Ministry of Mines and Energy

2014 Annual Report Strategic Environmental Management Plan (SEMP) for the Central Namib Uranium Province

April 2016

Prepared by

Geological Survey of Namibia

Project Management: Ministry of Mines and Energy, Geological Survey of Namibia, Division of Engineering and Environmental Geology

Status of Data Received: April 2015

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Citation
Geological Survey of Namibia (2016). Strategic Environmental Management Plan (SEMP) for the Central Namib Uranium Mining Province, 2014 Annual Report. Ministry of Mines and Energy, Windhoek, Republic of Namibia.

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EXECUTIVE SUMMARY

Namibia currently has two significant uranium mines, with one larger mine that is yet to start production. Although the uranium industry suffered the negative impact of the Fukushima earthquake and tsunami, uranium still plays a big role in driving the Namibian mining industry. This is partly because of the new Husab mine where production is expected to commence late in 2015 once in production the mine will elevate Namibia to the second rung on the world ladder of uranium producers.

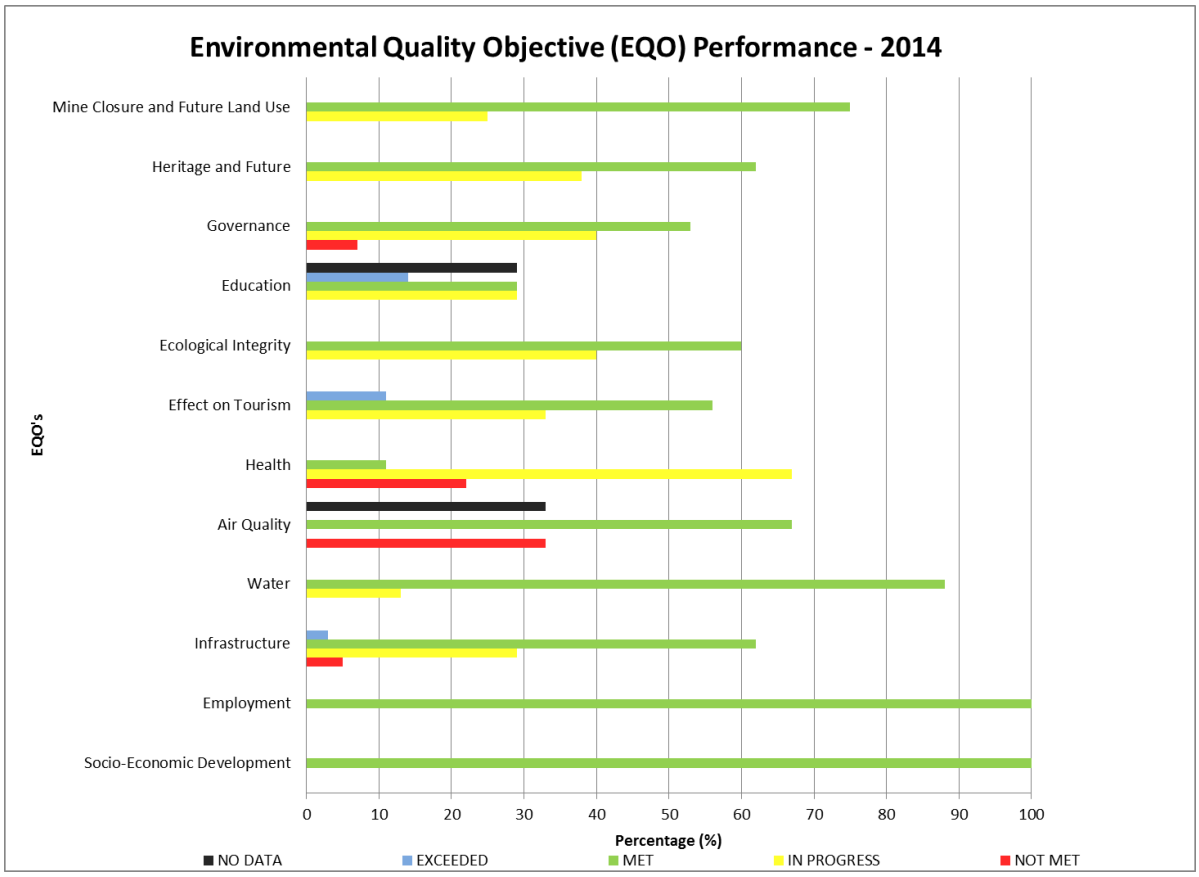
The commodity market created shock waves through the international and local economy, especially for uranium when the price dropped to a nine year low of U$28/lb in June 2014. The depressed market for uranium forced major mining companies across the globe to scale back on production, and some to shut down operations to sustain operations; to avoid possibility of placing the mine on care and maintenance, or worse, mine closure. Several mines in Namibia underwent restructuring exercises. During the year there were a number of projects under development, or being prepared for development. In January, public comment was invited on the Environmental Impact Assessment for the heap leach pilot plant at Bannerman Resources' Etango mine project in Namibia. In September, contracts were awarded for the heap leach pilot plant. Areva announced that it has no plans to restart its mothballed Trekkopje mine project in Namibia. In May, the Chinese-owned Husab mine (formerly Rössing South) in Namibia was commissioned. Cameco Corp. has shown interest in buying offtake output from the mine. In August, construction of a sulfuric-acid plant was to start at the mine. Deep Yellow Ltd plans to develop the Tubas Sand mine in Namibia as an interim standalone project, until its Omahola project would come on stream. Construction of Forsys Metals Corp's Valencia mine in Namibia is to start in early 2015.

The world-wide first Strategic Environmental Assessment (SEA) for the uranium province was an initiative that provided vision and generated a culture of collaboration within the uranium mining industry, government, and the public. The SEMP was developed as a result of the Strategic Environment and Socio-Economic Assessment of the Uranium industry “rush” in 2009 (SEMP, 2013). The SEMP is a public-private collaborative initiative housed within the Geological Survey of Namibia, Ministry of Mines and Energy and it is supported by the Namib Ecological Restoration and Monitoring Unit (NERMU) at the Gobabeb Research and Training Centre. SEMP is an over-arching framework and roadmap addressing the cumulative impacts of existing and potential developments, within which individual projects have to be planned and implemented; measured around twelve Environmental Quality Objectives (EQOs) and the extent to which uranium mining is impacting the central Namib. Each EQO articulates a specific goal, provides a context, sets standards and elaborates on a number of key indicators that are monitored.

The 2014 SEMP operational table consisted of 122 indicators, 45 targets and 37 desired outcomes. The overall performance of the 2014 SEMP is slightly better than the preceding years. 58 % of the indicators are MET, with 33% IN PROGRESS, 7% NOT MET and 2% EXCEEDED. The Socio-Economic development (EQO1) Employment (EQO2) and Air Quality (EQO6) all had 100% performance. These are followed by EQO12 Mine Closure and Future Land use, Heritage and the Future (EQO11), Effect on Tourism (EQO7) and Governance (EQO10); although these also carry indicators that are IN PROGRESS. The IN PROGRESS indicators increased from 30% in 2013 to 33% in 2014. Most of the NOT MET indicators are from the Infrastructure (EQO3), Education (EQO9), Health (EQO6) and Governance (EQO10).

Currently in its 4th assessment period, the SEMP’s major achievements to date still includes the establishment of a long-term monitoring and decision-making tool through which potential impacts

are avoided and/or remedial measures are developed to mitigate unavoidable impacts; and the commitment of key government institutions, the uranium industry, NGOs and the public who have undertaken certain actions towards the desired future state of the SEMP.



ACKNOWLEDGEMENTS

Our biggest appreciation goes to all those who have been involved in the SEMP process since initiation. We would like to acknowledge the commitments of the SEMP Steering Committee Members for their voluntary participation. Your visions and professionalism continue to make the SEMP into a reality. Through the Namibian Uranium Association, the SEMP office is able to conduct meetings with its stakeholders in Erongo Region, and we had always received mine data through Sandra Müller of Areva timely. The uranium mining industry's contribution and commitment to the SEMP is highly appreciated. Our greatest appreciation is extended to all the contributing authors from the GSN-SEMP office, NERMU, for gathering all the assessment data, all ministerial offices, tour operators, tourist and others who contributed to the compilation of this report.

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SEMP BACKGROUND

The vision of the Namibian mining Industry is to be widely respected as a safe, environmentally responsible, globally competitive and meaningful contributor to the long term prosperity of Namibia. The world-wide first Strategic Environmental Assessment (SEA) for the uranium province was an initiative that provided vision and generated a culture of collaboration within the uranium mining industry, government, and the public. As a result of the SEA, the Strategic Environmental Management Plan (SEMP) was developed. SEMP is an over-arching framework addressing cumulative impacts of existing and potential developments, within which individual projects have to be planned and implemented (Figure 1). It has a collective of twelve Environmental Quality Objectives (EQOs), measuring the extent which uranium mining is impacting the Erongo Region (Figure 1). Each EQO articulates a specific goal, provides a context, sets standards and elaborates on a number of key indicators that need to be monitored. The desired outcome is that development and utilization of Namibia´s uranium resources significantly contribute to the goal of sustainable development for the Erongo Region and Namibia as a whole. This public-private collaborative initiative is housed within the Geological Survey of Namibia, Ministry of Mines and Energy. The SEMP office is supported by a steering committee that consists of various stakeholders from government institutions, non-governmental organisation, the uranium industry and the public (Figure 4).

The SEMP Office with its stakeholders collects data on indicators of environmental performance and publishes an annual report. This is in a form of an annual audit report consisting of a set of matrices, in which 122 indicators, 45 targets and 37 desired outcomes spread across 12 'environmental quality objectives' (EQOs) are assessed (Figure 1). Each indicator is assessed in terms of whether it is "Not Met", "In progress", "Met", or "Exceeded", using a four tiered colour coding system.

The SEMP's major achievements to date are the establishment of a long-term monitoring and decision-making tool through which potential impacts are avoided and/or remedial measures are developed to mitigate unavoidable impacts; and the commitment of key government institutions, the uranium industry, NGOs and the public who have undertaken certain actions towards the desired future state of the SEMP (Figure 2).

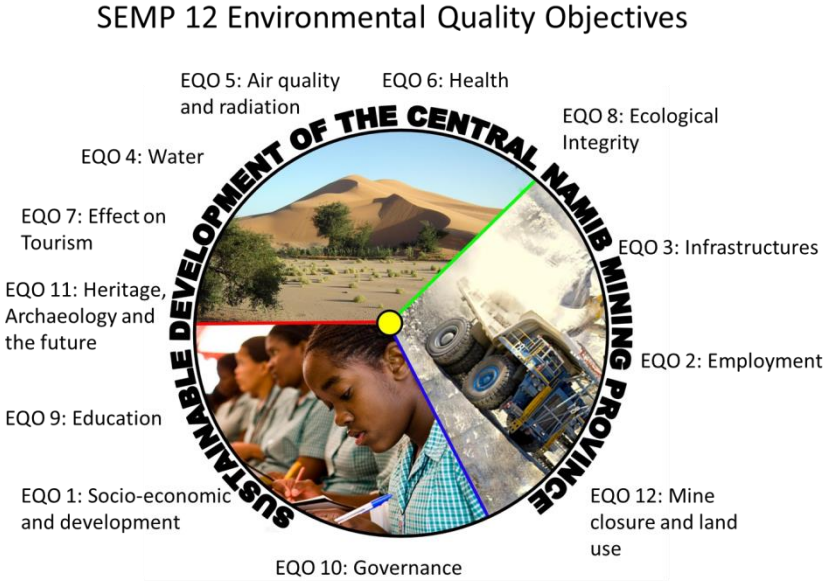

Figure 1: The Environmental Quality Objectives (EQO) of the SEMP Operational Plan

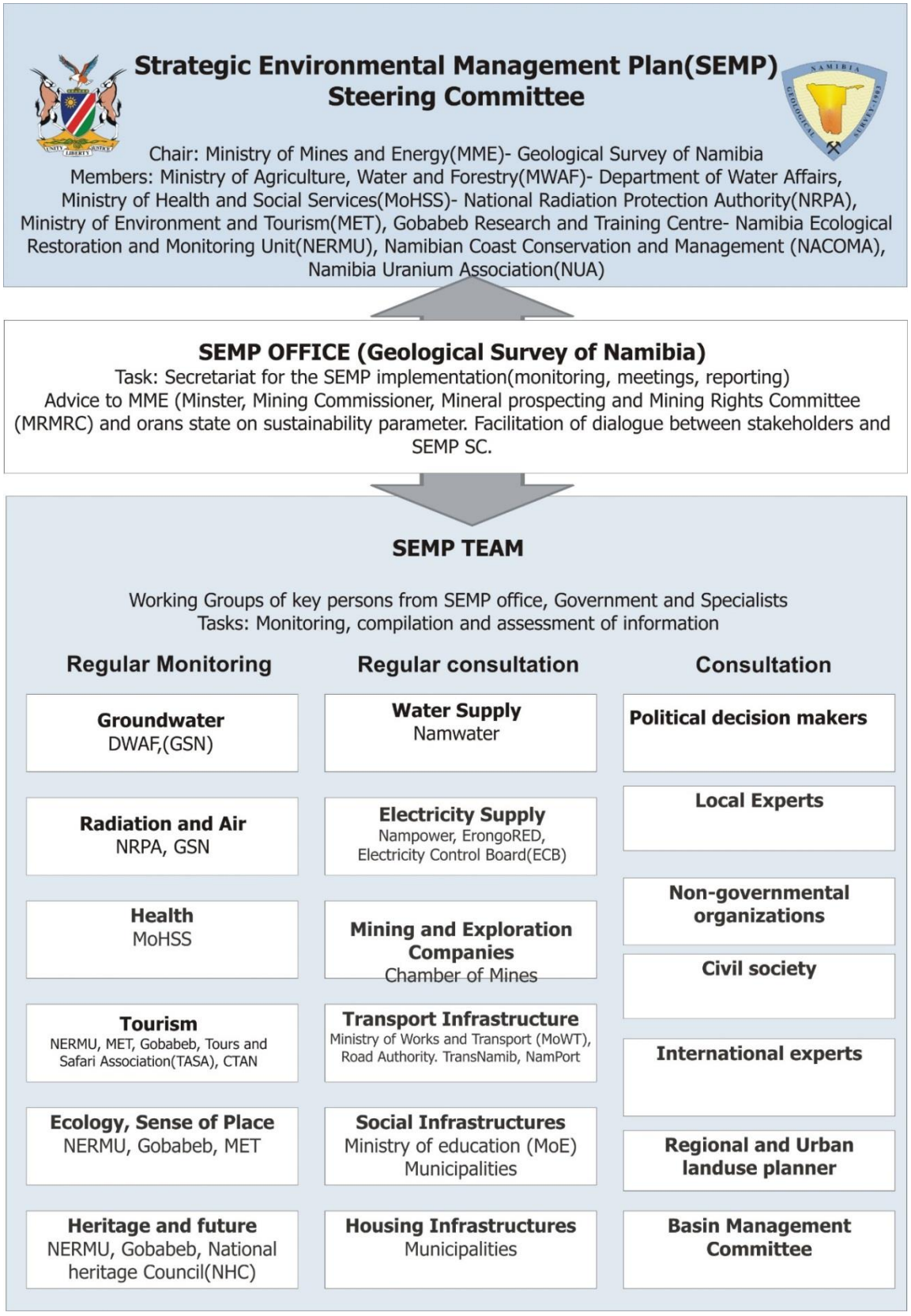

Figure 2: The SEMP's Governance structure

MINING SCENARIO – 2014

According to wiseinternational.org during the first quarter of 2014 the uranium spot price (U_3O_8), remained close to its first value of US$ 34.65/lb and then fell to approximately US$ $28/lb, where it remained during June and July. Subsequently it increased until reaching a sharp peak at $44.00 on November 17th, from where it then declined to its year-end value of $35.50, not very far from the value at the beginning of the year. So therefore most companies like Areva remained in hibernation because the uranium price remained below the lower bound of approximately U$60-70 per lb U3O8 which is required for the profitability of many projects.

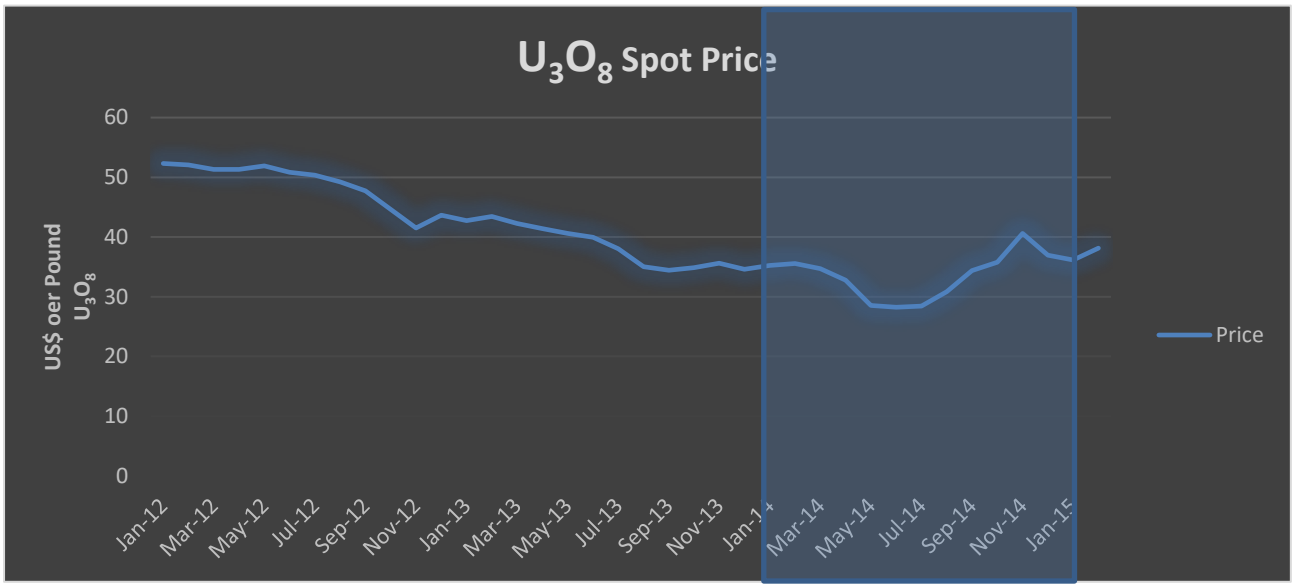

Figure 3: U3O8 Spot Price, January 2012 – January 2015
Source: http://www.indexmundi.com/commodities/?commodity=uranium&months=60

The uranium industry in 2014 like 2013 fell in Scenario 1 in with Rio Tinto's Rössing Uranium and Paladin's Langer Heinrich the only producing uranium mines, with the Husab project still being developed. AREVA Resources Namibia's Trekkopje mine remained in care and maintenance in 2014; there were no production or exploration activities. The company is using the down-time to thoroughly research and optimise the alkaline heap leach process that will be employed once the mine enters full-scale production. It successfully completed the second phase of metallurgical test work in 2014. Bannerman Mining Resources (Namibia) constructed a heap leach demonstration plant at its Etango uranium project and conducted exploration at the Etango and Swakop River sites. A bulk sample for the demonstration plant was mined and the affected area was rehabilitated. Langer Heinrich Uranium experienced production constraints and focussed on sustaining nameplate production, improving efficiencies and reducing costs. The company commissioned a hydraulic classifier and started construction of a reagent recovery plant that will reduce reagent and freshwater consumption. Marenica Energy Namibia continued its intensive metallurgical test work on a physical beneficiation process that pre-concentrates calcrete-based uranium ore to create a chemical environment suitable for acid-leaching. There was no further exploration work in 2014 and the site camp was rehabilitated. The company also closed its Swakopmund office in June 2014 and relocated to the company secretary's office in Windhoek.

Reptile Uranium's exploration programme consisted of drilling, sampling, geochemical assays and a ground radiometric survey. Twelve employees were retrenched at the end of these activities. The company completed a resource update and a trade-off study on the Tubas Sand project, as well as a

preliminary economic assessment of the Omahola project. Rössing Uranium's output declined significantly, largely due to a curtailment plan that was adopted to survive the depressed uranium market. The restructuring impacted operations through a reduced workforce (204 retrenched) and changed shift pattern. The company considered other ways to improve its economic viability and proposed the construction of its own desalination plant.

Swakop Uranium made good progress with the construction of Husab mine, which is on target for the envisaged start of production in early 2016. In full production it is expected to double Namibia's uranium output and will be the second largest uranium mine in the world. Valencia Uranium announced a consolidated name for its Valencia and Namibplaas projects: The Norasa Uranium Project. The pre-feasibility study for this project was completed in 2014 and the original process design was optimised. The company started a definitive feasibility study that will be completed in 2015. Zhonghe Resources Namibia implemented a supplementary exploration programme in 2014 and prepared data for optimising the mining and processing technology. Exploration consisted of geochemical sampling and ground geophysical surveys, followed by rehabilitation of the disturbed areas.

NARRATIVE REPORT ON EACH ENVIRONMENTAL QUALITY OBJECTIVE

EQO 1. Socio-Economic Development

Aims of this EQO: The Uranium mining improves Namibia´s and the Erongo region's sustainable socio-economic development and outlook without undermining the growth potential of other sectors.

The term "Natural Resource Curse" has been traditionally used to describe countries enriched with natural resources such as minerals and oil, but have more disappointing growth performances compare to countries with diffuse natural resource that relies on other industries such as agricultural products for economic growth (McMahon and Moreira, 2014). Without proper management of potential socio-economic development within the Region, the central Namib uranium can be susceptible to the "Natural Resource Curse". It is therefore the objective of EQO1 to ensure that the socio-economic development the uranium industry contributed to the society in the Erongo Region and Namibia as a whole.

The contribution of the mining sector to the socioeconomic development of the country can be determined in several indicators, partially by the amount of fiscal revenue generated i.e. royalties paid by the mines and corporate taxes, and by increasing local sourcing and beneficiation and by contributing to overall industrialization of the country.

Mining plays a vital role in the economies of many developing countries and Namibia is no exception. In 2014 the mining sector made a direct contribution of 13% to the GDP of the country which is less by 4.6% from the preceding year (CoM, 2015).The uranium market performed poorly, with the market place hitting a nine year low of U$28.5/lb. Thus, the producing mines in 2014, Rössing and Langer Heinrich had a decline in uranium production and thus a reduction in income and taxes paid to the government.

