit scheme for small and medium enterprises for the period 2014-2015. The scheme, which also receives contributions from the Rössing Foundation, Swakop Uranium and Bank Windhoek, provides affordable finance to small businesses.

Up-and-coming entrepreneurs, who are excluded from the commercial banking system, are eligible for loans from the EDF if they have been operating a business for at least one year. Loans are issued to a minimum of five beneficiaries per constituency from the seven constituencies of the Erongo Region. Candidates are selected in their towns, screened and then trained in the basics of business management. AREVA Namibia financed the training of the candidates in 2012.

A maximum amount of N\$10 000 per applicant at an interest rate of 9.75% per annum is granted as a first loan. Beneficiaries may apply for further financing after one year, provided they are on track with their repayments. Close to 120 applicants have benefited from this loan scheme over the past five years. Business ideas include hydroponics gardening, printing and security firms, manufacturing of crafts and clothing, as well as various shops. The EDF board regularly visits the beneficiaries to see how they are doing.

To support education, AREVA Namibia has sponsored an additional class room for the Kolin Foundation secondary school in Arandis and is developing a bursary scheme for deserving students from disadvantaged families in the Spitzkoppe area. The training of artisans at the Namibian Institute of Mining and Technology (NIMT) was supported by providing them with a vehicle.

The EDF was established in 1996 as an independent and financially prudent community organisation which has broad community and political support. It is a registered company not for gain, managed by a Board of Trustees. The primary goal of the EDF is to advance funding to projects that have quantifiable social, cultural and economic benefits to residents and communities in the Erongo region.



The most popular event on the AREVA sports calendar is the annual The Rock Spitzkoppe Community Run and Mountain Bike Challenge. The event attracted 469 entries for the walk, run and cycling categories in 2013 and 420 entries in 2012.

AREVA annually holds an "Athlenergy" competition to encourage employees' involvement in sport and their community. The company pays one Euro for each kilometre walked or run to a charitable project. In 2012 the theme was literacy and in 2013 it was the support of disadvantaged children. Namibian employees clocked up 15 000 km in 2012 and the funds generated were donated to the Namibian National Literacy Fund under the Ministry of Education. In 2013, the financial assistance went to the "House of Safety" in Swakopmund, which cares for disadvantaged children and is managed under the

auspices of the Erongo Development Forum.

The "AREVA Walk and Run for Fun" in Swakopmund was another energising event for employees and the public. Altogether 88 runners and 60 walkers entered this fun event. Erich Goeieman, sponsored by AREVA for the past three years, won the 20 km veteran category. On his own initiative, Erich started a training and coaching outreach programme for talented runners in February 2013.

AREVA Namibia supported the first ever Erongo Governor's Cup soccer tournament at Karibib in March 2013 with ten teams from Erongo schools competing for the top position in the region. Erongo Governor Cleophas Mutjavikua praised the initiative, adding that Erongo was a "sports region" which had delivered star athletes and teams.



Donation to the House of Safety Swakopmund



Trekkopje Mine employees at the Midi Fun Walk



Children taking part in the event



AREVA Namibia supported the Radiowave 96.7FM indoor Cycle4Cancer 24-hour relay in June 2013. A total of N\$300,000 was raised countrywide and donated to cancer prevention and treatment. Ashwell Forbes, Jimi Hill and Sugnet Smit each did one hour on spin-bikes to contribute their energy towards cancer prevention and treatment.



Derrick Koopman
C&M Maintenance and Planning Coordinator

Throughout my professional career, I have always worked hard to promote a high engineering standard at my work place. It is a strong motivation for me to improve the work standard and quality produced. This was particularly true when I ran the Mini and Midi Engineering operational programme and remains true now when - among others - I guide the implementation of the Care and Maintenance programme at Trekkopje Mine. I am responsible for the implementation of projects like the Mini test plant and the Arandis road. This greatly helps me contribute to an effective working environment.



John Nekongo
Maintenance Planner

Being new in my position is a major motivator as I am eager to learn more about scheduling and want to upgrade my skills in maintenance planning. Much has changed: since the beginning of C&M we now focus on finding ways to keep the equipment at the Maxi in the best possible condition, so that the mine can start up without any difficulty when uranium prices are more favourable.



Kaarina Nkandi
Environmental Officer

During Care and Maintenance, my focus is more on environmental monitoring and rehabilitation as opposed to the construction and operational phase when I had to enforce compliance with the environmental management plan. This gives me the opportunity to continuously collect data for analysis and research that will be used to optimise the management of environmental aspects in future. Much effort is also being put into completing the rehabilitation of disturbed sites and monitoring the success of the restoration process.