Desired Outcome 1.1.	**Income and economic opportunities from the Uranium Rush are optimized**
Target 1.1.1.	**Contribution of mining to the economy increases over time**
Target 1.1.2.	**Royalties are paid in full by mining companies**
Data Source	**SEMP Office/MoF/NUA**
Status:	**MET**

Mining royalties generally comprise of a percentage of the export value of the uranium. Royalties are only levied on products sold. If a mining company is not making taxable profits but exports large quantities of product, revenue is still generated through royalties. The two operating mines paid royalties in 2014 as shown in the table below in comparison to the previous two years (Table 1). This indicator is however not applicable to exploration companies or mines that are not yet in operation as they do not sell any products.

Table 1: Royalties paid by uranium mining companies

Company	2014 (N$)	2013 (N$)	2012 (N$)
Langer Heinrich	65,175,939	56,277,197	53,990,032
Rössing	56,828,000	85,240,000	110,183,000

Motivation of status: The operating mines Rössing and Langer Heinrich paid royalties, this indicator id therefore **MET**.

Indicator 1.1.2.1.	**Corporate taxes are paid in full by mines**
Data Source	**SEMP Office/MoF/NUA**
Status:	**MET**

Companies are not required to pay corporate taxes when they do not make a profit. Langer Heinrich Uranium therefore did not pay any corporate taxes in 2012-2014 (Table 2). Rössing Uranium paid no taxes in 2012 and 2013, but reported the amount paid off in 2014 as "deferred taxation".

Table 2: Corporate taxes paid by uranium mining companies

Company	**2014 (N$)**	**2013 (N$)**	**2012 (N$)**
Langer Heinrich	Nil	Nil	Nil
Rössing	74,170,000	Nil	Nil

Motivation of status: Companies are only required to pay corporate taxes when they make a profit, Langer Heinrich did not pay taxes in 2014 as they did not make profit however, Rössing paid deferred taxes. Overall, the indicator is **MET**.

Indicator 1.1.2.2.	**Increasingly, inputs that can be sourced locally are not imported.**
Data Source	**NUA**
Status:	**MET**

The indicator measures the percentage of total procurement that operating mines spent locally (within Namibia). Table 3 elaborates the past local procurements of Rössing and Langer Heinrich mines. Langer Heinrich recorded a 7% drop in local procurements in 2014 compared to 2013, however the mine still manage to get 71.5% of its procurements locally and still 3.5% higher than Rössing Uranium. Rössing Uranium however recorded a 4% increment in local procurement in 2014 compare to 2013. Procurements figures for exploration companies and mines under development have not been included here because their procurement choices mostly depend on the nature of activities and stage of development. As an example, the local procurement percentages for AREVA, Bannerman, Marenica and Reptile ranged from 80 to 100% in 2014.

Table 3: Percentages of local procurement of goods and services by operating uranium mines

Company	**Local procurement of goods and services (as % of total procurement)**		
	2014	**2013**	**2012**
Langer Heinrich Mine	71.5%	78.1%	85.6%
Rössing Mine	68%	64%	63%

Motivation of status: Although the procurements of Langer Heinrich decrease by 7% compare to the 2013 procurement and that of Rössing increased by 4 %; and the exploration companies have procurements ranging from 80-100%, this still proves that procurement in mainly done locally. This indicator is therefore **MET**.

Indicator 1.1.2.3.	**Processing companies connected to uranium mines are not granted EPZ status.**			
Data Source	**SEMP Office**			
Status:			**MET**	

No new companies that are related to uranium companies were granted EPZ status in 2014. Moreover, the EPZ status granted to AREVA Processing Namibia expired in November 2014 without being renewed (pers. comm. AREVA).

Motivation of status: The indicator is **MET**, because there are was no new EPZ status granted to processing companies associated to uranium mining.

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Summary of performance: EQO 1

Total no. indicators assessed: 4

	NOT MET	IN PROGRESS	MET	EXCEEDED
Number of indicators in class:	0	0	4	0
Percentage of indicators in class:	0	0	100%	0

Overall performance: All the indicators in the Socio-economic development have been **MET.**

EQO 2. Employment

Aims of this EQO: Promote local employment and integration of society.

The mining industry contributes about 12% of the country's gross domestic product (GDP) in 2014. The National Development Plans which are the implementing medium-term plans for the national long-term goal Vision 2030 are clear on the issue of unemployment. Namibia has put in place a number of policy measures and programs to encourage local and foreign investment. The government of Namibia's policy is aimed at promotion of growth, increasing employment and alleviation poverty, as well as reduction of unequal distribution of income. Measures have also been taken by the government to create employment and address labour market inequalities. Among the policy measures in place is the Affirmative Employment Act No. 29 of 1998 that aim to enhance participation and integration of previous disadvantaged groups in the society in the labour market and to promote equal opportunity in employment.

Despite the aforementioned, unemployment rate remain a concern in Namibia. The Labour Force Survey of 2014 shows that 990,998 of the estimated population aged 15 years and above in Namibia is in the economically active group, which forms the labour force, while 441,500 of the estimated population is outside the labour force (Figure 4). The survey recorded that 71.9% were employed in 2014 and an unemployment rate of 28.1 percent, which is 1.5 points higher than the rate of 29.6 percent reported in 2013 (Figure 4).

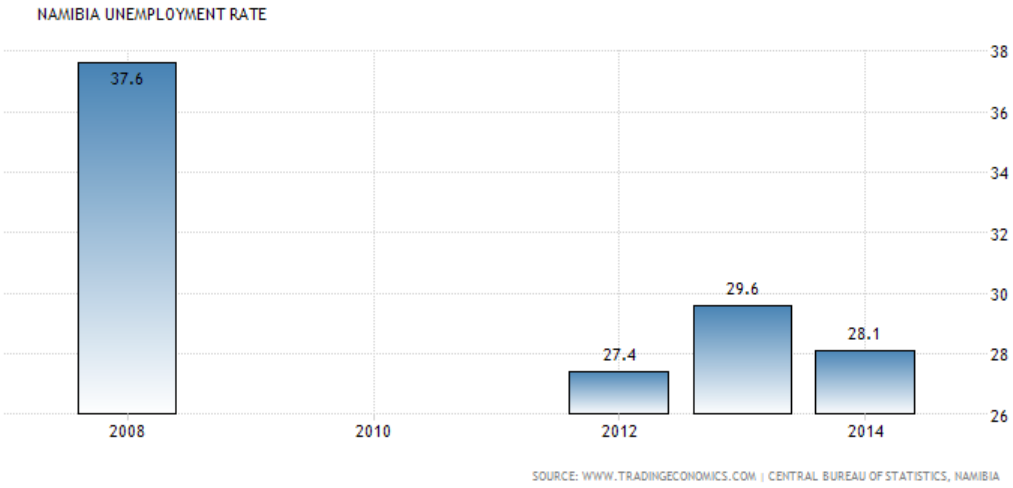

Figure 4: Namibia unemployment rate from 2008 – 2014. Source: 2014 Namibia Labour Force Survey

Desired Outcome 2.1.	**Mainly locals are employed**			
Target 2.1.1.	**Uranium companies hire locally where possible**			
Indicator 2.1.1.1.	**During operational phase all mining companies to comply with their employment equity target (certificate).**			
Data Source	**SEMP Office/EEC/NUA**			
Status:			**MET**	

The two operational mines, Langer Heinrich and Rössing, complied with the provisions of the Employment Equity Act and met their employment equity targets. Although Swakop Uranium is the production face, they also submitted an Affirmative Action (AA) report and received provisional certification. Companies with less than 25 employees do not need AA certificates, these are Zhonghe resource, Marenica Energy and Marenica and Reptile Uranium that ceased to be a relevant employer

in September 2013 following collective redundancy. Amongst the companies that are either on care and maintenance or on exploration break due to the unfavourable market prices, AREVA and Bannerman Resources complied with the Act and submitted reports for 2014, though Bannerman had fewer than 25 employees.

Additionally, the NUA has started collecting data from its member companies, but not all of them had the necessary information. Most exploration companies employed only a few contractors in 2014 or none at all. The contractors at Bannerman, Langer Heinrich and AREVA complied by 75%, 85% and 100% respectively. Swakop Uranium reported that the Husab project employed 3,800 people and the percentage of Namibians varied from 75%-88% of the workforce, depending on the skills requirement during the year; some contractor packages required a higher degree of skills for a limited period and such skills were not available in the country. Though it was not possible for all contractors to comply with Employment Equity (EE) requirements, a lot of skills transfer and on-the-job-training took place on the project.

Due to the poor performance of the uranium market some companies were forced to retrench employees in 2014. The highest number was at Rössing with 204 employees, while Reptile retrenched 12 and Zhonghe two persons. The majority of the retrenched workers were Namibian citizens.

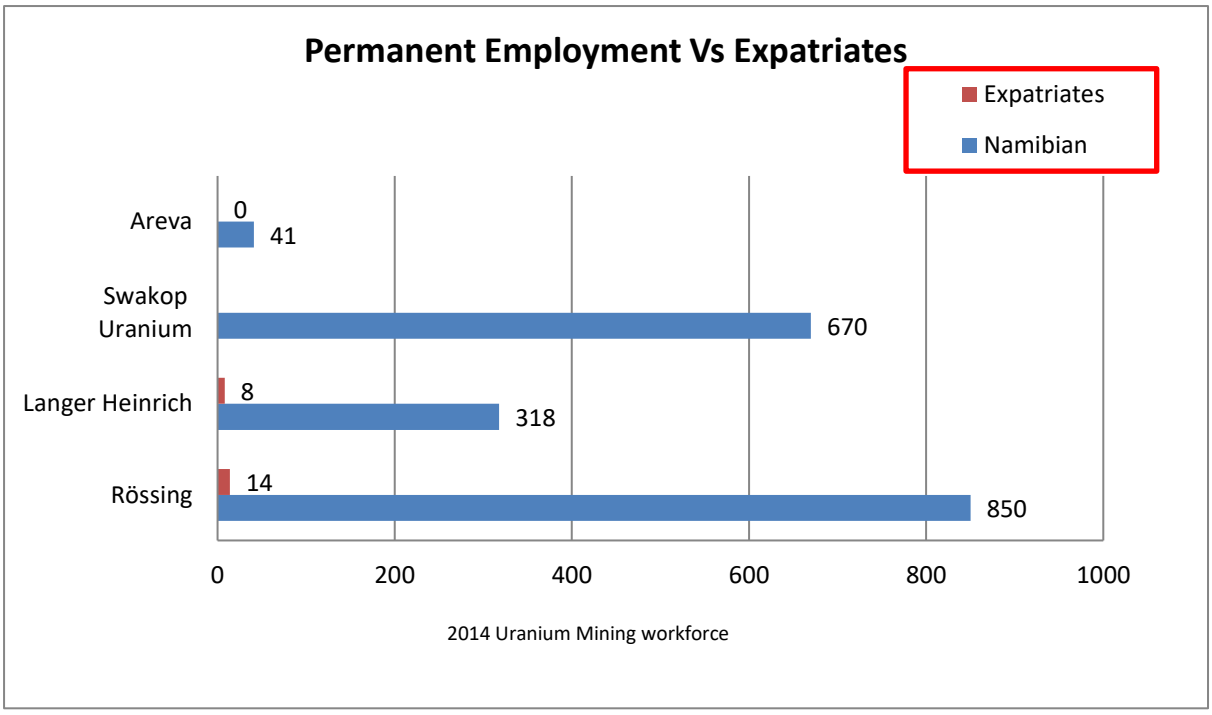

Figure 5: 2014 Uranium Mining workforces. Source: CoM 2014 Annual Review

Motivation of status:

Although there is a significant decrease in the industry workforce due to the low price of yellow cake, the producing mines all complied with the Employment Equity Commission (EEC) therefore this EQO is **MET**.

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Summary of performance: EQO 2				
Total no. indicators assessed	**: 1**			
	NOT MET	**IN PROGRESS**	**MET**	**EXCEEDED**
Number of indicators in class:	0	0	1	0
Percentage of indicators in class:	0	0	100%	0

Overall performance: Like the previous reporting years, this indicator remains met.

EQO 3. Infrastructure

Aims of this EQO: Key infrastructure is adequate and well maintained, thus enabling economic development, public convenience and safety.

Poor infrastructure impedes a nation's economic growth and international competitiveness. Infrastructure has a bearing on a country's attractiveness to foreign investors and on its ability to compete with other countries. It ensures that we are able to move goods and services, but also people in the most effective ways possible.

Failure to invest in infrastructure means a failure to sustain and develop Namibia's social and economic wellbeing. Investment in infrastructure is an ongoing process as there are always changes in technology, changes in the business environment and the economy drives new needs and with the passing of time. Existing infrastructure assets needs to be maintained, updated and/or replaced.

Desired Outcome 3.1.	**Existing, proclaimed towns are supported**			
Target 3.1.1.	**Most employees are housed in proclaimed towns**			
Indicator 3.1.1.1.	**Mines do not create mine-only townships or suburbs**			
Status:			**MET**	
Indicator 3.1.1.2.	**There are no on-site hostels during the operational phase of a mine**			
Data Source	**SEMP Office/NUA**			
Status:			**MET**	

All the operating mines and exploration projects are housing or planning to house employees in proclaimed towns. They will not establish mine-only townships or suburbs or on-site hostels. Once operation commerce at Valencia, they will provide operational staff with accommodation near site while they are on-shift and then assist with transport to and from their homes during their off periods. No relocation of families will be required.

Motivation of status: Both these indicators is rated as **MET** because no mine has on site accommodations.

Desired Outcome 3.2.	**Roads in Erongo are adequate for uranium mining and other traffic**			
Target 3.2.1.	**Roads are well maintained, traffic frequency is acceptable for tourism/ other road users and traffic is safe**			
Indicator 3.2.1.1.	**All key gravel roads are graded timeously to avoid deterioration**			
Data Source	**RA/NUA**			
Status:			**MET**	

The M36 road was re-gravelled in 2014 and is still in good condition. A short section will again be refurbished in 2015, because of heavy truck traffic to the salt factory (near the Walvis Bay airport). The M52 and M44 roads are also well maintained. There is a program followed by the maintenance division to blade the roads timeously.

Motivation of status: This indicator is rated as **MET** as all key gravel roads are timeously graded to avoid deterioration.

Indicator 3.2.1.2.	Un-surfaced roads carrying >250 vehicles per day, need to be tarred
Data Source	RA
Status:	NOT MET

In principle, it is correct that all gravel roads with traffic >250 vehicles per day (vpd) should be upgraded, but because of insufficient funds not all roads above 250vpd are tarred. However, there are plans to tar the MR 36 (C14) gravel road in 2017.

Motivation of status: Due to insufficient funds for road upgrading in Road Authority, not all roads above 250vpd are tarred. This indicator is therefore **NOT MET**.

Indicator 3.2.1.3.	The B2 tar road is free of pot-holes and crumbling verges
Data Source	RA
Status:	IN PROGRESS

Roads Authority reports that the B2 tar road is free of potholes and crumbling verges, but in a fair condition as observed on the stretch between Swakop to the Trekkopje turn-off. Towards Usakos, the B2 road is deteriorated (NUA, 2014). There will be a re-seal done west of Usakos in 2015, which will improve a short segment of the road T0202 (part of B2). Maintenance works are ongoing, where required. Overall, potholes and crumbling verges are increasing and the road will need a major upgrade in the next few years (NUA).

Motivation of status: Although Road Authority reported no potholes and crumbling verges on the B2, other observation reported fairs conditions and needed maintenance that is needed on the B2 road. This indicator is therefore **IN PROGRESS**.

Indicator 3.2.1.4.	Road markings and signage are in place and in good condition
Data Source	SEMP Office/RA
Status:	MET

In addition to the existing road signs, more road marking will be done in September / October 2015 for the white centreline. Other road markings will follow. Although some direction signs near the coast are corroded, most of the road signs have been replaced with new ones.

Motivation of status: Signage on the roads are in good condition's additionally, those that where corroded where recently renewed. This indicator is therefore **MET**.

Indicator 3.2.1.5.	MR44 previously known as D1984 (Swakopmund to Walvis Bay east of dunes) is tarred
Data Source	SEMP Office/RA
Status:	IN PROGRESS

It has been the government initiative to upgrade MR44 road. The project is now in the detailed design stage. The upgraded road will be a dual carriageway. Construction works is envisaged for the year 2016.

Motivation of status: This indicator is rated as **IN PROGRESS** as plans are in place to upgrade MR44 into a dual carriage way. The project is still in design stage.

Indicator 3.2.1.6.	**90% of traffic on the B2 coastal road (Swakop-WB) is light vehicles**			
Data Source	**SEMP Office/RA**			
Status:		**IN PROGRESS**		

Current statistics shows that the total Average Daily Traffic (ADT) is 5885. The road is serving 5170 light and 715 heavy vehicles daily on average which translates to 88% light and 12% heavy vehicles. The previous year reported 70% of light vehicles on the B2 road.

Motivation of status: This indicator is **IN PROGRESS**; about 88% of the traffic is light vehicles, an increase from the 70% reported in 2013 and a 2% away from the targeted percentage.

Indicator 3.2.1.7.	**Mining traffic on predominantly tourist roads meets agreed conditions**			
Data Source	**NUA**			
Status:			**MET**	

Roads Authority did not give any information regarding roads in the park. Meanwhile, AREVA Resources Namibia has constructed a new gravel road from Arandis to Trekkopje mine which has shortened the distance to the mine by 30 km. This private road has slightly reduced the traffic volume on the accident-prone stretch of the B2 national road between Arandis and Usakos. A permanent tarred access road was constructed from the B2 national road to the Husab Mine with a total length of 20 km with the goal to provide safe, effective access to the mine, without compromising the surrounding environment. A bridge was also constructed over the Khan River. Construction of this road concentrated on not disturbing trees, not altering the natural waterways and not closing off the migration routes of animals found in the surrounding area. Since this road was put into service, Swakop Uranium staff and contractors completely stopped using the Welwitschia gravel route which was shared with tourists.

Valencia does not use any Roads Authority gravel roads, but has constructed a private gravel road (28 km) from the B2 to site. Part of the road is available to tourists into the Khan River valley at their own risk. Valencia maintains the road through regular grading and repairs following heavy rainstorms.

Motivation of status: This indicator is rated as **MET**. Mines have diverted from the mostly tourist-used road by constructing their own roads. .

Desired Outcome 3.3.	**Optimum use of rail infrastructure**			
Target 3.3.1.	**Most bulk goods are transported by rail**			
Indicator 3.3.1.1.	**80% of all bulk goods (all reagents and diesel) delivered to mines and associated industries, are transported by rail**			
Data Source	**NUA/Transnamib**			
Status:			**MET**	

As shown in the table below (Table 4), Rössing has transported 89% of its bulk goods by rail, which includes diesel fuel and sulphuric acid. Some reagents that are used in smaller quantities were

transported on the road. Langer Heinrich mine only uses road transport, because there is no railway nearby and various feasibility studies showed that it would be too expensive to construct a new line

Table 4: Transportation mode of bulk goods used by mining companies

Company	Tonnes by		Remarks on use of rail transport
	Rail	Road	
Langer Heinrich	0	136,363	No railway connection
Rio Tinto Rössing	174,168	22,270	89% by rail

Motivation of status: Eighty nine (89%) percent of Rössing's bulk goods are transported. Langer Heinrich's goods are only transported by road, with the current markets and insufficient fund in the transport authority, a rail line to Langer Heinrich is currently not feasible. This indicator is **MET**.

Desired Outcome 3.4.	**Walvis Bay harbour is efficient and safe**			
Target 3.4.1.	**The harbour authorities provide reliable, accessible and convenient loading, offloading and handling services**			
Indicator 3.4.1.1.	**Average loading rate for containers is >25 containers per hour**			
Status:		**IN PROGRESS**		
Indicator 3.4.1.2.	**Average waiting time for ships to obtain a berth is <12 hours**			
				EXCEEDED
Indicator 3.4.1.3.	**No oil/chemicals/contaminants/sewerage spills enter the Ramsar site**			
Data Source	**Namport**			
Status:			**MET**	

The average loading rate for containers reported by Namport is 20 bmph (berth moves per hour) (pers comm. Mr Tim Eimann). The average waiting time for ships to obtain a berth is < 1.0 hour as reported by Namport. Namport also reported no oil, chemicals, contaminants, sewerage spills has entered the Ramsar site in the year of 2014.

Motivation of status: Indicator 3.4.1.1 is rated as IN PROGRESS as only 20 bmph (berth moves per hour is loaded. Indicators 3.4.1.2 is rated as EXCEEDED as the average waiting time to obtain a berth is <1.0 per hour. There were no oil, chemicals, contaminants, sewerage spills that entered the Ramsar site in the year of 2014. Therefore indicator 3.4.1.3 is **MET**.

Desired Outcome 3.5.	**Electricity is available and reliable**			
Target 3.5.1.	**The public do not suffer disruptions in electricity supply as a result of the uranium mining**			
Indicator 3.5.1.1.	**No disruptions in electricity supply as a result of the uranium mining**			
Status:			**MET**	
Indicator 3.5.1.2.	**Industrial development is not delayed by electricity shortage**			
Status:			**MET**	

Indicator 3.5.1.3.	**No investment decision deferred because of electricity unavailability**			
Status:			**MET**	
Indicator 3.5.1.4.	**Electricity quality of supply meets ECB standard**			
Status:			**MET**	
Indicator 3.5.1.5.	**Electricity provision does not compromise human health**			
Data Source	**Nampower/NUA /SEMP Office**			
Status:			**MET**	

The following indicators 3.5.1.1, 3.5.1.2, 3.5.1.3, 3.5.1.4, 3.5.1.5 are discussed and assessed together. In the year 2014 NamPower reported that despite the overall supply deficit, it was able to consistently meet the electricity needs of all sectors of the economy at a cost that has continued to foster overall economic growth in Namibia. The organization is also busy upgrading to get higher capacity but for the interim period. Erongo RED currently only has limited capacity.

Namibian electricity consumption is strongly correlated to GDP growth. This is reported to be a fact evidenced by the decline in consumption following the 2008 global financial crisis. It has rebounded since 2010, and as the global economic recovery becomes more entrenched, demand for raw materials is expected to increase further, leading in turn to expand mining activities. Mines are significant users of electricity; and thus NamPower expect local energy demand to increase in tandem with international economic growth. Moreover, as Namibia continues to push toward diversification into beneficiation and manufacturing, NamPower expect long-term growth in these sectors. NamPower is able to ensure the stable platform of domestically-generated supply projected from 2018 onwards.

Erongo RED an institution tasked with the distribution and supply of electricity within the Erongo Region stated that no disruptions in electricity supply occurred as a result of uranium mining on the Erongo RED supply, but more on Nampower Supply (as per comm. Mr Thiel, ErongoRED). Erongo RED supply does comply fully with ECB standards. They do not comply with safety standards regarding the supply and distribution of electricity in the Erongo Region (as per comm. Mr Thiel, ErongoRED).

NamPower has played a vital, continuing role in the growth of Namibia's economy since national Independence was achieved in 1990. In line with Namibia's 4th Development Plan, the company has positioned and established itself as amongst the most reliable sources of energy generation and transmission on the African continent, helping Namibia become an attractive destination for foreign direct investment. NamPower is committed to investing in new power plants and associated transmission lines which will further stimulate economic growth for many years to come.

NamPower also reports that the mining sector, a major consumer of electricity, declined by 1.2% during 2013 after a strong performance in 2012.

No less important have been NamPower's efforts, which continued during the year under review, to broaden the foundations of GDP growth through rural electrification and other efforts to expand power supply to Namibia's less-developed areas, thus stimulating the SME sector predominant in these areas as well as educational and social development, both of which feed back into greater economic productivity and demand.

In the year 2014 NamPower reported that despite the overall supply deficit, it was able to consistently to meet the electricity needs of all sectors of the economy at a cost that has continued to foster overall economic growth in Namibia.

Motivation of status: Indicators 3.5.1.1, 3.5.1.2, 3.5.1.3, 3.5.1.4, 3.5.1.5 are rated as **MET**.

Indicator 3.5.1.6.	**Mines pursue renewable power supply options as far as possible.**
Data Source	**NUA/Nampower**
Status:	**IN PROGRESS**

With the ongoing shortage of power in Namibia and increases in Nampower's electricity tariffs renewable energy options will become more economic in the near future. In 2014, it would have been premature to invest in large-scale renewable power generation. Smaller applications like solar-powered boreholes and lighting of remote guard houses are however widely used. In 2014, two companies approached AREVA Resources Namibia about the possibility of constructing a large photovoltaic power station at Trekkopje mine. Both projects are still under investigation. Bannerman Resources looked at the option of having solar power for its Demonstration Plant but the costs were prohibitive for a plant that will only operate about 3 years and thus silent diesel generators were purchased. Swakop Uranium is installing an on-site power station which will capture waste heat from the acid plant, which in turn will heat boilers and generate steam to turn turbines and generate electricity.

Motivation of status: There are renewable initiative at mines but a on a very small scale. Although Swakop Uranium is still in the construction phase, they will install an on-site power station that will capture power from the waste heat of the acid plant. This indicator is rated as **IN PROGRESS**.

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Desired Outcome 3.6.	**Waste sites have adequate capacity**
Target 3.6.1.	**All sewage, domestic and hazardous waste sites are properly designed and have sufficient capacity for next 20 years, taking into account the expected volumes from mines and all associated industries**
Indicator 3.6.1.1.	**Municipalities have sufficient capacity of sewage works and waste sites based on actual and predicted volumes of waste**
Data Source	**Municipality of WB and Swakop**
Status:	**MET**

The Walvis Bay Municipality reports that they have sufficient space for the next 20 years for solid waste. The current treatment plants for sewage waste will be upgraded over the next two years to cope with 11 000m^3/day and a new 8000ML plant is planned for 2018 (pers comm, André Burger, Walvis Bay Municipality). The Swakopmund Municipality does have sufficient capacity of sewage (as per comm., CEO of Swakopmund Municipality).

Motivation of status: Indicator is rated as **MET** because both municipalities stated that they have sufficient capacity of sewage works and waste sites based on actual and predicted volumes of waste.

Indicator 3.6.1.2.	**Independent audits are undertaken for waste sites**			
Data Source	**Municipality of WB and Swakop**			
Status:		**IN PROGRESS**		

No independent audits are done at the Walvis Bay Municipality for the solid waste section but the waste water treatment plant permits are renewed every 3 years and regular inspections are conducted by the Department of Water Affairs (DWAF) (as per comm., André Burger, Walvis Bay Municipality). Independent audits are also undertaken for waste sites at the Swakopmund Municipality.

Motivation of status: Audits are conducted at the Walvis Bay and Swakopmund site but not for solid waste on the Walvis site. This indicator is therefore **IN PROGRESS**.

Indicator 3.6.1.3.	**All new waste sites undergo an EIA prior to construction and receive a licence to operate**			
Data Source	**Municipality of WB and Swakop**			
Status:		**IN PROGRESS**		

The regulations for landfill site only came in place in February 2012. The 2013 SEMP reported that the Swakopmund landfill has a licence and the Walvis Bay Municipality has applied. The Walvis Bay solid waste sites will comply if new site is developed, about 40 years in the future. The waste water treatment plant's (Environmental Impact Assessment) EIA and ECC requirements were taken into consideration for the new plant at Walvis Bay (as per comm., André Burger, Walvis Bay Municipality). Swakopmund Municipality stated that all new waste sites will undergo an EIA prior to construction and receive a licence to operate.

Motivation of status: The regulation to obtain a licence before waste site construction and operation has only been enacted in February 2012. Both municipality states that they will apply for license once news site come into operations. This indicator is therefore **IN PROGRESS**.

Desired Outcome 3.7.	**Waste sites are properly managed**			
Target 3.7.1.	**The management of waste sites meets national standards**			
Indicator 3.7.1.1.	**Waste site managers are adequately trained (Where managers have attended at least a one-week course in waste management at a reputable training institution)**			
Data Source	**Municipality of Walvis Bay and Swakop**			
Status:			**MET**	

At Walvis Bay municipality, both the foreman for solid waste and inspector of hazardous are trained. Other employees involved with waste water treatment are competent and trained as well, and all employees are overseen by a professional engineer (as per comm., André Burger, Walvis Bay Municipality). Also at Swakopmund Municipality, waste site managers are adequately trained (as per comm. Swakopmund Municipality).

Motivation of status: This indicator is **MET** as the necessary employees are adequately trained.

Indicator 3.7.1.2.	Site manifests which record non-hazardous wastes, volumes and origins are kept			
Data Source	Municipality of Walvis Bay and Swakop			
Status:			MET	

In Walvis Bay the weighbridge records all refuse entering the landfill site (as per comm., André Burger, Walvis Bay Municipality). The Swakopmund Municipality does keep records of the waste volumes (as per comm. Swakopmund Municipality).

Motivation of status: This indicator is rated as **MET** because site manifests which record non-hazardous wastes, volumes and origins are kept.

Indicator 3.7.1.3.	Only hazardous waste classes for which the sites are licensed are accepted			
Data Source	Municipality of Walvis Bay and Swakop			
Status:			MET	

In Walvis Bay hazardous waste classes for which the sites are licensed are accepted (as per comm., André Burger, Walvis Bay Municipality). The Swakopmund site is not authorise to accept hazardous waste.

Motivation of status: No hazardous waste is dumped at the WB hazardous waste site unless pre-approved and Swakopmund does not accept hazardous wastes, the indicator is therefore **MET**.

Indicator 3.7.1.4.	Water and air quality monitoring data at waste disposal sites show no non-compliance readings			
Data Source	Municipality of Walvis Bay and Swakop			
Status:	NOT MET			

Generally municipalities do not monitor water and air quality at waste disposal sites, because there is no legal requirement and standards set and it is therefore impossible to identify non-compliance. Walvis Bay municipality and Swakopmund reported that no monitoring is taking place at their sites. Walvis Bay furthermore reported that they haven't observed leachate on their site (as per comm., André Burger, Walvis Bay Municipality).

Motivation of status: This indicator is rated as **NOT MET** as there are no regulations regarding waste disposal site water and air quality monitoring.

Indicator 3.7.1.5.	Municipal budgets are sufficient to comply with the site licence requirements relating to pollution control			
Data Source	Municipality of Walvis Bay and Swakop			
Status:		IN PROGRESS		

The municipality of Walvis Bay budgets are sufficient to comply with the site licence requirements relating to pollution control (as per comm., André Burger, Walvis Bay Municipality). Swakopmund Municipality does not have a budget that is sufficient to comply with the site licence requirements relating to pollution control (as per comm. Swakopmund Municipality).

Motivation of status: This indicator is **IN PROGRESS** because the indicator is MET for the Walvis Bay but not for Swakopmund.

Target 3.7.2.	**The management of mines' mineral waste sites (tailings and waste rock facilities) meets national standards**			
Indicator 3.7.2.1.	**Mines comply with DWAF industrial effluent exemption permit conditions**			
Status:			**MET**	
Indicator 3.7.2.2.	**Complies with NRPA regulations**			
Status:			**MET**	
Indicator 3.7.2.3.	**Complies with approved EMP**			
Status:			**MET**	
Indicator 3.7.2.4.	**Complies with approved closure plan**			
Data Source	**DWAF/NRPA/MET**			
Status:			**MET**	

Langer Heinrich Mine's compliance in terms of the waste water and effluent disposal exemption permit conditions was audited by a DWAF delegation during 2014 and no non-compliances were reported. Rössing Uranium's waste water discharge permit does not specify conditions for the management of mineral waste facilities. It however states that industrial effluents, including tailings solution, have to be recycled and the mine complies with this requirement. The Environmental Management Plan (EMP)for Husab mine will implement the following:

- Ensure that the various effluent streams (tailings decant, treated effluent, dirty storm water, process effluent) are managed to prevent overflow of the process dam
- Ensure that a freeboard is maintained to accommodate run-off during a 1:100 year storm event in all contaminated water storage facilities
- Prevent industrial effluent from polluting the environment
- Discharge of industrial effluent to the process dam for reuse and mineralised waste facility

The National Radiation Protection Authority (NRPA) inspected both Langer Heinrich and Rössing Uranium in 2014 and identified no issues or shortcomings. Both companies have approved Radiation Management Plans that include provisions for the management of mineral waste. Huasb mine completed a Radiation Management Plan for mining in 2014. Mining and stockpiling of ore only commenced in 2015 and hence no issues were highlighted.

A detailed approved EMP is in place at Langer Heinrich and audits are carried out to measure compliance with the commitments, standards and legal requirements. The same system applies at Rössing and the environmental management systems of both companies are ISO14001 certified.

Closure arrangements for Langer Heinrich mine are integrated into the approved EMP, which was submitted for the application of an environmental clearance certificate. In addition a Closure Management Plan exists, which is reviewed and updated periodically (see also EQO12). Rössing Uranium has an approved Closure Management Plan that guides the management of mineral waste facilities during the remaining years of operation. Closure commitments for Husab Mine have been made in the EMP and mine is working towards

- Developing a restoration plan in consultation with relevant experts and stakeholders at an early stage in the life of mine and integrate it with the mine closure plan,
- Initiate restoration trials in order to allow the investigation of the most appropriate approaches. Monitor the results and adapt the restoration plan throughout life-of-mine to achieve best results,
- Consider the support of a restoration research programme for long-term rehabilitation of ecological processes at the Husab Mine site,
- Establish a restoration budget as part of the closure rehabilitation fund and the operational budget for concurrent rehabilitation, and
- As part of closure planning, the designs of any permanent and potentially polluting structures (mineral waste facilities) will consider the requirements for:
    - Long term pollution prevention and confirmatory monitoring,
    - The establishment of long term biodiversity functionality, aftercare and confirmatory monitoring, and
    - The isolation requirements related to periodic, but ecologically important, surface water flow.

In addition Langer Heinrich Mine (LHM) has provided the following text that describes the approach to waste management that most mines follow.
At Langer Heinrich Mine (LHM-site), waste is generated during the different phases of the mine. This waste is categorised into two key categories:

1. Mineralised Waste
2. Non-mineralised Waste

1. Mineralised Waste

This type of waste is generated at the start of mining also referred to as the non-process waste (low-grade ore material, waste rock), during the metallurgical process (tailings material and barren material). This constitutes all mineral material that cannot be processed further either because of constraints related to current metallurgical technology and processes or due to the current commodity price or as a combination. No mineralised waste leaves the LHM-site but is re-used as backfill material in the Tailings Storage Facility (TSF) and in other identified areas where rehabilitation is required.

Standard operational procedures describe the waste disposal methodology. The application of these standard operating procedures is verified through inspections and audits (first, second and third party). Records of the mineralised waste generated and re-used are documented and reported on an annual basis to the relevant authorities.

2. Non-mineralised Waste

This type of waste includes all waste that is not mineralised waste (see above). Standard operational procedures describe the waste management process. Waste management training is provided to all employees and visitors to the LHM-site. This training is undertaken by the Environment Department. Radiation clearance for site removal of waste is done through the Radiation Management Section. The amount of waste generated, recycled and disposed is monitored and tracked by the Environment Department. The implementation and application of these standard operating procedures is verified through inspections and audits (first, second and third party). The amount of waste and final destination is recorded. Records of the waste generated and re-used are documented and reported on an annual basis to the relevant authorities.

The waste is classified as described below and segregated at source. It is disposed in labelled containers where it is kept until ready for final destination (landfilled, incinerated or recycled). This

process is executed through contractors. The contractors are responsible for the correct and safe handling, transport and disposal of the waste. A summary of the non-mineral waste classification is provided below:

2.1 Non-mineralised radioactive contaminated solid waste

All waste is scanned for radioactive contamination. Only waste with a surface contamination of less than 4 Bq/cm^2 over an area of 300 cm^2 is allowed to leave the LHM-site. The waste is buried on-site in a dedicated waste storage facility. Records of the coordinates and the amount of waste disposed of are documented.

2.2 Non-mineralised non-radioactive hazardous solid waste

This waste typically includes printer cartridges, computer screens, fluorescent bulbs, batteries, sewage and medical waste etc. This waste is separated into recyclable and non-recyclable waste. A contractor transports this waste to the hazardous waste facility at Walvis Bay. A record containing information on the amount of waste removed as well as the destination of the waste is documented.

2.3 Non-mineralised non-radioactive hazardous liquid waste

This waste typically includes but is not limited to hydrocarbons (oil, grease and diesel), paint and chemicals. This waste is separated into recyclable and non-recyclable waste. A contractor transports this waste off site. A record containing information on the amount of waste removed as well as the destination of the waste is documented.

2.4 Non-mineralised non-radioactive non-hazardous waste

This waste includes general waste (domestic waste, paper, tins, glass bottles etc.). A standard operational procedure describes how this waste needs to be managed to ensure its safe final disposal (either re-use, landfill or incinerate). This waste is separated into recyclable and non-recyclable waste. A contractor takes this waste off site. A record containing information on the amount of waste removed as well as the destination of the waste is documented.

Motivation of status: Indicators 3.7.7.1, 3.7.2.2, 3.7.2.3 and 3.7.2.4 are rated as **MET** because no non-compliance was reported by DWAF, NRPA and the Ministry of Environment and Tourism.

Desired Outcome 3.8.	**Recycling is common practice in the Central Namib**			
Target 3.8.1.	**A sustainable waste recycling system is operational in the Central Namib, servicing the uranium mines and the public**			
Indicator 3.8.1.1.	**A waste recycling depot is established**			
Data Source	**Municipality of Walvis Bay and Swakop**			
Status:		**IN PROGRESS**		

The Swakopmund municipality planned a new recycling system during 2014 and the selected contractor established a recycling facility in 2015. Separate orange waste bins for recyclable materials were distributed to all households. Private enterprises with MRF will be coming in Feb 2016 for the Walvis Bay Municipality (pers. comm., André Burger, Walvis Bay Municipality).

Motivation of status: The establishment of a sustainable waste recycling system is still in the process therefore this indicator is **IN PROGRESS**.

Indicator 3.8.1.2.	**Waste recycling operators have sufficient capacity to collect, transport and recycle waste in a safe and responsible manner**			
Data Source	**Municipality of Walvis Bay and Swakop**			
Status:			**MET**	

The Walvis Bay municipality has depots in town, capable of handling recycled material (pers. comm., André Burger, Walvis Bay Municipality). Moreover, the Swakopmund Municipality have sufficient capacity to collect, transport and recycle waste in a safe and responsible (pers. comm. Swakopmund Municipality).

Motivation of status: This indicator is rated as **MET** because both municipalities are capable of collecting, transporting and recycling waste in their respective towns.

Indicator 3.8.1.3.	**Volumes of waste disposed to landfill per capita decreases**			
Data Source	**Municipality of Walvis Bay and Swakop**			
Status:		**IN PROGRESS**		

Walvis Bay Municipality recorded a slight reduction in the volume of waste removed or disposed of over the past reporting years. For the 2014 assessment, they Walvis Bay municipality reported that urbanisation and increase in businesses and industry, cancels out any decreases, so there is no decrease per capita (as per comm., André Burger, Walvis Bay Municipality). The Swakopmund indicated that the volumes of waste disposed on their landfill per capita decreases.

Motivation of status: Although Swakop municipality reported that their landfill volumes are under control, which is not the case at the Walvis Bay landfill site. This Indicator is therefore **IN PROGRESS**.

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	Summary of performance: EQO 3			
Total no. indicators assessed:	**34**			
	NOT MET	**IN PROGRESS**	**MET**	**EXCEEDED**
Number of indicators in class:	2	10	21	1
Percentage of indicators in class:	5%	29%	62%	3%

Overall performance: The infrastructure EQO performed better in 2014 than in 2013. The Infrastructure EQO is made of 8 desired outcomes and 8 targets measured by 34 indicators. In the 2013 assessment, 50% of these indicators are MET, 35% are IN PROGRESS 15% are NOT MET. In the 2014 assessment, 58.8% of these indicators are MET, 29.4% are IN PROGRESS 8.8% are NOT MET and 2.9% EXCEEDED.

EQO 4. Water

Aims of this EQO: To ensure that the public have the same or better access to water in future as they have currently, and that the integrity of all aquifers remains consistent with the existing natural and operational conditions (baseline). This requires that both the quantity and quality of groundwater are not adversely affected by prospecting and mining activities.

Underground water plays an important role in the sustainable development of our country. This resource is utilized in cities and communal areas; in industries such as mining and agriculture, and is an integral part of the functioning ecosystem. Namibia relies much on rainfall water which flows along ephemeral rivers and infiltrations as water flow.

The Water EQO in this management plan involves assuring the quality and quantity of water to the public in the Erongo Region (Uranium Province). Key stakeholders in this EQO are the Department of Water Affair and Forestry (DWAF) of the Ministry of Agriculture, Water and Forestry (MAWF) as the regulator, NamWater, as the bulk-supplier and distributor, and the mining industry as a major consumer. Monitoring of groundwater in the uranium province is undertaken with the aid of 15 boreholes (the initial recommended boreholes where 18, there are washed away by floods) along the Swakop/Khan Rivers. Data for monitoring this EQO is thus supplied through DWAF and is complimented by contributions from NAU that sources data from the mining industry. In fulfilling the monitoring responsibility, DWAF carries out an annual sampling campaign in the Khan and Swakop Rivers, as well as the portable water in the coastal towns.

Water quality monitoring involves analysis of anions and cations of major and trace elements, and radionuclides, depending on expertise and finances available in the monitoring institution, which are compared to the Namibian Guideline Values for drinking water. Water quantities are assessed through measurements of water level fluctuation in boreholes along the two rivers. Initially this indicator focused only on groundwater in the Swakop/Khan River systems, however due to the fact that drinking water for the rural and urban communities in this region are not sourced from these two rivers, the indicator was modified to include drinking water which is also included in this annual report.

Desired Outcome 4.1.	**Water for urban and rural communities is of acceptable quality**
Target 4.1.1.	**Uranium Mining does not compromise community access to water of appropriate quality:** • **Urban users** • **Rural communities supplied by DWACC** • **Commercial farmers (own supplier)** • **Lower Swakop River small holdings**
Indicator 4.1.1.1.	**Aesthetic/physical, inorganic, radio-nuclide and bacteriological determinants conform to minimum required quality as prescribed in the national water quality standards**
Data Source	**DWAF**
	MET

The monitoring scope as defined in this target included water supplied to urban users in Swakopmund and Walvis Bay, as well as commercial and communal farmers along the Khan and Swakop rivers, including the lower Swakop smallholdings. No rural communities were supplied with groundwater from the lower Khan and Swakop rivers by the Directorate of Water Supply and Sanitation Coordination (DWSSC).

Chemical Analyses of Groundwater in the Swakop and Khan Rivers

Evaluation of the groundwater quality was based on uranium content, electrical conductivity, sulphate, pH, and the sodium contents.

Uranium ranges between 0.03 – 0.18 mg/dm; the highest concentration of 0.18 mg/dm was recorded in BH 202028 in the Khan River downstream of Rössing (Figure 6). These values all fall within Group A (excellent quality) of the Namibian Guidelines of Drinking water (appendix 1). Two BHs (BH4 & KEM3) upstream of the BH 202028, and closer to Rössing showed lower levels of uranium. A slightly higher level of uranium in BH 202028 is attributed to background geology, as there is no observed trend in U concentration towards the mine (Rössing) on the Khan River.