Jacques van Wyk
Mechanical Foreman

It is an honour and privilege to be part of the Care and Maintenance Team. In my new role as Foreman I have more responsibilities and challenges; however I am confident that we as a team will meet the expectations. In Care and Maintenance one might think we were in a more relaxed mode, but it is actually the other way around. We have started protecting our infrastructure, but a lot must still be done. There is no reason for us to be bored or to stagnate.



Jan Olivier
Intermediate Life Support Paramedic

I had the opportunity to become a Level 3 registered First Aid Instructor and have just done a NOSA course in occupational health and safety because my goal is to qualify as a Safety Officer. I started to adopt healthier habits and a positive attitude which enhances my self-confidence and makes me feel more energetic. I want to prepare for the day when our mine opens its doors and be there to welcome the new employees.

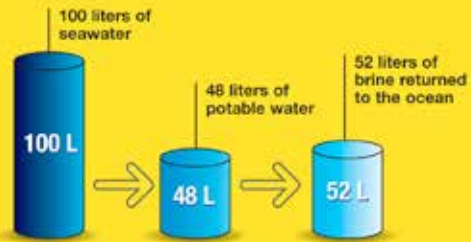


Valencia Husselmann
Warehouse Controller

The biggest change for me is that I am now alone in the warehouse and have added responsibilities like dealing with Customs, which used to be done by the Logistics department. Our current aim is to separate the normal stock items from the maintenance parts that will only be used in the Maxi plant, put them in different warehouses and update the stock database. During Care and Maintenance I want to upgrade my qualification in the field of logistics and supply chain management.

Desalination in the desert

Key figures



20 million: annual potable water production in cubic meters

1.5 million: number of man-hours to construct the desalination plant

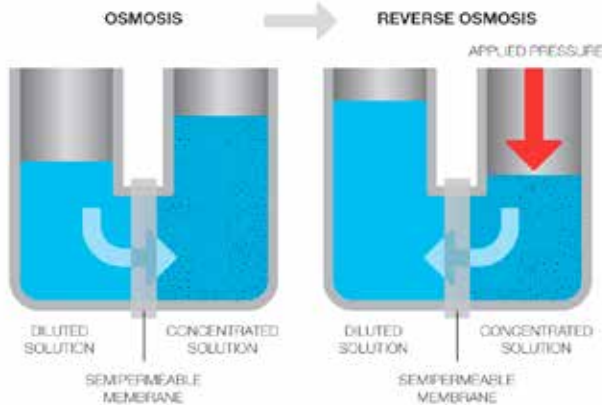
5,000 tonnes: weight of underwater intake pipe

99.75%: percentage of salt removed from the seawater with the ultrafiltration and reverse osmosis processes

40%: energy recovered by using a pressure exchange system



What is reverse osmosis?



Plant Manager Antony Kostopoulos discussing ultra filtration plant performance with Plant Shift Foreman Franco Badear

AREVA Resources Namibia constructed the largest reverse-osmosis seawater desalination plant ever built in Southern Africa. It is located 30 km north of Swakopmund and was inaugurated on 16 April 2010. The Erongo Desalination plant is owned by AREVA and operated by AVENG Water.

At full capacity the plant is able to produce 20 million cubic metres of potable water per year. This is because the initial process design estimated that Trekkopje Mine would utilise most of the water produced. However, during the care and maintenance phase the mine's water demand will be minimal and it was agreed to sell the excess capacity to NamWater.

The seawater **desalination process** consists of screen filtration, ultrafiltration, reverse osmosis, limestone contact and chlorination. The first step in the process is the collection of seawater through an intake pipe anchored 1000 metres off the coast, at a depth of 10 m. At the intake a 40 mm-diameter screen catches all aquatic plants and animals. The water is disinfected and passes through screens that eliminate micro-organisms and particles larger than 60 micrometres in diameter and then ultrafiltration removes all remaining particles so that only the salt remains in the water.

The next step is reverse osmosis which separates the sea water into two streams – pure water of excellent quality and a brine stream that is returned to the ocean. The reverse osmosis process forces the water through semi-permeable membranes under high pressure. The membranes only allow water molecules to pass through, thus producing potable fresh water, while the salt remains in the brine. The brine has approximately twice as much salt as sea water, but it is diluted back to normal levels within a short distance of the outfall pipe.

After the reverse osmosis step the brine is still at high pressure. This pressure is exchanged with the fresh incoming sea water, thus directly recovering 98% of the energy that would otherwise be lost and reducing the desalination plant's electricity consumption by approximately 40%.

AVENG Water's operations and maintenance team is made up of 25 staff members, 23 of which are Namibian. The company has invested heavily in training and process knowledge. This has paid off as the plant has been operating for three years without a single lost time injury.

The company has implemented very stringent safety standards and was awarded OHSAS 18001 certification by NOSA affiliates and the independent auditors NQA Africa.