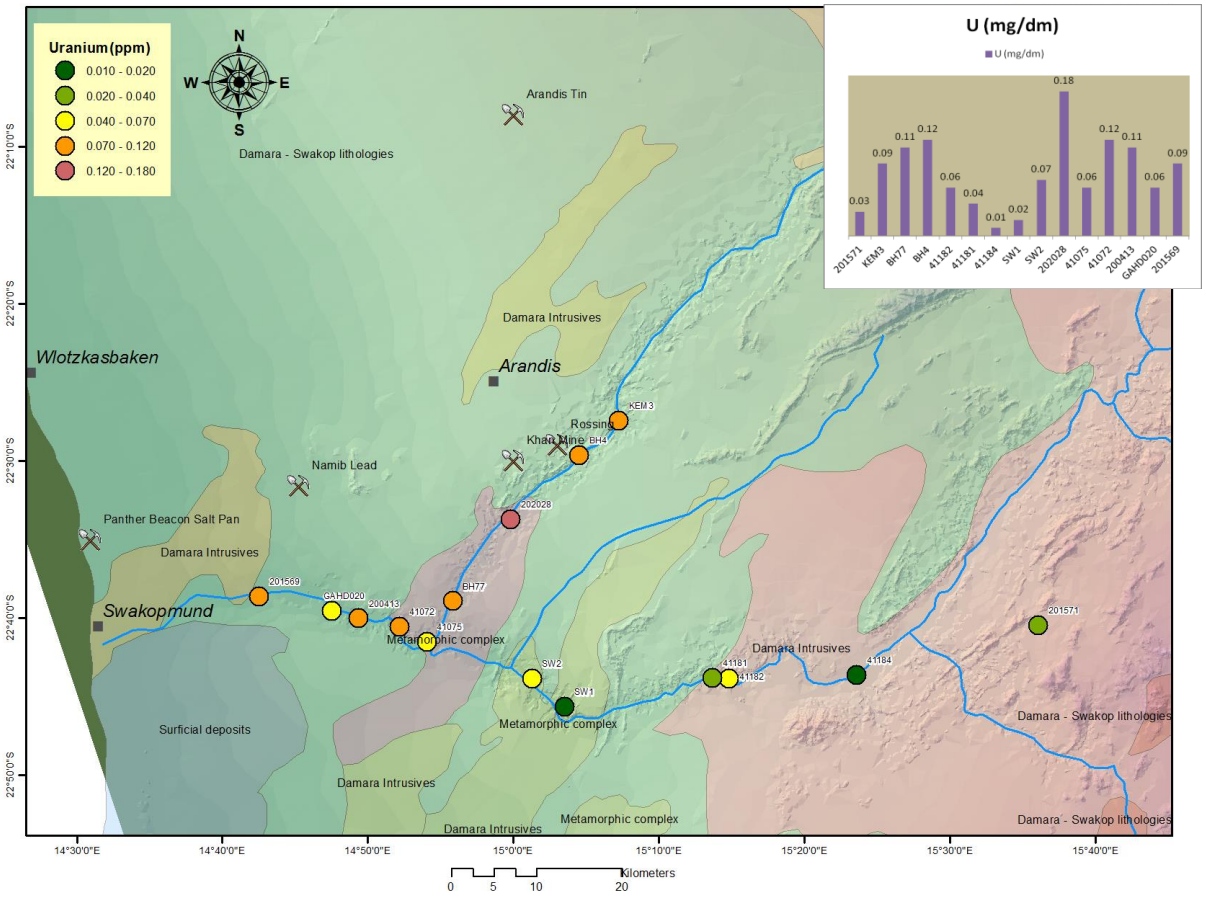

Figure 6: Uranium content measured in the Swakop – Khan Boreholes

Water quality in-terms of the electrical conductivity (EC) classifies the groundwater as Group D (high health risk and unfit for human consumption) in all boreholes except of borehole SW1 located upstream of the Swakop- Khan confluence. Sulphate and Sodium were used as indicators for groundwater salinity. In terms of the sulphate, the water falls within Group C and B, with majority falling in Group C. On the other hand borehole SW1 showed lower sulphate quality compared to the rest of the boreholes. Sodium content is in the range of 400 – 3000mg/dm^3, classifying the water in Group B up D. The pH falls within a neutral range of 7.2 – 7.8. Plots of these parameters are displayed in Figure 7.

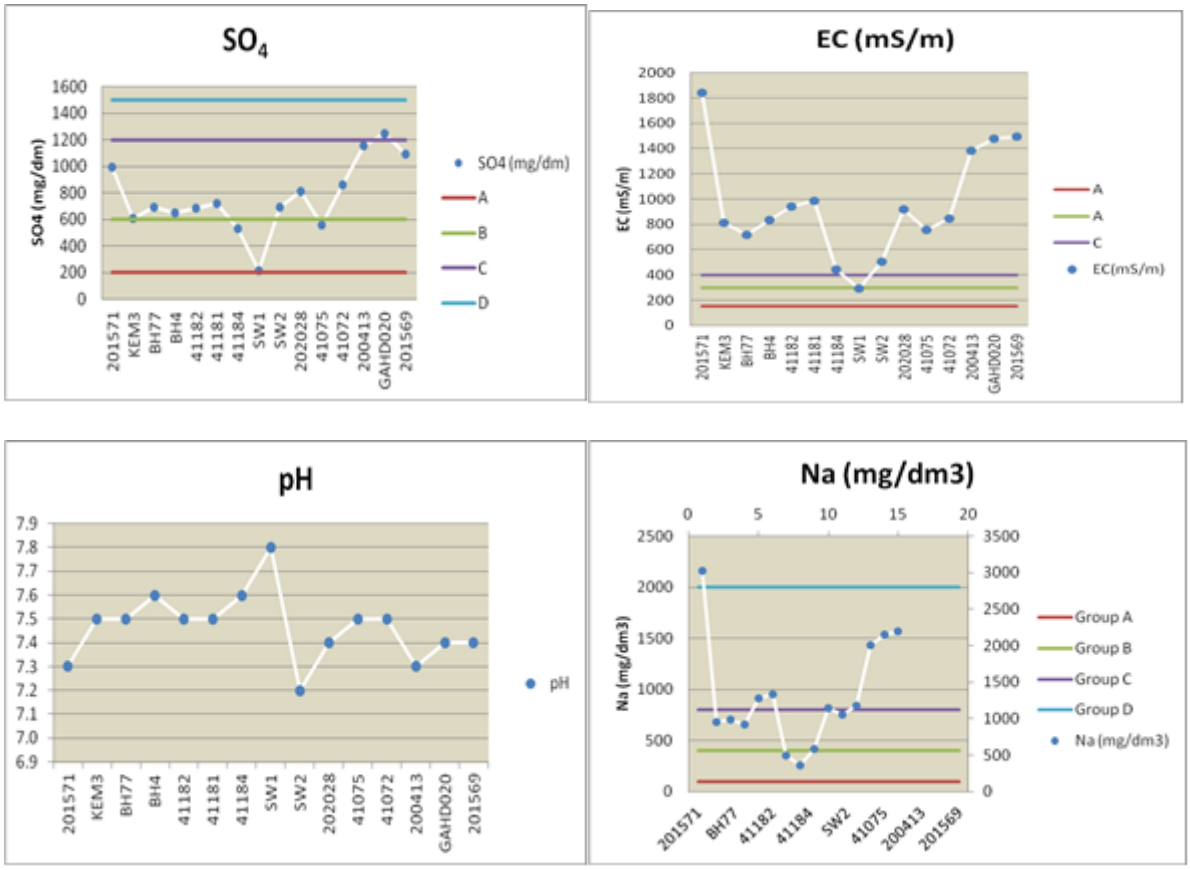

Figure 7: Parameters used in assessing the groundwater quality of the Swakop- Khan rivers in 2014

Chemical Analyses of Drinking Water (Tap water)

In October 2013, DWAF collected drinking water samples from Swakopmund and Walvis Bay as part of the SEMP sampling exercise. They were analysed at the NamWater laboratory and results confirmed that the water was of good to excellent quality and suitable for human consumption. NamWater have kindly provided their own chemical analyses and bacteriological tests of samples taken at Henties Bay, Swakopmund and Walvis Bay in 2013, 2014 and 2015, which are presented in Table 5 to

Table 7.

The water supplied from Omdel to Henties Bay, Swakopmund and Arandis is of excellent quality for most of the physical and chemical parameters, but the sodium and chloride concentrations are higher than the limits for Group A. The overall classification is thus Group B – good quality. The quality of the groundwater from the Kuiseb River that is supplied to Walvis Bay is also of Group B, though the salinity is slightly lower than the Omdel's and only sodium exceeds the Group A limit.

In terms of heavy metals, the NamWater laboratory analyses iron (Fe), manganese (Mn), copper (Cu), zinc (Zn), cadmium (Cd) and lead (Pb), but does not have a method to determine uranium in water. The towns' drinking water is pumped from the Kuiseb and Omaruru Rivers where there is no uranium mining, it is therefore not possible for uranium from the mines to enter the potable water supply. The concentrations of the other metals are mostly at or below the detection limit of 0.01-0.02 mg/L. Iron reached up to 0.04 mg/L in two samples. It causes no health effects but can stain laundry if the levels are too high.

Table 5: Chemical Analyses of the NamWater Supply to Henties Bay

Sampling Point Name	Henties Bay	Henties Bay	Henties Bay	Henties Bay	Henties Bay	Henties Bay
Location Description	Reservoir	Reservoir	Reservoir	Reservoir	Reservoir	Reservoir
Date sample taken	11-Feb-13	12-Jul-13	18-Oct-13	7-Feb-14	26-Jan-15	10-Feb-15
pH	8.1	8.5	8.3	8.4	8.0	8.1
Colour	<1	<1	<1	<1	<1	<1
Turbidity in NTU	0.308	0.51	0.266	0.617	0.635	0.327
Conductivity mS/m	136.2	133.5	129	109.9	146.6	149.1
TDS Calculated	912.5	894.5	864.3	736.3	982.2	999.0
Na in mg/l	165	167	166	158	200	185
K in mg/l	9	9	9	9	10	10
Ca as CaCO3	140	145	135	120	177.5	172.5
Mg as CaCO3	83.3	83.3	75.0	75.0	95.8	91.7
SO4 in mg/l	52	54	60	58	56	54
NO3 as N in mg/l	3.9	4	3.7	3.5	1.2	3.3
NO2 as N in mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
SiO2 in mg/l	22	24	21	24	27	28
F in mg/l	0.7	0.6	1.4	0.7	0.6	0.6
Cl in mg/l	245	230	230	220	320	320
Alkalinity as CaCO3	150	166	152	160	170	182
Fe in mg/l	<0.01	<0.01	<0.01	<0.01	0.04	<0.01
Mn in mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cu in mg/l	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Zn in mg/l	-	<0.01	0.01	<0.01	0.02	0.01
Cd in mg/l	<0.01	<0.01	<0.01	<0.01	0.01	0.01
Pb in mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Table 6: Chemical Analyses of the NamWater Supply to Swakopmund

Sampling Point	Swakopmund	Swakopmund	Swakopmund	Swakopmund	Swakopmund	Swakopmund	Swakopmund	Swakopmund	Swakopmund
Location Description	Reservoir	Reservoir	Reservoir	Reservoir	Reservoir	Reservoir	Reservoir	Reservoir	Reservoir
Date sample taken	11-Feb-13	25-Mar-13	15-Jul-13	18-Oct-13	7-Feb-14	19-May-14	7-Oct-14	6-Nov-14	4-Nov-14
pH	8	7.5	8.4	8.2	8	8	8.1	8.2	8.1
Colour	<1	4	<1	<1	<1	6	<1	1	<1
Turbidity in NTU	0.518	0.913	0.316	0.874	0.821	0.684	0.404	0.579	1.28
Conductivity mS/m	161.1	149.1	159	142.3	108.9	143.1	130.3	142.6	125.1
TDS Calculated	1079	999	1065	953	730	959	873	955	838
Na in mg/l	190	179	185	161	142	180	180	203	185
K in mg/l	12	12	13	13	9	9	10	7	5
Ca as CaCO3	230	248	230	220	150	187.5	155	120	95
Mg as CaCO3	87.5	100	87.5	91.7	54.2	62.5	54.2	45.8	33.3
SO4 in mg/l	104	103	97	120	84	82	57	40	36
NO3 as N in mg/l	3.9	0.8	4.1	4.6	2.7	1.9	2.1	1.5	1.5
NO2 as N in mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
SiO2 in mg/l	26	4	28	27	14	20	18	11	7
F in mg/l	0.4	0.4	0.4	0.8	0.3	0.3	0.3	0.3	0.2
Cl in mg/l	270	300	265	215	219	305	290	345	295
Alcalinity as CaCO3	204	182	202	210	142	152	124	110	94
Fe in mg/l	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
Mn in mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
Cu in mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
Zn in mg/l	-	0.07	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
Cd in mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	0.01
Pb in mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	<0.02

Sampling Point	Swakopmund	Swakopmund	Swakopmund	Swakopmund	Swakopmund	Swakopmund	Swakopmund	Swakopmund	Swakopmund
Location Description	Reservoir	Reservoir	Reservoir	Reservoir	Reservoir	Reservoir	Reservoir	Reservoir	Reservoir
Date sample taken	18-Nov-14	1-Dec-14	3-Dec-14	13-Jan-15	30-Dec-14	26-Jan-15	10-Feb-15	21-Apr-15	25-Aug-15
pH	8.1	8.1	8.3	8	8.1	8.2	8.1	8.1	8
Colour	2	6	9	5	4	<1	<1	3	6
Turbidity in NTU	1.49	1.49	0.276	0.741	0.446	0.437	0.368	0.201	9.96
Conductivity mS/m	131.9	129	120.7	117.3	177.8	144.4	131.8	143.3	147.2
TDS Calculated	884	864	809	786	1191	967	883	960	986
Na in mg/l	190	154	145	155	200	205	165	170	189
K in mg/l	9	7	7	8	12	10	10	9	10
Ca as CaCO3	143	168	160	123	233	108	180	175	198
Mg as CaCO3	54.2	66.7	66.7	50.0	87.5	62.5	70.8	62.5	75
SO4 in mg/l	61	69	67	53	108	51	78	79	83
NO3 as N in mg/l	1.3	1.6	1	1.2	2.9	<0.5	3.2	2.9	2.8
NO2 as N in mg/l	<0.1	<0.1	<0.1	0.1	0.1	<0.1	0.1	<0.1	<0.1
SiO2 in mg/l	17	16	16	14	32	8	23	22	23
F in mg/l	0.3	0.3	0.3	0.2	0.4	0.2	0.3	0.3	0.4
Cl in mg/l	295	245	225	240	320	330	250	285	320
Alcalinity as CaCO3	136	136	142	122	212	92	174	162	150
Fe in mg/l	-	<0.01	-	-	-	0.01	<0.01	-	-
Mn in mg/l	-	<0.01	-	-	-	<0.01	<0.01	-	-
Cu in mg/l	-	0.02	-	-	-	<0.01	<0.01	-	-
Zn in mg/l	-	0.01	-	-	-	0.01	<0.01	-	-
Cd in mg/l	-	<0.01	-	-	-	0.01	<0.01	-	-
Pb in mg/l	-	<0.02	-	-	-	<0.02	<0.02	-	-

Table 7: Chemical Analyses of the NamWater Supply to Walvis Bay

Sampling Point	Walvis Bay	Walvis Bay	Walvis Bay	Walvis Bay	Walvis Bay	Walvis Bay	Walvis Bay	Walvis Bay	Walvis Bay	Walvis Bay
Location Description	Mile 7	Mile 7	Mile 7	Mile 7	Mile 7	Mile 7	Mile 7	Mile 7	Mile 7	Mile 7
Date sample taken	11-Feb-13	25-Mar-13	15-Jul-13	21-Oct-13	7-Feb-14	19-May-14	3-Nov-14	1-Dec-14	26-Jan-15	9-Feb-15
pH	8.1	7.7	8.6	8.3	8.1	8.0	8.1	8.1	8.0	8.2
Colour	<1	8	<1	<1	<1	5	1	5	<1	3
Turbidity in NTU	0.40	0.74	0.41	0.22	0.62	2.14	1.51	0.24	0.18	0.38
Conductivity mS/m	132.4	121.6	133.8	143.2	122.3	126.9	134.8	131.4	116.1	118.4
TDS Calculated	887.1	814.7	896.5	959.4	819.4	850.2	903.2	880.4	777.9	793.3
Na in mg/l	125	124	136	131	123	118	131	116	117	114
K in mg/l	16	15	17	16	15	14	13	14	15	15
Ca as CaCO3	233	245	240	230	215	185	225	255	220	215
Mg as CaCO3	150	158	154	154	138	121	150	150	133	125
SO4 in mg/l	162	170	172	175	170	150	178	171	150	161
NO3 as N in mg/l	5.3	5.4	5.6	4.7	5	3.9	4.5	3.3	2.9	4.7
NO2 as N in mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
SiO2 in mg/l	30	30	33	30	31	35	37	34	35	36
F in mg/l	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Cl in mg/l	156	157	174	170	155	135	162	146	130	130
Alkalinity as CaCO3	240	240	242	238	254	248	258	250	244	258
Fe in mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	<0.01
Mn in mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cu in mg/l	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Zn in mg/l	-	0.01	<0.01	0.01	<0.01	0.01	0.01	<0.01	0.01	0.01
Cd in mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pb in mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Microbiological Analyses of Drinking Water*

Microbiological testing of drinking water determines three parameters: Heterotrophic plate count, coliform bacteria and Escherichia coli. The heterotrophic plate count is an analytical method used to measure the variety of bacteria that are common in water. The concentration of bacteria shows whether the water system is well maintained. Increases in heterotrophic plate count are due to the re-growth of bacteria in tanks and plumbing, and do not necessarily indicate the existence of a health risk, if the entry water meets the microbial water quality norms and contamination from outside is

prevented. To consider water as very safe for human consumption (Group A) the total plate count may not exceed 100 colony-forming units per millilitre (cfu/mL) and coliform and *Escherichia coli* (*E. coli*) must be absent in 100 mL in 95% of the samples. A heterotrophic plate count exceeding 1000 cfu/mL results in a classification of Group C - water with a risk factor which requires rectification. In this case, the water supply system is disinfected with chlorine.

Coliform bacteria are commonly found in the environment (e.g. soil or vegetation) and are generally harmless. If only total coliform bacteria are detected, the source is probably environmental rather than faecal. Faecal coliforms (more specifically *E. coli*) indicate faecal pollution by warm-blooded animals or humans, which implies the potential presence of waterborne pathogens.

The results of the examination of a single sample from a source are considered inadequate to evaluate the water quality. An evaluation should be based on the examination of a series of samples collected over a long period of time. If the guideline values are exceeded in one sample, a second sample should be taken from the same source as soon as possible.

The results in Table 8 show that the water supplied to the coastal towns was mostly very safe (Group A) or safe (Group B). There were a few instances of high plate count, but no coliforms or faecal coliforms were detected in any of the samples. The results for the Rössing reservoir apply to the mine and the town of Arandis. The Mile 7 reservoir supplies Walvis Bay, while the Rooikop reservoir is used for the airport and army base.

*Source of the general description: Analytical Laboratory Services Microbiological Analysis Report Form

Table 8: Microbiological Analyses of the NamWater Supply to the Coastal Towns

Date	Town	Sample taken	Heterotrophic plate count	Coliforms	Faecal coliforms	Quality
14/01/2013	Henties Bay	Reservoir	108	Not detected	Not detected	B
11/02/2013	Henties Bay	Reservoir	2	Not detected	Not detected	A
12/07/2013	Henties Bay	Reservoir		Not detected	Not detected	A
13/08/2013	Henties Bay	Reservoir	60	4	Not detected	B
01/10/2013	Henties Bay	Reservoir	Not detected	Not detected	Not detected	A
18/10/2013	Henties Bay	Reservoir		Not detected	Not detected	A
07/02/2014	Henties Bay	Reservoir		Not detected	Not detected	A
03/06/2014	Henties Bay	Reservoir	Not detected	Not detected	Not detected	A
30/06/2014	Henties Bay	Reservoir	3	Not detected	Not detected	A
28/11/2014	Henties Bay	Reservoir		Not detected	Not detected	A
26/01/2015	Henties Bay	Reservoir	1323	Not detected	Not detected	C
10/02/2015	Henties Bay	Reservoir		Not detected	Not detected	A
15/01/2013	Rössing Mine	Reservoir	101	Not detected	Not detected	B
12/02/2013	Rössing Mine	Reservoir	2	Not detected	Not detected	A
25/03/2013	Rössing Mine	Reservoir	12	Not detected	Not detected	A
15/05/2013	Rössing Mine	Reservoir	6	Not detected	Not detected	A
16/07/2013	Rössing Mine	Reservoir	116	Not detected	Not detected	B
14/08/2013	Rössing Mine	Reservoir	10	Not detected	Not detected	A
02/10/2013	Rössing Mine	Reservoir	1	Not detected	Not detected	A
21/10/2013	Rössing Mine	Reservoir		Not detected	Not detected	A
10/02/2014	Rössing Mine	Reservoir		Not detected	Not detected	A
19/03/2014	Rössing Mine	Reservoir		Not detected	Not detected	A
19/05/2014	Rössing Mine	Reservoir		Not detected	Not detected	A
04/06/2014	Rössing Mine	Reservoir	20	Not detected	Not detected	A
01/07/2014	Rössing Mine	Reservoir	85	Not detected	Not detected	A
04/11/2014	Rössing Mine	Reservoir	Not detected	Not detected	Not detected	A
01/12/2014	Rössing Mine	Reservoir		Not detected	Not detected	A
26/01/2015	Rössing Mine	Reservoir	1	Not detected	Not detected	A
11/02/2015	Rössing Mine	Reservoir		Not detected	Not detected	A
14/01/2013	Swakopmund	Reservoir	115	Not detected	Not detected	B
11/02/2013	Swakopmund	Reservoir	2	Not detected	Not detected	A
25/03/2013	Swakopmund	Reservoir	1	Not detected	Not detected	A
14/05/2013	Swakopmund	Reservoir	7	Not detected	Not detected	A
15/07/2013	Swakopmund	Reservoir		Not detected	Not detected	A
13/08/2013	Swakopmund	Reservoir	3	Not detected	Not detected	A
01/10/2013	Swakopmund	Reservoir	3	Not detected	Not detected	A
18/10/2013	Swakopmund	Reservoir		Not detected	Not detected	A
10/02/2014	Swakopmund	Reservoir		Not detected	Not detected	A

Date	Town	Sample taken	Heterotrophic plate count	Coliforms	Faecal coliforms	Quality
18/03/2014	Swakopmund	Reservoir		Not detected	Not detected	A
19/05/2014	Swakopmund	Reservoir		Not detected	Not detected	A
03/06/2014	Swakopmund	Reservoir	43	Not detected	Not detected	A
01/07/2014	Swakopmund	Reservoir	12	Not detected	Not detected	A
04/11/2014	Swakopmund	Reservoir	3	Not detected	Not detected	A
01/12/2014	Swakopmund	Reservoir		Not detected	Not detected	A
26/01/2015	Swakopmund	Reservoir	201	Not detected	Not detected	B
10/02/2015	Swakopmund	Reservoir		Not detected	Not detected	A
14/01/2013	Walvis Bay	Rooikop Reservoir	43	Not detected	Not detected	A
14/01/2013	Walvis Bay	Mile 7 Reservoir	72	Not detected	Not detected	A
11/02/2013	Walvis Bay	Rooikop Reservoir	61	Not detected	Not detected	A
11/02/2013	Walvis Bay	Mile 7 Reservoir	1	Not detected	Not detected	A
25/03/2013	Walvis Bay	Rooikop Reservoir	4	Not detected	Not detected	A
25/03/2013	Walvis Bay	Mile 7 Reservoir	1	Not detected	Not detected	A
14/05/2013	Walvis Bay	Rooikop Reservoir	Not detected	Not detected	Not detected	A
14/05/2013	Walvis Bay	Mile 7 Reservoir	1	Not detected	Not detected	A
15/07/2013	Walvis Bay	Rooikop Reservoir		Not detected	Not detected	A
15/07/2013	Walvis Bay	Mile 7 Reservoir		Not detected	Not detected	A
13/08/2013	Walvis Bay	Rooikop Reservoir	5	Not detected	Not detected	A
13/08/2013	Walvis Bay	Mile 7 Reservoir	3	Not detected	Not detected	A
01/10/2013	Walvis Bay	Rooikop Reservoir	83	Not detected	Not detected	A
01/10/2013	Walvis Bay	Mile 7 Reservoir	Not detected	Not detected	Not detected	A
21/10/2013	Walvis Bay	Rooikop Reservoir		Not detected	Not detected	A
21/10/2013	Walvis Bay	Mile 7 Reservoir		Not detected	Not detected	A
10/02/2014	Walvis Bay	Mile 7 Reservoir		Not detected	Not detected	A
18/03/2014	Walvis Bay	Mile 7 Reservoir		Not detected	Not detected	A
19/05/2014	Walvis Bay	Mile 7 Reservoir		Not detected	Not detected	A
03/06/2014	Walvis Bay	Rooikop Reservoir	8	Not detected	Not detected	A
03/06/2014	Walvis Bay	Mile 7 Reservoir	4	Not detected	Not detected	A
30/06/2014	Walvis Bay	Rooikop Reservoir	106	Not detected	Not detected	B
30/06/2014	Walvis Bay	Mile 7 Reservoir	1856	Not detected	Not detected	C
03/11/2014	Walvis Bay	Rooikop Reservoir	4	Not detected	Not detected	A
03/11/2014	Walvis Bay	Mile 7 Reservoir	5	Not detected	Not detected	A
01/12/2014	Walvis Bay	Mile 7 Reservoir		Not detected	Not detected	A
26/01/2015	Walvis Bay	Rooikop Reservoir	89	Not detected	Not detected	A
26/01/2015	Walvis Bay	Mile 7 Reservoir	7	Not detected	Not detected	A
09/02/2015	Walvis Bay	Rooikop Reservoir		Not detected	Not detected	A
09/02/2015	Walvis Bay	Mile 7 Reservoir		Not detected	Not detected	A

Motivation of status:

The indicator requires that aesthetic/physical, inorganic, radionuclide and bacteriological determinants conform to the minimum required quality as prescribed in the national water quality standards. The quality of the NamWater supply to Henties Bay, Swakopmund and Walvis Bay was good to excellent and suitable for human consumption. This part of the target has therefore been **MET**.

The other part of the indicator referring to rural communities supplied by the DWSSC is not applicable to the lower Khan and Swakop rivers. The last two points regarding commercial farmers along the rivers and on the lower Swakop smallholdings are evaluated together. The farmers use groundwater for livestock watering and crop irrigation. The Namibian water quality standard for livestock watering sets limits of 6000mg/L TDS, 1500-3000 mg/L chloride and 2000 mg/L sodium. In 2014, most of the

Khan and Swakop boreholes were within the limits of the standard and therefore safe to use for animals. The only exception was the area of the Swakop smallholdings, but the high salinity there is a natural phenomenon that is not linked to uranium mining.

There is no Namibian water quality standard for crop irrigation water, though there are indicators like salinity index and sodium adsorption ratio that agricultural organisations use to assess the suitability of a water source for this application. Farmers along the Swakop and Khan rivers know that only certain plants, e.g. olive trees and tomatoes, can tolerate the brackish to saline groundwater; and they use freshwater from the NamWater pipeline for other vegetables. Monitoring results show that there has been a general improvement in water quality during the last two years, except for the area of the Swakop smallholdings. This, in combination with the stock watering results, leads to the conclusion that the last part of the indicator has also been **MET**.

Target 4.1.2.	**Uranium mining does not compromise the water quality in the lower Khan and Swakop rivers**
Indicator 4.1.2.1.	**Radionuclide and heavy metal concentrations conform to the national water quality standards**
Data Source	**DWAF**
Status:	**MET**

As mentioned above the whole suite of physical and inorganic components, including trace metals and uranium was only analysed in January 2013. This shortcoming will be addressed by a comprehensive sampling in 2016. The table below summarises the results for some heavy metals that may be of concern at elevated concentrations. Note that the figures are in mg/L and <0.01 indicates that the concentration was below the detection limit of 0.01 mg/L (shown in grey).

Table 9: Summary of selected trace metal analyses, January 2013

	Valencia	RUL	RUL	RUL	LHU	LHU	LHU	Husab	Husab	Husab	BMR	BMR	BMR	Farms
	200400	KEM 3	BH4	200411	41181	41182	41184	202082	SW1	SW2	41072	41075	GAHD020	201570
Arsenic	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	0.01	<0.01	0.01	0.01	0.01	0.01	<0.01	0.01	0.01	0.01	0.02	0.01	<0.01	0.01
Iron	0.04	0.04	0.52	0.10	0.57	0.03	0.04	0.05	0.02	0.36	0.04	1.1	0.02	0.08
Lead	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	0.23	<0.01	0.12	0.02	1.5	0.96	0.38	<0.01	<0.01	0.88	0.55	0.06	0.80	0.05
Mercury	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.01	<0.01	0.01	0.01	0.01	0.01
Nickel	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium	0.10	0.11	0.16	0.11	0.05	0.03	0.01	0.20	0.01	0.13	0.09	0.15	0.11	0.05
Vanadium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.04

None of the tested borehole waters contained measurable quantities of arsenic, cadmium, lead, mercury, nickel or vanadium. Copper, molybdenum and zinc were present at concentrations that were well below the drinking water limits of 1.0, 0.1 and 5.0 mg/L, respectively. Iron and manganese are usually found in groundwater and values of up to 1.0 mg/L are within the drinking water standard. Only two samples exceeded the limits with iron of 1.1 mg/L at Bannerman WW41075 and manganese of 1.5 mg/L at Langer Heinrich WW41181. Note that the standard is just used as a benchmark for comparison because the salinity makes the water unsuitable for human consumption.

To supplement this rather oudated information, the NUA has obtained Swakop Uranium's annual radionuclide analyses of boreholes in the Swakop and Khan Rivers. The graph below summarises the results for uranium-238 which is the predominant radionuclide in naturally occurring radioactive material. There was a marked difference between the two rivers with higher activity concentrations around 3000-3500 millibecquerel per kilogram (mBq/kg) found in the lower Khan River (WW202081-

202083). These activities correspond to around 0.2-0.3 mg/L of uranium in the water. The U-238 levels in the Swakop River boreholes (SW1-2) were much lower.

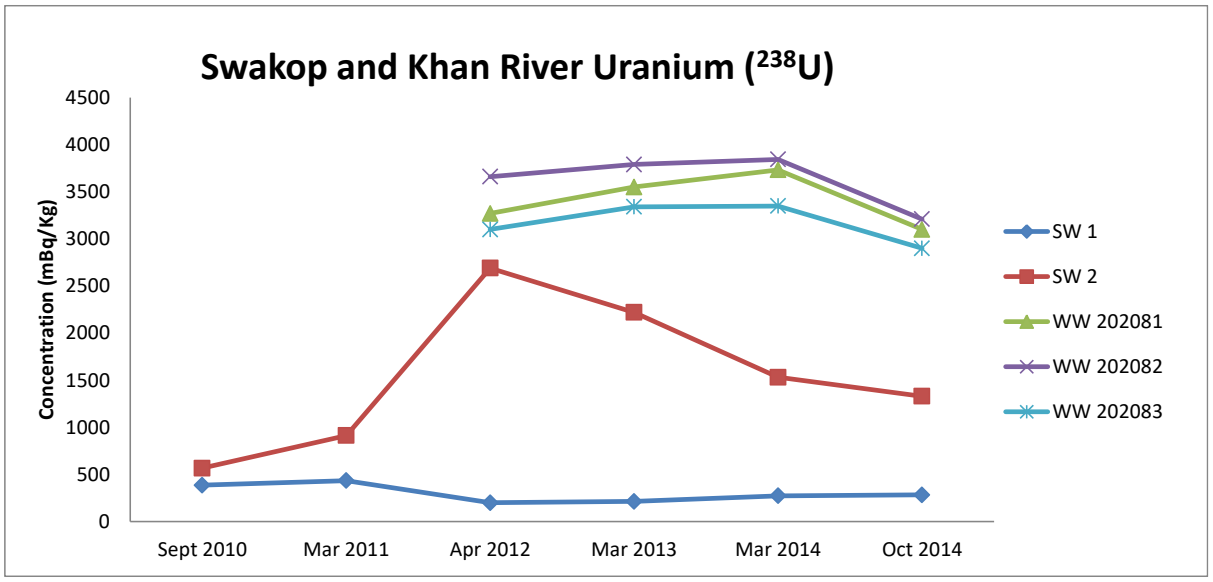

Figure 8: U-238 activities in the Swakop and Khan Rivers near Husab Mine

Analysed uranium concentrations in Table 9 ranged from 0.01 to 0.20 mg/L, compared to the Namibian standard of 4 mg/L and World Health Organisation guideline of 0.03 mg/L for drinking water. Specialist studies carried out as part of the Strategic Environmental Assessment for the Central Namib Uranium Rush concluded that uranium in Khan and Swakop groundwater originated from weathering of uranium-bearing rock types that occur in the catchment areas (SEA, 2010).

Motivation of status:

The indicator requires that radionuclide and heavy metal concentrations conform to the national water quality standards. This is broadly the case, even though the tested groundwater samples were more saline than potable water. The slightly elevated iron and manganese concentrations in two samples are not significant and these elements are not toxic. Uranium, the only radionuclide that was determined by DWAF in this period, was within the natural range of variation that is found in a uranium province and in compliance with the national standard. The indicator was therefore **MET.**

Desired Outcome 4.2.	**The natural environment, urban and rural communities have access to adequate water**			
Target 4.2.1.	**Uranium mining does not compromise surface and groundwater availability**			
Indicator 4.2.1.1.	**Groundwater abstraction from NamWater's Central Namib water scheme does not exceed the aquifers' sustainable yield**			
Data Source	**DWA**			
Status:			**MET**	

In line with the principle of Sustainable Water Resource Management, Namwater has reduced abstraction from 9 Mm^3/a to 4.6 Mm^3/a from OMDEL and 9 Mm^3/a to 7 Mm^3/a from Kuiseb.

Motivation of status: The water levels in both aquifers are has stable for the past 2 years, this indicator is rated as **MET**.

Indicator 4.2.1.2.	Borehole levels fluctuate within existing norms			
Data Source	NUA/DWA			
Status:			MET	

Groundwater levels in the boreholes along the Swakop/Khan Rivers show an increase compared to the measurements form last year 2013. This shows that there was a little recharge which occurred after the rain season in the area. Bannerman's boreholes up and down stream shows an increase or rise in groundwater along the river in the same month of August 2014, with arise from 3.37m to 1.05m (WW41072) and 2.99m to 2.7m (WW41075) below surface. Boreholes downstream also showed a rise in water table from 2.11m to 1.8m (GAHD020) and decreased from 1.54m to 1.82m (WW200413) below surface. (Figure 9 and Table 10).

Water level monitored at Langer Heinrich boreholes in July 2013 from boreholes WW41181, WW41182 and WW41184, compared to August 2014 shows an increase in water table. The water table rose from approximately 2.38m to 2.4m (WW41181) and decreased from 1.09m to 1.72m (WW41182) below surface respectively. Some of the boreholes monitored at Rossing Uranium mine are BH4, BH77 and KEM3. In July 2013 the water levels recorded from the boreholes compared to the measurement in August 2014 shows that the water table rose from approximately 10.04m to 9.47m (KEM3) below surface. This shows that there is fluctuation in water level at Rossing Uranium Mine. Boreholes monitored at Swakop Uranium are WW202082, SW1 and SW2. In November 2013, the water levels recorded from SW1 borehole compared in August 2014 shows that the water table rose from 1.77m to 1.2 metres below surface. This shows rise in water table contributed by recharge (Figure 9 and Table 10).

Figure 9: Boreholes water levels in the Swakop and Khan River

Table 10: Rest Water Level (RWL) from 2013 to 2014

WW	Lat	Long	Location	RWL (m)2013	RWL (m)2014	Classification
41072	-22.6766	14.86943	Bannerman	3.37	1.05	D
41075	-22.6928	14.90099	Bannerman	2.99	2.7	D
200413	-22.6679	14.82250	Bannerman	1.54	1.82	D
GAHD020	-22.6595	14.79251	Bannerman	2.11	1.8	D
41181	-22.7308	15.22724	Langer Heinrich	2.38	2.4	D
41182	-22.7316	15.24607	Langer Heinrich	1.09	1.72	D
41184	-22.7273	15.3924	Langer Heinrich	5.2	1.77	D
BH4	-22.4945	15.07501	Rossing Uranium	9.51	6.75	D
BH77	-22.6496	14.93043	Rossing Uranium	17.8		D
KEM3	-22.4579	15.12024	Rossing Uranium	10.04	9.47	D
202082	-22.5626	14.99653	Swakop Uranium	11.47		D
SW1	-22.7613	15.05840	Swakop Uranium	1.77	1.2	C
SW2	-22.7316	15.02125	Swakop Uranium	1.36		D
201571	-22.6739	14.59983	Lower Swakop River		1.82	D
201569	-22.6444	14.70915	Lower Swakop River		3.1	D

Motivation of status: There were no concerns from the farmers along the Rivers closer to the mines that are using the groundwater, that the mines are over-abstracting the groundwater resources. The groundwater level have increased and therefore showing a positive effect, this indicator is rated as **MET**.

Indicator 4.2.1.3.	**Aquifer water will be made available to domestic users at approved NamWater rates**			
Data Source	**DWAF**			
Status:			**MET**	

Namwater has been supplying water to consumer since its inception in 1997 (DWAF, 2015). Domestic users supplied from NamWater's central Namib scheme paid water rates that were approved by Government (source: Government Gazette). The tariffs that were gazetted in 2014 were broadly in line with the inflation rate and did not include any additional increases to recover the higher cost of desalinated water from domestic consumers (NUA, 2015). The mining companies continued to carry the full cost of desalination in 2014, while domestic users paid for aquifer water, even though all users actually consumed a mixture of about 70% groundwater and 30% desalinated water.

Motivation of status: The tariffs gazetted in 2014 were in line with the inflation rate and did not include any additional increases to recover the higher cost of desalinated water from domestic consumers. The indicator was **MET**.

Indicator 4.2.1.4.	**NamWater disaster management plans are in place a and implements them in case of flood damage to supply schemes**			
Data Source	**DWA**			
Status:		**IN PROGRESS**		

Efforts are ongoing to ensure that NamWater infrastructure is flood damage proof; this is done by constructing boreholes, pipe lines and power lines to either withstand or avoid flood damage.

Motivation of status: Because of the ongoing activity this indicator is rated as **IN PROGRESS**.

Desired Outcome 4.3.	**Water for industrial purposes is available and reliable**			
Target 4.3.1.	**Additional water resources (notably desalinated water) are developed to meet industrial demand**			
Indicator 4.3.1.1.	**Industrial investors are not lost because of water unavailability**			
Data Source	**DWA**			
Status:			**MET**	

Water supply to development is stable considering the availability of the desalination plant and current efforts to develop the southern palaeochannel at Omdel.

Motivation of status: Supply is secure, although it might come at a higher cost if the need to cover the groundwater supply shortfall with for desalinated water increases. This indicator is rated as **MET**.

Indicator 4.3.1.2.	**Desalinated water meets mine demand**			
Data Source	**DWA**			
Status:			**MET**	

In 2014, NamWater supplied 4.8 Mm^3 of desalinated water to meet the demand of Husab Mine (0.97 Mm^3), Langer Heinrich (1.35 Mm^3) and Rössing (2.43 Mm^3)(more details in indicator 4.2.1.1 for statistics on desalinated water production). The only issue that came up during the year was the high cost of desalinated water, which caused Rössing Uranium to consider building its own desalination plant.

Motivation of status: The volume of desalinated water was sufficient to meet the mines' demand. The indicator was therefore **MET**.

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Summary of performance: EQO 4

Total no. indicators assessed: 8

	NOT MET	IN PROGRESS	MET	EXCEEDED
Number of indicators in class:	0	1	7	0
Percentage of indicators in class:	0%	13%	88%	0%

Overall performance: Of the eight indicators in this EQO, 7 (88 %) has been MET. With one number of indicators rated as IN PROGRESS is 1 (13%). Overall the water EQO performed better than the previous reporting year, most data was provided by responsible stakeholders

EQO 5. Air Quality

Aims of this EQO: Workers and the public do not suffer significant increased health risks as a result of radiation exposure to dust emission from the uranium mines.

The objective of the Air Quality EQO involves assessment of the quality and quantity blown from the mining sites into the environment. Dust emissions may occur during each stage of the mine cycle, in particular during exploration, development, construction and operational activities. The principal source includes dust from blasting, exposed surfaces such as tailings, stockpiles, waste dumps and haul roads and to a lesser extent gases from combustion of fuels from equipment.

The SEMP office monitors and reports public exposure from dust, PM_{10}, ambient concentration of radon at the three major coastal towns (Arandis, Swakopmund and Walvisbay), as well as short lived progeny. The SEMP office has a PM_{10} E-Sampler at Swakopmund and three real time radon/radon progeny monitors at Arandis, Swakopmund and Walvis Bay. The data collected includes PM_{10} concentrations, ambient temperature (AT), barometric pressure (Pa), wind speed (WS), relative humidity (RH), and wind direction (WD). The dust fraction monitoring is aimed at ensuring that ambient PM10 concentrations at public locations and mines do not exceed the required target/limit for both annual and 24-hour averages. The uranium industry in Erongo supports the SEMP office by monitoring of PM_{10} at Arandis (AREVA and Rössing) as well as management of Radon equipment (Bannerman Resources and NUA).

The mining and exploration companies' reports on the air quality in their mining areas and operations are reported through the NUA -SEMP contribution. The dust fallout is collected by a dust buckets system and South African National Standards limits are used i.e. 600 mg/m²/day as permissible for residential and light commercial areas (may be exceeded up to three times within any year, but not in successive months). The limit for heavy commercial and industrial sites is 1,200 mg/m²/day and may be exceeded up to three times within any year, but not in successive months.

Desired Outcome 5.1.	**Annual human exposures to particulate concentrations are acceptable (IFC Standard).**			
Target 5.1.1.	**Ambient PM_{10} concentrations at public locations and mines should not exceed the required target/limit to be set for the Erongo Region for both annual and 24-hour averages. The target/limit should be based on international guidelines but should consider local environmental, social and economic conditions.**			
Indicator 5.1.1.1.	**Ambient PM_{10} monitoring (µg/m³) is established at Swakopmund**			
Data Source	**SEMP Office/NUA**			
Status:			**MET**	

Mines are monitoring PM_{10} dust concentrations on site and at receptor locations. The information has been provided to enable comparison of the dust levels at mines and receptor locations and to inform the public.

AREVA Resources Namibia PM_{10} monitor in the centre of Arandis recorded an average concentration of 9.1 ± 6.8 µg/m³ in 2014, the daily average figures were all below the WHO interim target of 75 µg/m³. Average values for 2014 and 2013 were very similar; they also correlated well with the readings obtained by Rössing Uranium PM_{10} on the eastern edge of the town (Figure 10). The Rössing station also recorded an average dust concentration of 11.4 with the higher concentration in December.

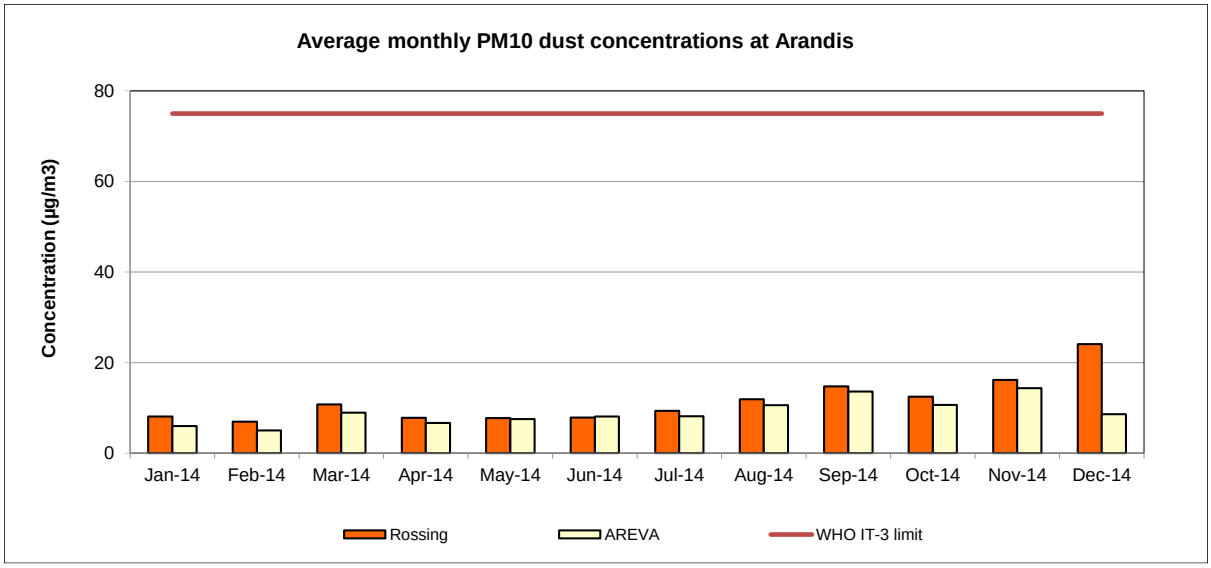

Figure 10: Average Monthly PM_{10} Dust Concentrations at Arandis

High volume dust samplers that collect PM_{10} dust particulates have been deployed at two monitoring stations at the Langer Heinrich mine site. These high volume samplers are of an international standard and are operated at 67.8 $m_3\ h^{-1}$ for around 168 hours (one week) at a time.

One of the monitoring stations is situated on the Run-Of-Mine (ROM) pad near the crushers as this is an area that could be considered the main source of environmental dust on the site. The other station is situated at the entrance gate to the site.

Results from this monitoring are presented in Table 11 and plotted in Figure 11. Higher PM_{10} concentrations were measured at the ROM pad with an average concentration of 328ug/m^3 whereas the average concentration at the entrance gate is 42ug/m^3. The concentration at the entrance gate is below the WHO international recommended limit of 75ug/m^3, therefore higher dust concentrations are confined within the mine area at dust producing zones.

Also included in these environmental dust sampling results (Figure 11) are the results from monitoring dust concentrations in LHU's Swakopmund office during 2013. This sampling was conducted to obtain an indication of dust concentrations away from the mine site. Samples taken in this location recorded results less than the radiometric minimum detection limit; this sampling was not conducted in 2014.