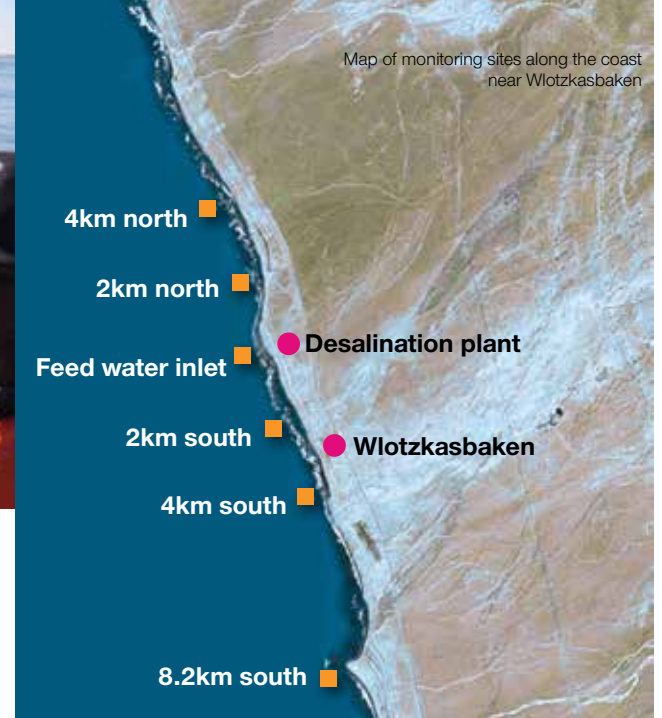




1.6 Two intake pipes and one outfall pipe extend hundreds of metres into the sea



Monitoring team checking net with oysters



The **Environmental Management Plan** for the Erongo Desalination Plant requires monitoring to assess the impact that the discharge of brine may be having on the marine environment. This is especially important now that the plant is in continuous operation.

A **monitoring programme** was planned in 2012 and implemented in 2013. The aim is to assess the water quality of the coastal waters in the vicinity of the desalination plant and its effect on marine life. This concern was taken into account in the design of the outfall structure. The brine pipeline extends 600 metres into the sea and its last section was equipped with diffusers to ensure quick mixing of brine and sea water. Using actual measurements of the currents along the coast and the strong wave action near the beach, a model developed for the environmental impact assessment showed that the brine would be diluted to natural salinity within 20-50 metres from the outlet.

Since it would be impossible to monitor all organisms in the vicinity of the brine outlet the study was designed using oysters as a biological indicator species. Nets with small oysters are placed in a circle around the outfall pipe and at control points upstream and downstream of the discharge point. The theory

is that oysters affected by higher salinity or pollutants will either die or grow slower than those at the control sites. The oysters are checked monthly and their growth is measured. In addition, water samples are collected for chemical analysis, while probes and current meters are used during field surveys.

Divers placed the moorings that anchor the buoys to the seafloor at the various monitoring sites in January 2013 and the first oysters were suspended from the structures in February. By that time, some of the initial moorings had already disappeared. Sixteen new concrete moorings were made and secured in place whenever the sea was calm enough. When this was completed the second set of oyster nets was attached to the moorings in May.

Measurements showed that the first batch of oysters had grown from 10 mm in diameter to about 40 mm in the five months between February and July 2013. In comparison, commercially grown oysters are harvested after nine months.

The analysis of the data collected will provide a continuous assessment of any impact that the discharge of brine from the desalination plant may have on the marine ecosystem.



In August 2013, AREVA Namibia and NamWater signed their first interim water supply agreement that makes provision for up to 10 million cubic metres per annum to be supplied to large consumers in the Erongo region, e.g. Rio Tinto Rössing Uranium, Swakop Uranium and Langer Heinrich Uranium mines. This will alleviate the pressure on NamWater's groundwater resources and contribute to further economic development in the region.

Monitoring the environment





The **environment** is more than landscape, plants and animals. All aspects that could be affected by the mine are monitored to help us define the baseline conditions before the start of full-scale mining. The monitoring programme continues during the care and maintenance phase. This page shows the most important features of the monitoring network and summarises the results of the last two years.



We monitor the **vegetation** annually at five sites around the mining footprint by taking photos of each plant, measuring the average height and diameter, and recording the presence of leaves, flowers and seeds. The aim is to see if plants are affected by construction or mining activities. To date we have only observed changes in plant condition due to variations in rainfall.



The question of interest to the public is how much additional **radiation** will be released by the mine's activities. There is no straightforward answer and the preferred approach taken is a radiological public health risk assessment. This is based on an air dispersion model for air-borne dust and radon gas, and on consumption and uptake factors for food and water. Monitoring data from the mine are used to verify the model results.