Table 11: PM_{10} dust concentrations at Langer Heinrich Mine (LHU)

Gravimetric Dust Concentrations - Environmental

Location		Number of Samples		Dust Concentration ($mg.m^{-3}$) [a]					
Code	Description			Max		Mean[a]		Std-Dev	
ENV01.1	Entrance Gate[b]	50	*46*	1.02E-01	*1.06E-01*	4.21E-02	*4.43E-02*	2.11E-02	*2.01E-02*
ENV02.1	ROM Pad[b]	53	*44*	9.23E-01	*1.03E+00*	3.28E-01	*3.09E-01*	1.86E-01	*1.66E-01*

(a) Figures in blue italics are from the previous year
(b) Minimum Detection Limit: 1.00E-03 $mg.m^{-3}$.
(c) Minimum Detection Limit: 1.00E-02 $mg.m^{-3}$.

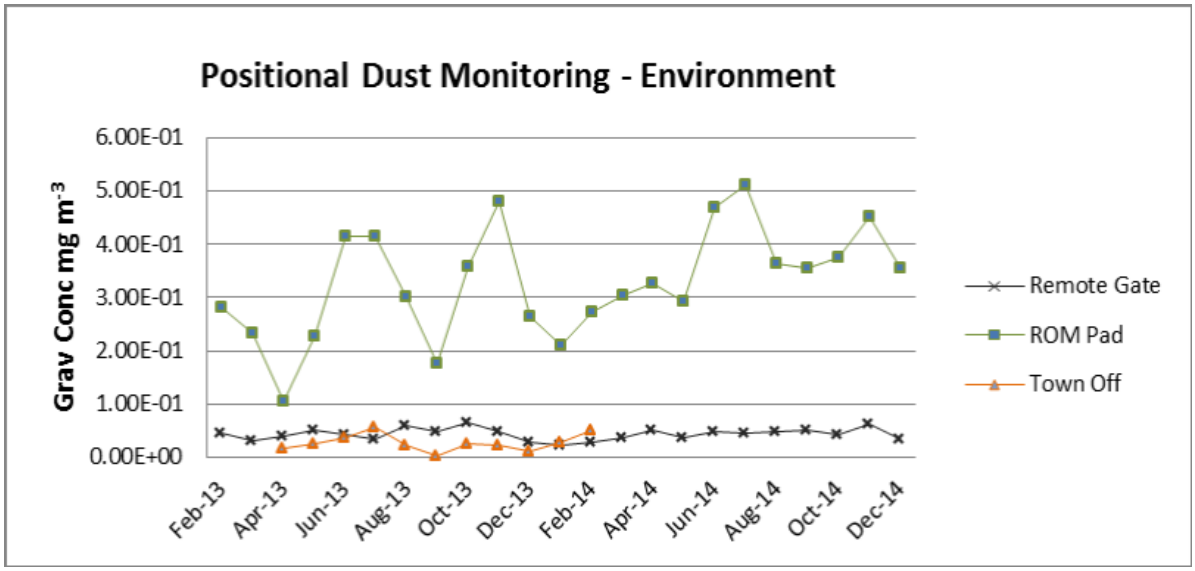

Figure 11: Positional gravimetric dust concentrations

Swakop Uranium installed a continuous PM_{10} monitor at Husab mine and reported daily average concentrations in 2014. The annual average for 2014 was 28.2 ± 23.4 µg/m³ and the monthly average figures were all below the WHO interim target of 75 µg/m³ (Figure 12).

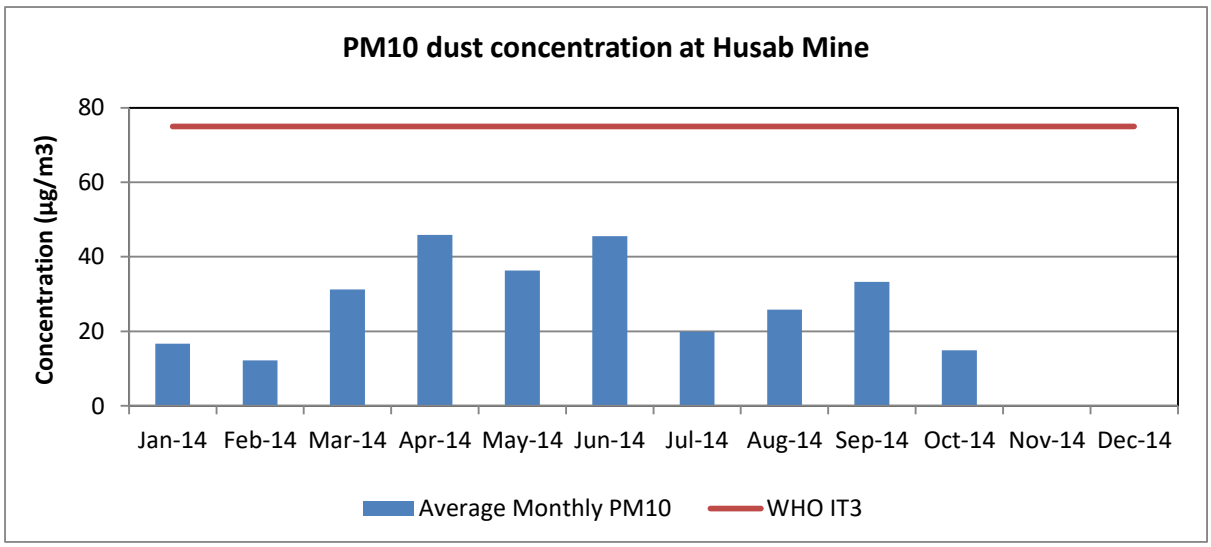

Figure 12: Average monthly PM10 Dust Concentrations at Husab Mine

The SEMP office monitors PM_{10} dust concentration in the town of Swakopmund. Figure 13 below shows the average monthly PM_{10} concentration for 2014. The concentrations are well below the WHO-IT3 limit of 75µg/m³ with the average of 12.50 µg/m³ and the highest concentration of 19.5 µg/m³ recorded in November.

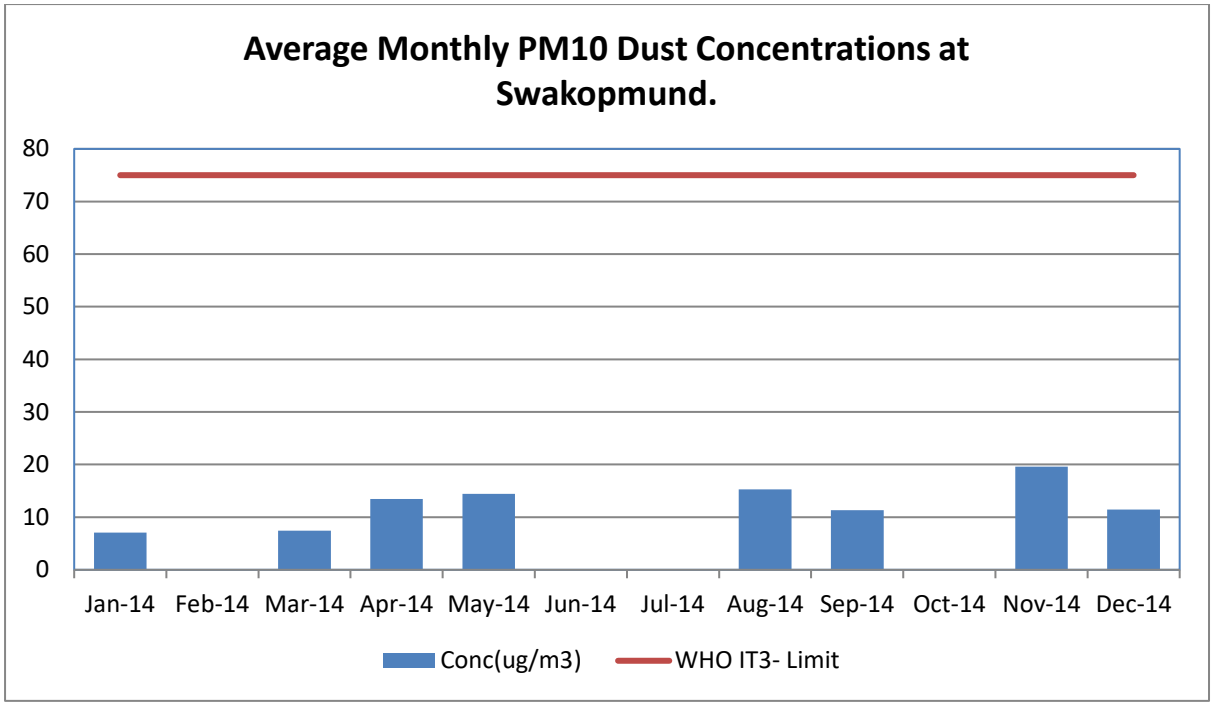

Figure 13: Average monthly PM_{10} dust concentrations at Swakopmund.

Motivation of status:

All PM_{10} concentrations recorded at the mines and the SEMP PM_{10} are below the WHO-It3 limit of 75ug/m3. Therefore the Indicator is rated **MET**.

Desired Outcome 5.2.	**Nuisance dust resulting from the uranium mining is within acceptable thresholds.**
Target 5.2.1.	**Dust fallout levels at residences in towns should not exceed the recommended limit of 600 mg/m^2/day.**
Indicator 5.2.1.1.	**Continuous dust fallout measurements (mg/m^2/day) on a regional scale e.g. maintain existing SEA dust fallout network.**
Data Source	**SEMP Office/NUA**
Status:	**NOT MET (NO DATA)**

Monitoring of the SEA dust fallout network ended in 2012 after an adequate baseline of regional dust fallout levels had been established. It was found during this survey that the highest dust concentrations outside of mining areas occurred in the vicinity of gravel roads. None of the towns in the region were affected by dust fallout exceeding the recommended limit of 600 mg/m^2/day. This indicator has therefore become obsolete and could be omitted from the next report.

Motivation of status: The dust fallout monitoring was discontinued in 2012. This indicator was not measured.

Target 5.2.2.	**Mitigation measures to be implemented by mines at all major dust generating sources such as haul roads, materials transfer points and crushing operations. The best practical dust suppression methods should be implemented and monitored through dust fallout buckets at strategic locations.**			
Indicator 5.2.2.1.	**Mines must implement a dust fallout network, measuring dust fallout at main dust generating sources and mine license boundaries.**			
Data Source	**SEMP Office/NUA/NRPA**			
Status:			**MET**	

All operating mines and mines under development or care and maintenance applied mitigation measures and maintained dust fallout monitoring networks in 2014.

In 2014, AREVA Resources Namibia monitored dust fallout at 14 sites on Trekkopje mine, at Arandis and at the Erongo desalination plant. Low dust levels of 9-41 mg/m^2/day were recorded with a maximum of 189 mg/m^2/at the desalination plant in October 2014. It is not clear what that specific increase. The second highest dust levels were measured at the Midi plant (DM16), where most of the traffic passes (Figure 14). Background dust levels were in the range of 9-20 mg/m^2/day. All the results were below the SANS limit for residential areas of 600 mg/m^2/day and the limit for industrial areas of 1200 mg/m^2/day. Many monitoring sites showed higher dust fallout during the second half of the year, which may be caused by generally drier conditions and higher wind speeds during the winter and spring seasons.

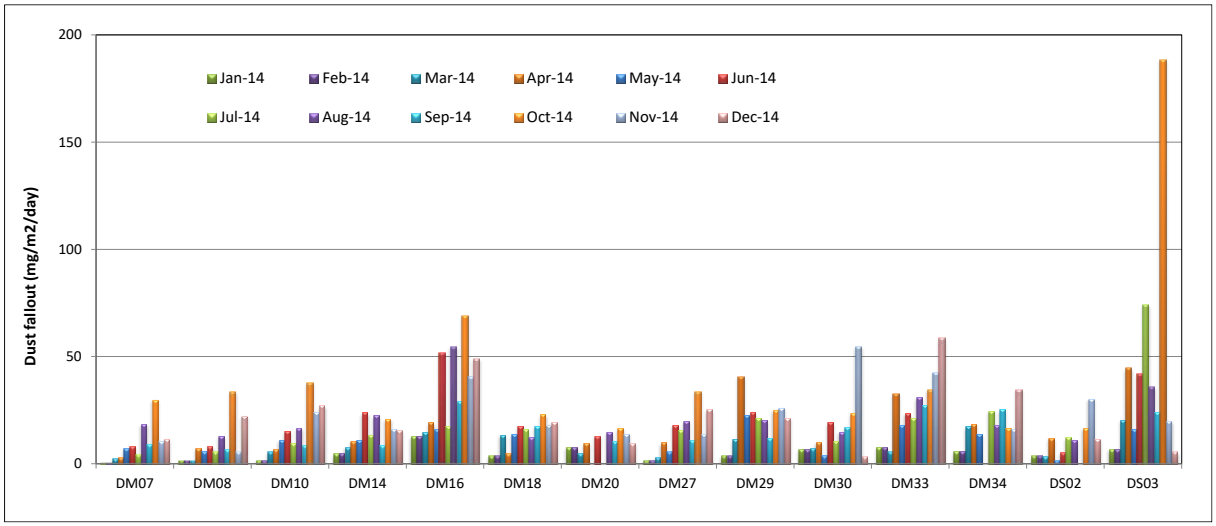

Figure 14: Average monthly dust fallout concentrations at Trekkopje Mine

In 2014, Langer Heinrich Mine monitored dust fallout at 11 sites on and around the mine. The results (Figure 15) showed generally higher dust levels than at Trekkopje, Husab and Rössing, which may be explained by the mine's location in a valley hemmed in by mountains that restrict the air flow. The dust levels were though below the SANS limit for industrial areas of 1200 mg/m^2/day, except for valley south CCD that exceeded the limit in July and August 2014. This site is however in the centre of the processing plant close to dust generating sources.

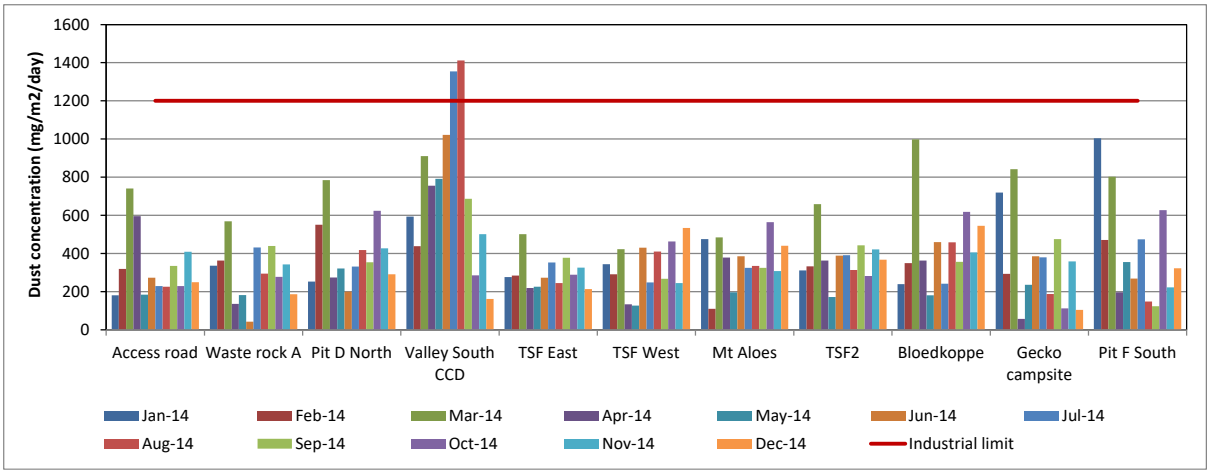

Figure 15: Average monthly dust fallout concentrations at Langer Heinrich Mine

Rössing Uranium measured dust fallout in the vicinity of Arandis and at five "background dust" (BD) sites south-west and north-east of the open pit and tailings dam. These directions were chosen to correspond with the prevailing wind directions in the coastal region. The results were all below 100 mg/m^2/day (Figure 16), showing firstly, that the dust mitigation measures were effective and secondly, that nuisance dust generally does not travel very far from its sources.

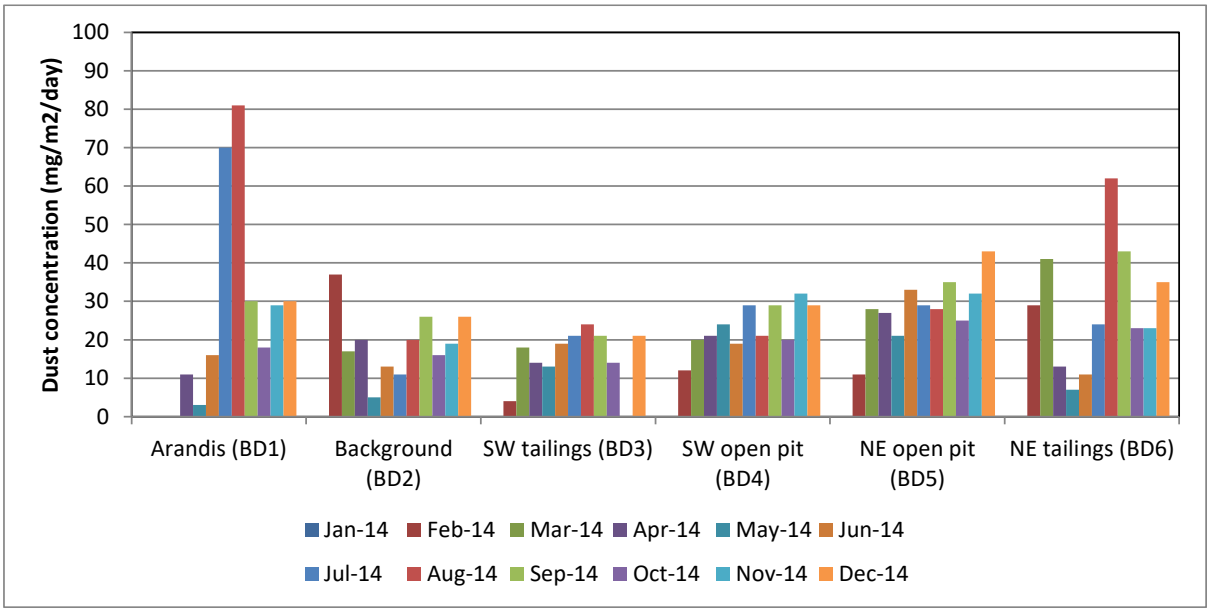

Figure 16: Average monthly dust fallout concentrations at Rössing Mine

At Husab Mine, an extensive network of 28 dust fallout buckets where monitored in 2014. The graph below summarises the results. The dust levels were generally below the SANS limit for industrial areas of 1200 mg/m^2/day and below the residential limit of 600 mg/m^2/day in most cases. Occasional peaks occurred at sites that were close to construction activities, e.g. EXT03A and EXT15. One site, EXT04, has been omitted from the graph because it had very high dust levels of 2225-5331 mg/m^2/day in January-May 2014 (Figure 17). Values for the rest of the year at EXT04 were around 200 mg/m^2/day.

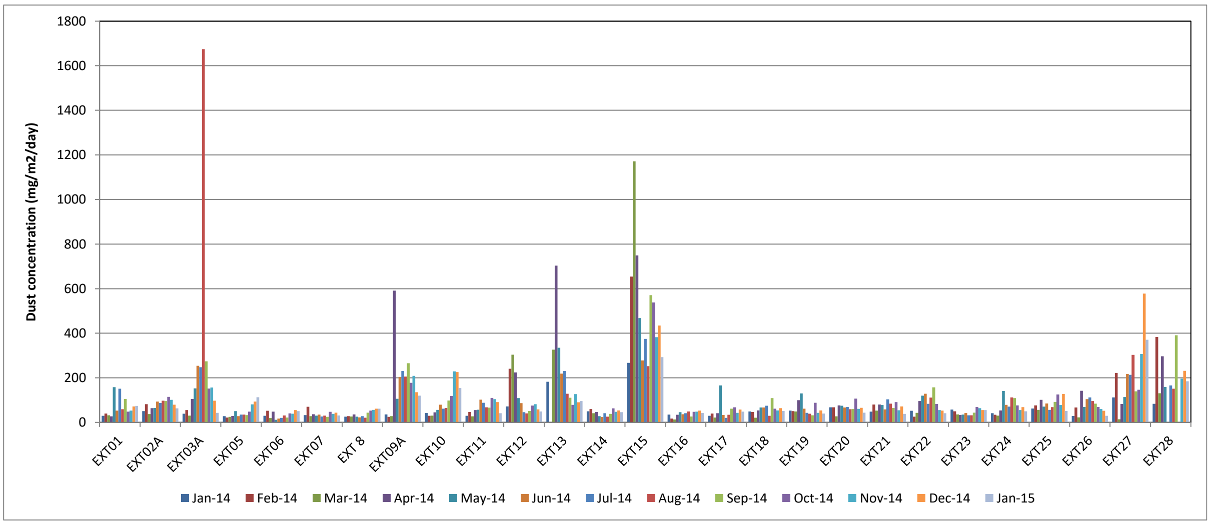

Figure 17: Average monthly dust fallout concentrations at Husab Mine

Motivation of status:

As demonstrated by the results above, mines have implemented dust fallout networks at main dust generating sources and mine licence boundaries. The general dust levels were all below the South African National Standards industrial limit of 1200 mg/m^2/day except one station at Husab and one at LHM which exceeded once. The indicator is therefore rated as **MET**.

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Summary of performance: EQO 5

Total no. indicators assessed: 3

	NOT MET	IN PROGRESS	MET	EXCEEDED
Number of indicators in class	1	0	2	0
Percentage of indicators in class	33%	0%	67%	0%

Overall performance: A total of three indicators were assessed of which two were rated as MET compared to 2013 when all three indicators were MET. The indicator for continuous dust fallout measurements on a regional scale could not be assesses because the dust fall out network was deemed economically not necessary on a yearly basis. In the meantime, a regional advanced air quality and management is to be commenced in 2016.

EQO 6. Health

Aims of this EQO: Workers and the public do not suffer significant increased health risks from the Uranium Rush.

Radiation has existed in the universe since the beginning of time. Light, heat, infra-red and ultraviolet rays have bombarded the earth since it was formed. We have learned to harness the energy of many types of radiation, such as radio waves, microwaves and the radioactivity emitted by unstable atoms of elements such as uranium, and we have added human-made sources to those that occur in nature. Because radiation occurs naturally on earth, both people and the environment have adapted certain levels of ionising radiation. We are exposed every day to ionising radiation from cosmic rays, building materials, food, the earth we walk on, and the air we breathe. This naturally occurring radiation is known as background radiation and it constitute by far the greatest exposures. For people involved in mining there is potential exposure to what are in fact naturally-occurring radioactive materials (NORM). As for other occupational health hazards, monitoring and then controlling the risks is necessary. A dose is the amount of medically significant radiation a person receives. Although uranium itself is barely radioactive, the ore which is mined must be regarded as potentially hazardous due to uranium's decay products (such as radon), especially if it is high-grade ore. Radon gas emanates from the rock (or tailings) as radium decays. It then decays itself to (solid) radon daughters, which are energetic alpha-emitters. A number of precautions need to be taken at uranium mines to protect the health of workers and the surrounding environment. Additionally, meeting of air quality objectives which are directly related to health plays an important role. Adequate monitoring data must be available to assess performance of the industry

The National Radiation Protection Authority (NRPA) is a division with in the Ministry of Health and its objective is to protect human beings (workers, patients, and the public) and the environment from undue risks, resulting from the harmful effects of ionising radiation, while allowing for its beneficial application in medical, industrial, scientific and other purposes.

Desired Outcome 6.1.	**Disease rates amongst the public and employees of the mining are not increased as a result of the Uranium Mining**			
Target 6.1.1.	**Increments in the concentrations of uranium, thorium and health-relevant nuclides of the uranium, thorium and actinium decay chains such as Ra-226 and Ra-228 (above respective background concentrations) in air and water (ground and surface) that originate from uranium mines, must be constrained so that the cumulative radiation dose to members of the public is reasonably minimized and does not exceed 1 mSv per annum above background.**			
Indicator 6.1.1.1.	**Public dose assessments produced by each new mine project include the cumulative impact of other operating mines.**			
Data Source	**NUA/NRPA**			
Status:		**IN PROGRESS**		

Up to now, most existing mines and new projects have done their public dose assessments without considering the cumulative impact because it was difficult to predict how many new mines would start up during the "uranium rush". The only assessment for the entire region was carried out as part of the SEA in 2009. However, the SEMP project will conduct an advanced air quality and management study for the Uranium Province from April 2016; an update of the original air quality model. In turn this will allow informing of the atmospheric pathway portion of the public radiation dose assessment for the whole region.

On the other hand, Husab the only new mine in development conducted a public dose assessment as part their latest EIA amendment in 2013. The assessment identified all critical groups around the mine boundaries and took the presence of other mines into account by using a dose constraint of 0.3 mSv/a instead of the public limit of 1 mSv/a for a single operation.

Motivation of status: Traditionally, existing mines have done their public dose assessments without considering the cumulative impact. At this point, Husab mine was the only mine that cumulative impact of other operations. This indicator is therefore **IN PROGRESS**.

Indicator 6.1.1.2.	**Modelled cumulative radiation dose to critical groups of the public does not exceed 1 mSv/a above background**			
Data Source	**NUA/NRPA**			
Status:		**IN PROGRESS**		

To date, the only assessment of the cumulative radiation dose was the SEA study of air quality and radiation in the Erongo region. This study predicted that critical groups of the public would not be exposed to doses exceeding 1 mSv/a above background. The results were however questioned because of shortcomings in the air quality model on which the radiological assessment was based. Now that several more years' worth of weather and dust data is available from the mines and the SEMP monitoring network, the SEMP Office is planning to update the air quality model and radiological dose assessment from 2016, running for the next 3 years.

The public dose assessments that AREVA, Langer Heinrich, and Rössing carried out did not specifically address the cumulative impact due to the presence of other mines. Conclusions can however be drawn from the modelled doses to critical groups around each operation. Although Husab has considered this aspect in their EIA, the dose was constrained to 0.3 mSv/a instead of the public limit of 1 mSv/a. Overall, the mines reported the following figures (Table 12).

Table 12: Public dose assessment results from the mines

Company	**Public dose assessment results (mSv/a)**		
	Additional dose at mine boundary	Dose to critical group	Critical group location
AREVA	0.04-0.4	0	Arandis
Langer Heinrich	1.9*	1.9*	Mine boundary
Rössing	<0.1	<0.1	Arandis airport
Husab	<0.1	0	Khan River, Welwitschia plains

*The dose of 1.9 mSv/a at LHU's mine boundary includes the natural background radiation. No members of the public live close to the mine boundary.

It could be argued that in the absence of significant additional doses at the mine boundaries there will be no cumulative impact on the public because the "radiation plumes" from the mines do not overlap at the towns. As elaborated in **Figure 18**, the highest exposure at the open pit and waste rock dump of 300 µSv/a corresponds to 0.3 mSv/a at Husab Mine ((Husab), 2014, (NECSA*), 2013). The Rössing's radon dose modelled in 2011 is shown in **Figure 19** for comparison ((Rossing), 2014; (NECSA**), 2011). If the maps were superimposed, the blue and green lines for 10 and 50 µSv/a at Rössing would overlap the blue part of the Husab "plume" in the area of the Khan River and Khan Mine. The Rössing radon dose model also proved that it is unlikely to have a cumulative impact on the population of Arandis.

This however needs to be confirmed by the updated air quality model and radiological dose assessment mentioned above that the SEMP project will embark on in 2016.

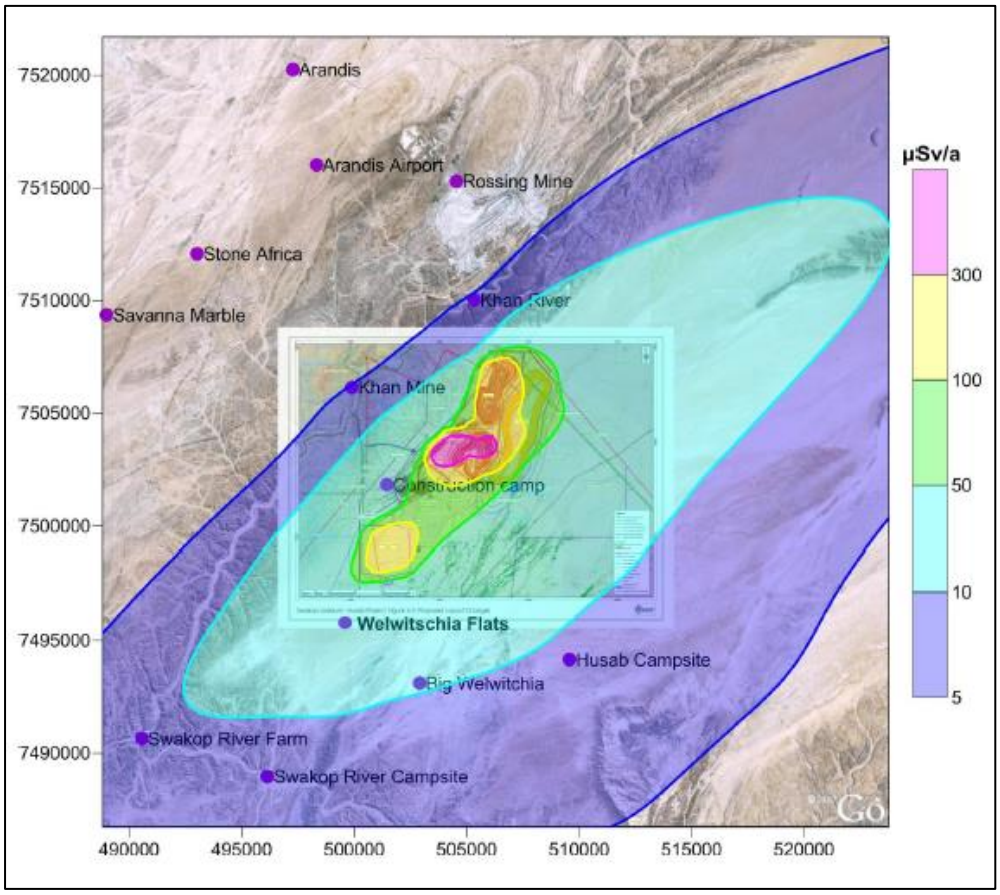

Figure 18: Modelled Radon Plume and Critical Group Locations at Husab Mine

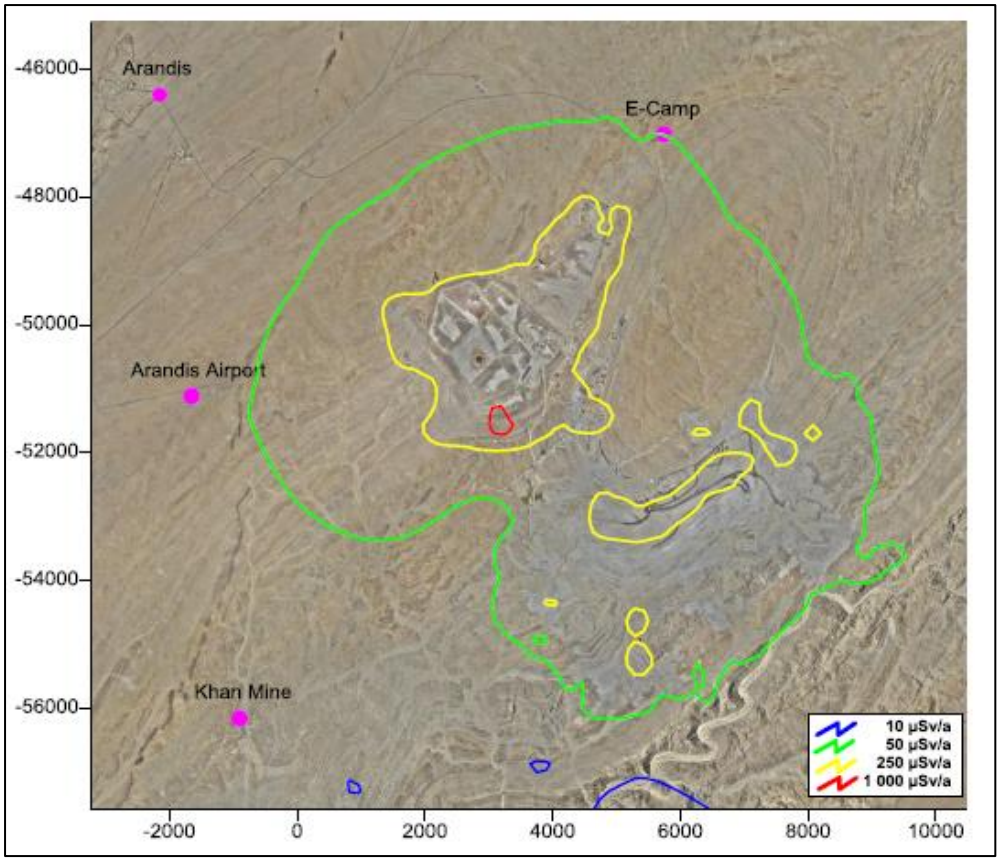

Figure 19: Modelled Radon Plume and Critical Group Locations at Rössing Mine

Radon gas makes the biggest contribution to the public dose: The weighted average for the Erongo region was estimated as 0.5 mSv/a in the SEA report (MME 2010). The SEMP Office has therefore established three radon monitoring station in towns in the Erongo region to collect data on public radon exposure.

The ambient radon concentrations measured in 2014 from the SEMP radon stations in Swakopmund, Walvis Bay and Arandis varied from 7.9 to 20.3 Bq/m^3, with the highest values recorded at Arandis and the lowest at Walvis Bay (**Table 13**). Radon is emitted from any type of soil but not from ocean water, so one would expect lower values at the coast. Public doses calculated from the measured data are 0.4 mSv/a at Arandis, 0.3 mSv/a at Swakopmund and 0.2 mSv/a at Walvis Bay. These results are similar to the figures for 2013 and are all in line with the natural background doses from the SEA study (MME 2010).

Table 13: SEMP Radon Monitoring Network Results for 2014

	Average Radon Concentration (Bq/m^3)		Radon Dose (mSv/a)	
	2013	**2014**	**2013**	**2014**
Arandis	22.2	20.3	0.5	0.4
Swakopmund	11.9	11.7	0.3	0.3
Walvis Bay	7.1	7.9	0.2	0.2

The doses were calculated as follows: Average radon concentration in Bq/m^3 * 0.4 (equilibrium factor between radon and progeny) * 0.00000556 mJ/m^3 (conversion factor) * 1.1 mSv (dose conversion factor) * 8760 hours.

Motivation of status: Though the various mines' public dose assessments did not specifically address the cumulative impact due to the presence of other mines, they predicted the doses to critical groups around each operation. This information indicated that there was probably no or very little cumulative impact to established residential areas. Also, the radon monitoring of the SEMP network confirmed that the public at Arandis, Swakopmund and Walvis Bay was not exposed to additional radiation from the mines. Because the cumulative impact still has to be confirmed by the updated air quality model and radiological dose assessment that the SEMP Office will commission, the indicator has been rated as **IN PROGRESS**.

Target 6.1.2.	**The cumulative radiation dose to members of the public and designated radiation workers does not exceed the legal limit.**			
Indicator 6.1.2.1.	**Measured change in absorbed radiation dose of uranium mine workers and medical professionals (designated radiation workers)**			
Data Source	**NUA**			
Status:			**MET**	

In the absence of regulations that specify whether the workers exposure should be calculated including or excluding the natural background radiation, the industry continued to apply its own systems that result in some inconsistencies (Table 14. AREVA Resources Namibia and Langer Heinrich Mine reported the radiation dose of all workers on site including the natural background. Rössing included the background as well, but measured only the dose from penetrating radiation. Bannerman calculated the additional dose to workers by subtracting the natural background radiation measured at Swakopmund. Reptile reported the additional dose excluding background. Swakop Uranium started monitoring employees' exposure when activities ramped up in 2015.

The advanced air quality and management that the SEMP will embark on in 2016 will yield amongst many, ambient air quality guidelines and targets taking into consideration risks to health, technological feasibility, economic considerations, and other political and social factors.

Table 14: Radiation dose to designated radiation workers (mSv/a)

Company	**Radiation dose to designated radiation workers (mSv/a)**	
	Average dose	Number of workers exposed to >20 mSv
AREVA Resources Namibia	2.4	0
Bannerman Mining Resources	0.35	0
Langer Heinrich Mine	3.1	0
Reptile Uranium Namibia	0.03	0
Rio Tinto Rössing	1.4	0
Swakop Uranium	No data	
Valencia	NA	NA
Zhonghe	0	0

Motivation of status: Although there is lack of regulations and guidelines, none of the measured doses to workers exceeded the limit of 20 mSv/a in 2014. This indicator is therefore **MET**.

Target 6.1.3.	**No measurable increase, directly or indirectly attributable to uranium mining and its support industries in the incidence rates of the following:** • **Industrial lung disease (including pneumoconiosis)** • **Lung cancer** • **Other industrial related cancers** • **Industrial induced renal damage** • **HIV/ AIDS** • **Tuberculosis** • **Industrial dermatitis**
Indicator 6.1.3.1.	**Measured change in the incidence rate of industrial diseases amongst uranium mine workers.**
Data Source	**NUA**
Status:	**NOT MET**

Indicator 6.1.3.2.	**Measured change in the incidence rate of diseases scientifically attributed to radiation amongst members of the public, uranium mine workers and medical personnel**
Data Source	**NUA**
Status:	**NOT MET**

Like in 2013 assessment, there is still a need for an independent epidemiological study.

Motivation of status: Indicator 6.1.3.1 and 6.1.3.2 are therefore remains **NOT MET**.

Target 6.1.4.	**No increase in road accidents directly attributable to uranium mining and its support industries.**
Indicator 6.1.4.1.	**Measured change in the number of fatal road accidents per road user over 1 year**
Data Source	**NUA**
Status:	**IN PROGRESS**

According to the MVA Road Crash and Claims report of 2014, Namibia is faced with the reality of an upsurge in the number of motor vehicle crashes, deaths and injuries. The recorded road crash statistics indicate an increase in the number of traffic crashes (Figure 20). Such recorded road crashes increased by 8% from 2010 to 2011 and by 22% between 2011 and 2012. The number of road crashes reduced during the year 2013 by 2% in comparison with 2012, but again increased, by 16% during the year 2014.

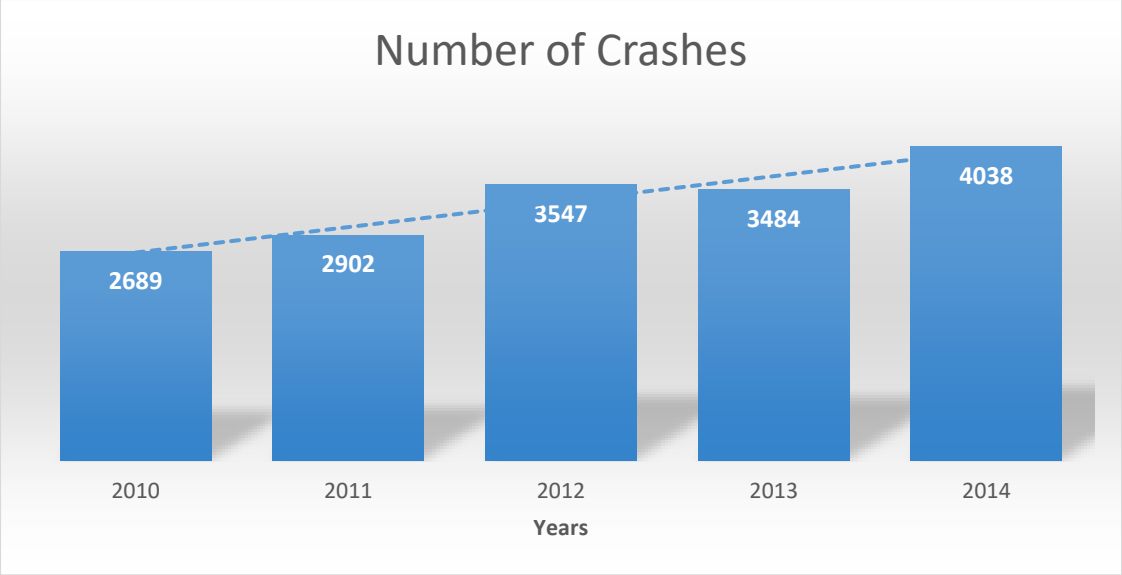

Figure 20: Road Crash statistics for 2014. Source: (MVA, 2014).

The five regions with the highest number of crashes remained the same for the past reporting two years. These are the Khomas (39%), Erongo (12%), Otjozondjupa (9%), Oshana (10%) and Oshikoto region (5%) (**Figure 21**) (MVA, 2014). Erongo Region reported 69 fatalities, fourth ranking amongst the regions (MVA, 2014). It is evident from the graph that the majority of road crashes are recorded in the regions that host bigger populations and highest number of vehicles.

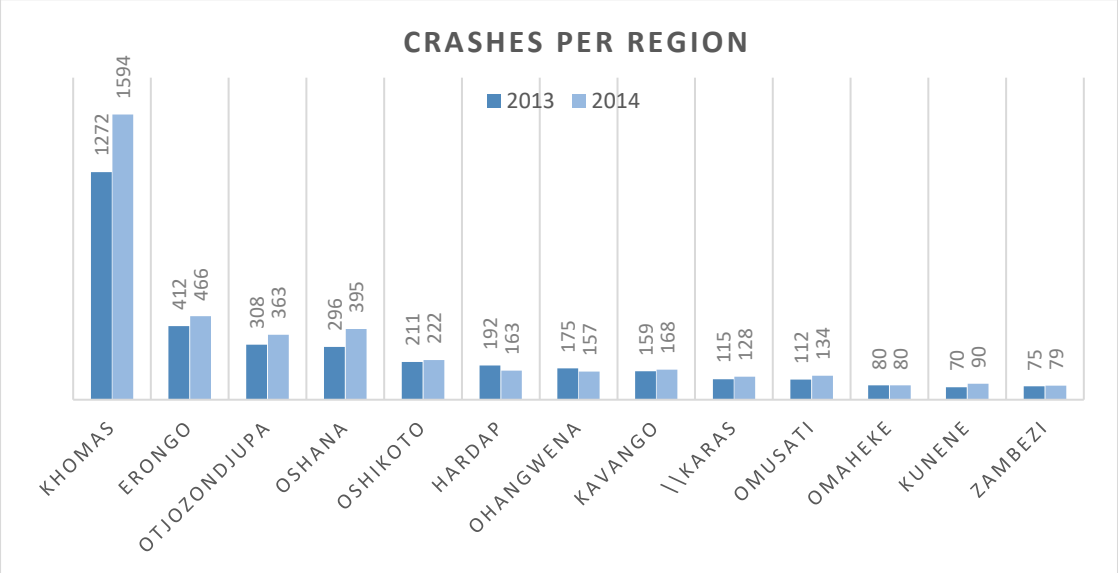

Figure 21: Road crash per Regions. Source: (MVA, 2014).

According to feedback from the mining industry, there were no fatal accidents involving mine employees or contractors in 2014. AREVA, Bannerman, Reptile and Valencia reported no vehicle accidents, while Langer Heinrich, Rössing and Swakop Uranium experienced several accidents and near-miss incidents. On the 29th July 2014, three Langer Heinrich employees were involved in an accident off-site on their way home. This was a result of vehicle that was travelling on the wrong side of the road when it came over a blind rise on the C28 road. All passengers were injured, including one serious injury. Rössing recorded twelve incidents, of which six were near misses, four were minor

incidents with no damage and two were medium with some vehicle damage, but no injuries. Swakop Uranium's bus conveying employees from Husab Mine to Swakopmund had a high potential near-miss while overtaking a truck. Overall, there where accidents reported in 2014 compared to none in 2013. The traffic volume on the B2 road has increased significantly, leading to a higher accident risk. The upward trend of road crashes, as presented in this report, calls for combined efforts from government, non-governmental organizations and civil society organizations to pull resources together. The Roads Authority should urgently consider upgrading the road and constructing passing lanes.

Motivation of status: Although there where accidents reported by Langer Heinrich, Rössing and Swakop Uranium, none where fatal. This indicator is therefore **IN PROGRESS.**

Desired Outcome 6.2.	**Improved Healthcare Facilities and Services are able to meet the increased demand for healthcare resulting from the uranium mining**			
Target 6.2.1.	**An increase in qualified health workers available to all in the Erongo Region, reaching 2.5 per 1000 of the population by 2020**			
Indicator 6.2.1.1.	**Number of available qualified healthcare personnel: 2.5 per 1000 of population; Number of Medical Practitioners: 1 per 1000 of population; Number of Dental Practitioners: 1 per 2000 of population; Number of nurses: 2.5 per 1000 of population; Pharmacists: 1 per 2000 of population**			
Data Source	**SEMP Office/MoHSS**			
Status:		**IN PROGRESS**		

Target 6.2.2.	**An increase in registered healthcare facilities in Erongo, available to all, reaching 2.5 acute care beds per 1000 population and 0.5 chronic care beds per 1000 population by 2020**			
Indicator 6.2.2.1.	**Number of available registered healthcare facilities: 1 per 1000**			
Data Source	**SEMP Office/MoHSS**			
Status:		**IN PROGRESS**		

Target 6.2.3.	**An increase in ambulances in Erongo, reaching 1 per 20,000 by 2020.**			
Indicator 6.2.3.1.	**Number of available ambulances: 1 per 20,000.**			
Data Source	**SEMP Office/MoHSS**			
Status:		**IN PROGRESS**		

Ensuring the provision of quality health care is one of the most important goals of the Ministry of Health and Social Services (MoHSS). Although efforts are being made to build capacity and skills of health workers to provide quality essential services, past research evidence shows that Namibia's public health facilities face several challenges related to governance, financing, resources, communication and coordination. Lack of proper maintenance has contributed to poor health provision. Currently, the country has a health infrastructure network consisting of 295 clinics, 47 health centers, 30 district hospitals, three intermediate hospitals and one national referral hospital, nine Sick Bays as well as various social welfare service points, private hospitals and clinics.