Groundwater samples from 20 boreholes within the mine area are analysed for major ions, metals and radionuclides. We measure the water levels around the leach pads monthly for early detection of potential leakage. No unexpected changes in water level or water quality have been observed so far.



Fauna baseline studies on the mine have focussed on invertebrates, reptiles and scorpions. Our register of **wildlife** incidents highlights the risk of collisions with vehicles and power lines. In response we strictly enforce the site speed limit and take part in NamPower's project with the Namibian Nature Foundation to reduce bird collisions.



The main purpose of **soil** monitoring is to determine the mine's addition to the background radiation dose. We measure the gamma radiation on a 1x1 km grid across the entire site and take soil samples for radionuclide analysis at each grid point. The results obtained to date indicate the pre-mining baseline.

Sustainable development indicator table

| Theme | Description | Unit | 2012 | 2011 | 2010 | 2009 |
|---|--|---------------------|-------------|-------------|-------------|-------------|
| Production | Tonnes of uranium (U) | t | 212 | 189 | 0 | 7 |
| Economy | Local purchasing | N\$ | 449,542,000 | 774,658,000 | 636,421,000 | 739,657,000 |
| | Community investment | N\$ | 1,647,000 | 2,437,490 | 1,458,000 | 1,495,500 |
| Biodiversity / Rehabilitation (cumulative figures) | Total disturbance to date | ha | 1,891 | 1,818 | 1,601 | 800 |
| | Habitats protected | ha | 4,941 | 4,941 | 41 | 41 |
| | Land restored to date | ha | 25.7 | 25.7 | 22.2 | 9.6 |
| | Total volume of overburden | Mm ³ | 1.408 | 1.408 | 1.172 | 1.073 |
| | Total volume of tailings | m ³ | 25,000 | 25,000 | 25,000 | 0 |
| Environmental incidents | Volume of significant spills ¹ | m ³ | 0 | 0 | 0 | 0 |
| | Number of significant spills ¹ | / | 0 | 0 | 0 | 0 |
| Water | Total water consumption | m ³ | 372,483 | 1,521,000 | 1,259,000 | 99,400 |
| | Groundwater withdrawal | m ³ | 5,000 | 14,300 | 194,800 | 171,300 |
| | Water recycled / reused | m ³ | 3,396 | 818,300 | 461,500 | 0 |
| Energy | Energy - electricity (indirect) | MWh | 7,544 | 6,775 | 5,278 | 2,203 |
| | Energy - fuel (direct) | MWh | 6,338 | 93,022 | 107,084 | 35,121 |
| | Energy savings achieved | MWh | 0 | 2.404 | 0 | 0 |
| Greenhouse gas emission | Direct GHG emission (fuel) | t CO ₂ e | 16,74 | 25,15 | 28.90 | 9.48 |
| | Indirect emission (electricity) ² | t CO ₂ e | 4,345 | 6,504 | 5,067 | 2,115 |
| | Indirect emission (other) ³ | t CO ₂ e | 2.25 | 7.73 | 0.28 | 0.00 |
| Waste | Hazardous waste | t | 0.58 | 0.22 | 0.10 | 0.08 |
| | Non-hazardous waste | t | 142.0 | 142.4 | 49.2 | 27.5 |
| | Waste that was recycled | t | 0 | 0 | 0 | 0 |
| Safety and health | Recordable injury frequency | / | 24.5 | 14.6 | 14.0 | 6.4 |
| | Number of fatalities | / | 1 | 0 | 0 | 0 |
| | Severity | / | 0 | 0 | 0.01 | 0.04 |
| Radiation | Average dose (AREVA) | mSv | 2.7 | 2.1 | 1.5 | 0.1 |
| | Average dose (contractors) | mSv | 3.6 | 2.6 | 1.4 | 0.1 |
| | Average public dose ⁴ | mSv | 0 | 0 | 0 | 0 |
| Employment | Percentage of local employees | % | 90.0 | 87.4 | 88.0 | 87.4 |
| | Skills development / training | N\$ | 3.3 million | 2.9 million | 2.5 million | 1.1 million |

Remarks

- 1 Significant spills are defined as those exceeding 1 m³ of hydrocarbons or 5 m³ of process solution
- 2 Assumed that Namibian power supply is 60% from Eskom, rest hydropower
- 3 Based on 60% of the desalination plant's total power consumption
- 4 Additional dose to nearest critical group as estimated by radiological public health risk assessment

Glossary

| | |
|---------------------|--|
| ha | hectare |
| MWh | megawatt hour |
| m ³ | cubic metre |
| Mm ³ | million cubic metres |
| t | tonnes |
| kt | kilotonnes |
| mSv | millisievert |
| t CO ₂ e | tonnes of carbon dioxide equivalent (measure for greenhouse gases) |

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