The population has access to three health services, which are namely public, private and not-for-profit healthcare systems. 85% of the country's population is able to access public, private and non-profit health care, while 15%, mostly middle and high income levels of the population, can access private profit-making health care systems. However, not all people have access to health facilities. Access is to health care felicities in some cases are challenged by distance and in cases of private healthcare it is affect by cost. Certain services like dialysis and organ transplantations are only available from private medical centers, putting them out of reach for the majority of Namibia's citizens.

The Annual report of 2012/2013 of MoHSS reported a total of 20 doctors in the region (Table 15). With a population of about 160 000, there ration of 1 doctor per 1000 population is still a far cry from reality. Additional reporting reported that most specialists are only hosted in the main hospital in Katutura, Windhoek Central and Oshakati Hospitals. The following health centre and clinics (Hakhaseb (upgrading), Mondesa (new clinic & staff accommodation), Swakopmund ART, Arandis, Kuiseb -, Tamariskia, Okombahe Clinics, Swakopmund, Walvisbay & Omaruru disrict Hospitals in Erongo region where under construction and renovation during the reporting year (MoHSS, 2013.p21-24).

Table 15: Medical officers and specialists in MoHSS from April 2012 to March 2013. Source: MoHSS Annual Report 2012/2013

Medical officers and specialists in MoHSS from April 2012 to March 2013					
Region/Hospital/ Directorate	# of doctors in posts	# of doctors additional to Staff establishment	# of Volunteers	# of Specialists	Total
Caprivi	6	3	4	0	13
Erongo	**15**	**4**	**1**	**0**	**20**
Hardap	7	0	0	0	7
Karas	9	0	0	0	9
Kavango	7	0	3	0	10
Khomas	10	5	12	0	27
Kunene	7	0	0	0	7
National level	4	1	1	0	6
Ohangwena	10	4	2	0	16
Omaheke	6	0	0	0	6
Omusati	18	0	1	0	19
Oshana	6	0	3	0	9
Oshikoto	8	1	1	0	10
Otjozondjupa	18	0	2	0	20
Windhoek Central Hospital	49	0	0	32	81
Katutura Hospital	37	59	8	10	114
Oshakati Hospital(Oshana Region)	36	3	0	14	53
Rundu Hospital (Kavango West)	15	0	0	10	25
Total	**268**	**80**	**38**	**66**	**452**

Motivation of status: Although there is some improvement in the health system, most of the indicators are still below the target. These indicators are then **IN PROGRESS.**

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Summary of performance: EQO 6

Total no. indicators assessed:	**9**			
	NOT MET	**IN PROGRESS**	**MET**	**EXCEEDED**
Number of indicators in class:	2	6	1	0
Percentage of indicators in class:	22%	67%	11%	0%

Overall Performance: The Health EQO previously had 9 indicators, although it was recommended in 2013 SEMP report that the indicator that measure road accidents attributed to the uranium mines be re-evaluated, it was assess this year. Overall, there is an underperformance of the health indicator compare to the 2013. More than 50% of the indicators are in progress. This is mainly due the long overdue independent epidemiological study and the public health care services that are still far from the acceptable. It is highly recommended that the responsible regulators undertake such a study and not just for the benefit of the uranium industry but also for future governance.

EQO 7. Effect on tourism

Aims of this EQO:

- **The natural beauty of the desert and its sense of place are not compromised unduly by the Uranium Rush; and to identify ways of avoiding conflicts between the tourism industry and prospecting/mining, so that both industries can coexist in the Central Namib.**
- **The Uranium Rush does not prevent the public from visiting the usually accessible areas in the Central Namib for personal recreation and enjoyment; and to identify ways of avoiding conflicts between the need for public access and mining.**

In 2014, the tourism sector in Namibia experienced a 1.0% increase in tourism activities and contributed 14.9% to GDP (WTTC 2015). This primarily reflects the economic activity generated by industries such as hotels, travel agents, airlines and other passenger transportation services and the activities of the restaurant and leisure industries directly supported by tourists (WTTC 2015). Annual statistics obtained from the Hospitality Association of Namibia for 2014 further suggest that tourism in Namibia experienced a record high of five percent increase in seven years (Figure 22), resulting in bed occupancy rates of 56.17% for Erongo Region compared to a 57.44% national average (G, Paetzold, HAN, pers. com., 2015 and TC 2015).

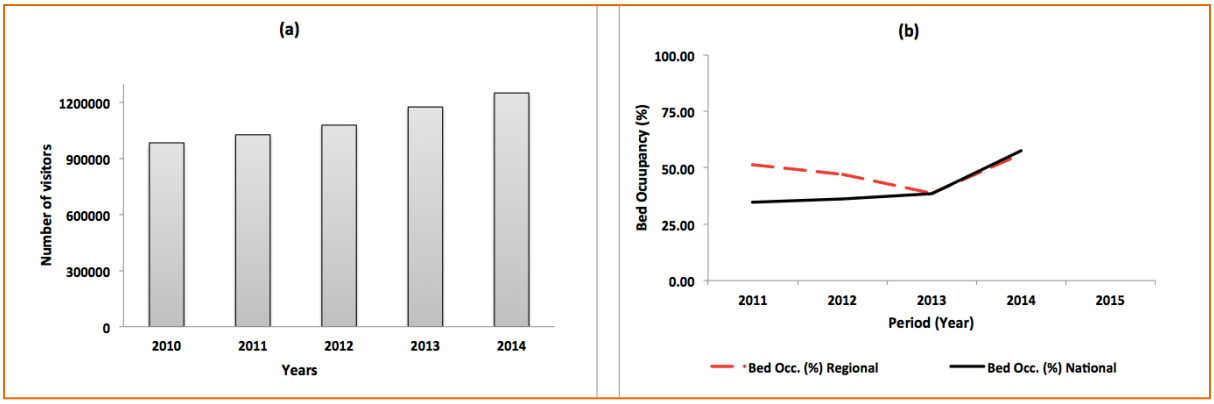

Figure 22: (a) The overall number of tourist arrivals per year to Namibia from 2010 to 2014, and (b) bed occupancy within the Erongo Region (where the uranium province is located) between 2010 and 2014.

The Central Namib thus continued to offer an agreeable-enough experience for both Namibian and foreign visitors to keep visiting it (Mbura and Wassenaar 2015).

Previous assessments by the SEMP (for 2011, 2012 and 2013) suggest that so far there has not been a significant reduction in visual attractiveness of the Central Namib in such a way that tourism activity declined. Tourists' expectations for both review periods with regard to their visual experience in the Central Namib were 'MET or EXCEEDED'.

Desired Outcome 7.1.	**Central Namib is accessible to the public (within the regulations of the National Park)**
Target 7.1.1.	**Uranium Rush does not result in net loss of publicly accessible areas.**
Indicator 7.1.1.1.	**Areas of importance for recreation that are not yet alienated by mining or prospecting are declared 'red flag' for prospecting or mining. These include: The Walvis-Swakop dunes, Messum Crater, Spitzkoppe (Gross and Klein), Brandberg, the Ugab, Swakop, Khan, KNUAseb and Swakop Rivers, the coastal area between the Ugab River Mouth and the tidal mud banks south of Sandwich Harbour (between lower mark and the main coastal road), the Welwitschia Drive and Park campsites.**
Data Source	**NERMU/NUA**
Status:	**IN PROGRESS**

Monitoring of net loss in public accessible areas is intended for regulation through the "red" and "yellow" flagged area principles proposed in the SEA. Although a legislative tool to enforce compliance with the principle of "Yellow" and "Red" flagged areas is yet to be developed, there were no new nuclear projects that occurred during the reporting period.

Motivation of status: As reported in the previous review this indicator remains **IN PROGRESS** due the lack of a legislative tool to enforce compliance with the Red/Yellow flagged areas.

Indicator 7.1.1.2.	**EIAs for all new listed mineral developments address the issue of public access**
Data Source	**NERMU/NUA**
Status:	**MET**

The only nuclear mineral developments that occurred in 2014 were the constructions of Bannerman Recourses Namibia's (BMR) heap leach pilot plant and the continuation of the Husab Mine construction and their linear (pipeline) infrastructure (CoM 2014). Both projects were granted environmental clearance earlier in 2013 (Table 16). The EIA/EMP reports for these projects were reviewed for provisions to address public access, and were observed to be compliant with the issue of public access (SLR 2013 and ASEC 2014).

Table 16: List of Environmental Clearance Certificates issued by the Ministry of Environment and Tourism (MET) in 2014 for uranium mining and related projects

Permits or Licences issued for mining and related activities in 2014		
Permit name	**Issued By**	**Date Received**
ECC* – BMR, Pilot Plant on EPL 3345 and 3346	MET	11 Feb 2013
ECC – BMR, Development of Demo Plant	MET	Sept 2014
ECC – BMR, Amendment to ECC for EPL 3345	MET	18 Mar 2013
ECC – Husab Mine EIA Amendment (TSF**)	MET	28 Aug 2013

*ECC = Environmental Clearance Certificate, **TSF = Tailings Storage Facility (source: CoM 2013 and 2014, ASEC 2014)

Motivation of status: The EIAs that were reviewed for projects commissioned in 2014 presents evidence of compliance to this indicator and they all addressed public access. The indicator is therefore rated as **MET**.

Indicator 7.1.1.3.	**Mine closure plans and environmental contracts of exploration companies address public access after project closure**			
Data Source	**NERMU/NUA**			
Status:			**MET**	

No new EMPs were published during the current review. Developments such as Husab Mine and Bannerman Mineral Resources Heap Leach Plant were awarded environmental clearances based on minor amendments made to existing EMPs which addresses public access after mine closure (SLR 2013 and ASEC 2014).

Motivation of status: All mining companies have considered and made provision for addressing public access upon decommissioning; this indicator is therefore rated as **MET**.

Desired Outcome 7.2.	**Uranium Mining does not significantly reduce the visual attractiveness of the Central Namib.**			
Target 7.2.1.	**Direct and indirect visual scarring from the Uranium Mining is avoided or kept within acceptable limits.**			
Indicator 7.2.1.1.	**Tour operators continue to regard areas such as the dunes, the coastline, Moon Landscape, Welwitschia Flats, Swakop and Khan River areas, and Spitzkoppe as a 'significant' component of their tour package.**			
Data Source	**CTAN, NERMU, NUA, Ministry Environment and Tourism,**			
Status:			**MET**	

Evidence presented in this section is based on the tourism survey conducted in 2014, but for which the assessment of mining impacts on tourism covered both 2013 and 2014. Tour operators (n = 12) interviewed during the survey, rated the Central Namib a median score range of 4 and 5 on a five-point scale (1=not used at all, 5=highly significant component) for the respective attraction sites. When the tour operators responses are clustered into three significant classes (i.e. not significant, significant or highly significant) for each attraction, more than 70% of operators rated the specific attraction as significant or "highly significant" (Figure 23).

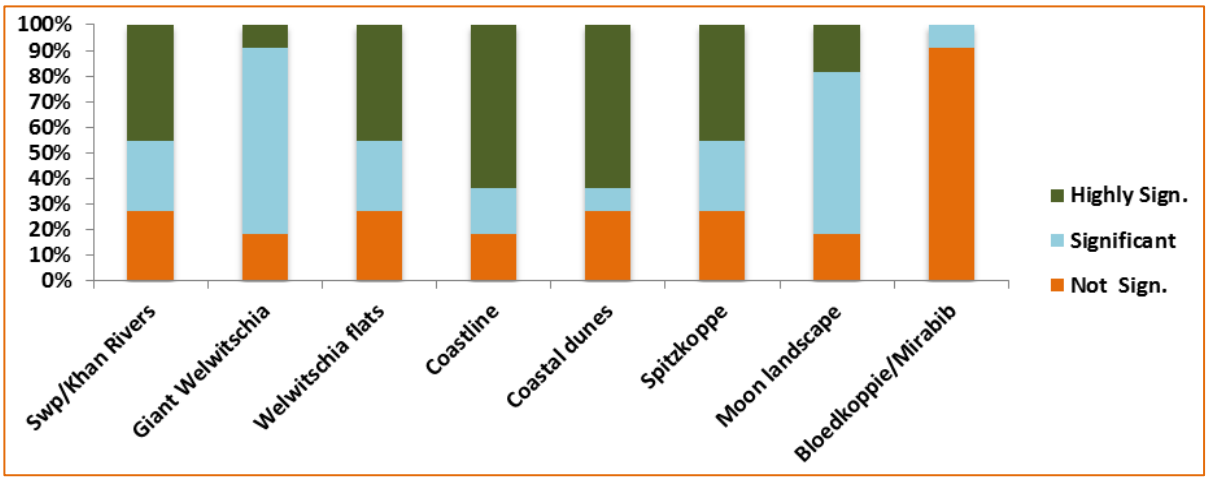

Figure 23: Shows the significance of the particular attraction sites as important component of the Central Namib's tour packages in percentage proportion. The site with least significance (Bloedkoppe/Mirabib) in this graph is not part of the initial SEMP listed Yellow/Red Flags areas reserved for tourism but listed by one operator as significant to their package.

Also, the coast seemed to be the biggest attraction (going only on "highly significant"), while sites closest to mining operations such as the giant Welwitschia was rated "significant" by 73% of the respondents. The Welwitschia flats are also rated "highly significant" by 45% of the respondents.

Motivation of status: Because the majority (>70%) of tour operators still consider the particular attractions as a highly significant component of their tour packages, the indicator is rated **MET.**

Indicator 7.2.1.2.	**Tourists' expectations are more than 80% of the time in terms of their visual experience in the Central Namib.**
Data Source	**NERMU/NUA**
Status:	**EXCEEDED**

Indicator 7.2.1.2 is assessed based on evidence abstracted from the tourism survey conducted in 2014 for the 2013 and 2014 reporting periods (Figure 23). The overall tourist's responses regarding their interests and quality of experience in the central Namib were highly satisfactory. An overall 83% and more of the respondents scored the overall expectation across all categories as MET or EXCEEDED.

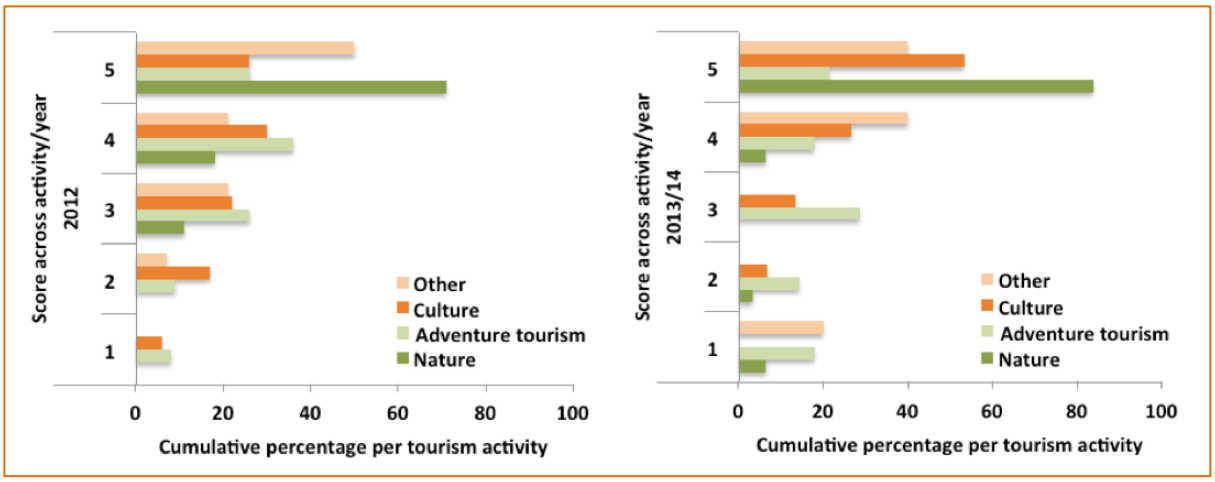

Figure 24: Responses of all respondents (in 2012 and 2013/14), when asked to estimate the extent to which their experience of the central Namib were MET or NOT MET on a 5-point scale (1=did not meet expectations, 5=exceeded expectations).

Motivation of status: The expectations of 83% (well above the 80% target set in the SEA) and more of the survey were met or exceeded across most of categories; hence this indicator is rated **EXCEEDED**.

Indicator 7.2.1.3.	**All EIAs for mine development address visual impacts and sense of place**			
Data Source	**NERMU/NUA/MET**			
Status:			**MET**	

No new EIA/EMP's were published during the current review, those developments carried out in 2014 (e.g Husab Mine and BMR Heap Leach Plant) were awarded environmental clearances based on amendments made to existing EMP's where visual impacts and sense of place were addressed (SLR 2013 and ASEC 2014).

Motivation of status: All mining companies have considered and made provision for addressing visual impacts and sense of place of the Namib, the indicator is thus **MET**.

Desired Outcome 7.3.	**Areas of significant natural beauty or sense of place are afforded proper protection (without undermining existing legal rights).**			
Target 7.3.1.	**Improved protection of listed areas.**			
Indicator 7.3.1.1.	**MME recognizes and respects 'red flag' status for areas regarded as being significantly beautiful. These include:**			
Indicator 7.3.1.2.	**MME recognizes and respects 'yellow flag' status for areas regarded as being scenically attractive.**			
Data Source	**NERMU/MME**			
Status:		**IN PROGRESS**		

Indicators 7.3.1.1 and 7.3.1.2 are both affected by the pending Policy on Prospecting and Mining in Protected Areas (NPPMPA). The policy is intended to address the issue of "Red" and "Yellow" flagged areas but it is still pending submission to cabinet. Until the policy is approved these indicators remain a milestone towards the implementation of the Red and Yellow flags principle.

Motivation of status: Policies to enforce compliance with the yellow flag principle are still pending. The indicator therefore remains **IN PROGRESS**.

Indicator 7.3.1.3.	**No new mines and prospecting licenses are awarded in the red and yellow flag areas as identified by the SEA**			
Data Source	**NERMU/NUA**			
Status:			**MET**	

The uranium moratorium, which remains in effect, prohibits the issuing of new prospecting licenses in the area of relevance to the SEMP, therefore no new licenses were issued in 2014. However, of the existing projects, Zhonghe Resources Namibia was the only entity awarded a Mineral Deposit Retention Licence in 2014.

Motivation of status: With the moratorium still in effect, new prospecting licenses are not awarded and thus the indicator status remains a **MET**.

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Summary of performance: EQO 7

Total no. indicators assessed:	**9**			
	NOT MET	**IN PROGRESS**	**MET**	**EXCEEDED**
Number of indicators in class:	0	3	5	1
Percentage of indicators in class:	0%	33%	56%	11%

Overall performance: Indicators reviewed for the current period in this EQO remained the same as in the previous review of 2013. The majority of the indicators (56%) are MET, 33% are in progress and 11% Exceeded. The 33% indicators are in progress due to the pending Policy on Prospecting and Mining in Protected Areas (NPPMPA).

EQO 8. Ecological integrity

Aims of this EQO: The ecological integrity and diversity of fauna and flora of the Central Namib is not compromised by the Uranium Rush. Integrity in this case means that ecological processes are maintained, key habitats are protected, rare and endangered and endemic species are not threatened. All efforts are taken to avoid impacts to the Namib and where this is not possible, disturbed areas are rehabilitated and restored to function after mining/development.

The SEMP has for a consecutive three-year period, offered an opportunity for the inhabitants of the uranium province to review and understand the cumulative impacts on their ecological environment resulting from uranium mining. This was achieved through the assessment of indicators within this EQO, also offering stakeholders a chance to collectively address concerns on likely impacts on biodiversity (ecological integrity).

Feedback from the three previous SEMP reports confirms that the central Namib's conservation objective of its species diversity and integration remains a priority, and efforts by both the regulating authorities and respective mining companies were made to avoid, mitigate and or rehabilitate mining impact. This reinforces the fact that continued monitoring of the extent of direct impacts and the measures put in place to ensure persistence of all species remains relevant.

However, biodiversity conservation in other parts of the Central Namib (outside the uranium mining area) remains a challenge as for instance, urban development especially on the coast; continue to exert pressure on the natural environment. This is evident as the local media continues to report on such as the Sand Rose development and the building of a sea wall for urban development (Namibian Sun 2015). Additionally, many other developments are going ahead without much environmental assessment or planning which makes the SEMP process even more important.

Desired Outcome 8.1.	**The ecological integrity of the Central Namib is maintained.**			
Target 8.1.1.	**The mining industry and associated service providers avoid impacts to biodiversity and ecosystems, and where impacts are unavoidable, minimisation, mitigation and/or restoration and offsetting of impacts is achieved.**			
Indicator 8.1.1.1.	**Important biodiversity areas (red or yellow flag areas) are taken into consideration when adjudicating prospecting and mining applications.**			
Data Source	**NERMU/NUA/MET**			
Status:		**IN PROGRESS**		

The status of this indicator has not changed from the previous report. Prior to the 2007 moratorium, prospecting or mining applications are not by regulation expected to comply with "Red/Yellow" flags principle. However, provision for consideration of "Red/Yellow" flagged areas (or a similar approach) is afforded in the proposed NPPMPA legislative framework and would be enforced once the policy is ratified.

Motivation of status: Pending the policy to enforce compliance with the yellow flag principle hinder the process of legally enforcing this indicator, it therefore remains **IN PROGRESS**.

Indicator 8.1.1.2.	The EIAs need to follow the mitigation hierarchy and incorporate offsets as an option.
Data Source	NERMU/NUA/MET
Status:	IN PROGRESS

No new projects were commissioned in 2014, however all activities conducted in the reporting period have EIAs/EMPs that follows the key aspects of the mitigation hierarchy except for "Avoidance" in the case of Rössing Uranium and the "Off-set" component for all operating mines. The offset option in the mitigation hierarchy remains non-applicable due to there being no legislative obligation and framework for mining companies to comply with yet. Rössing Uranium and Zhonghe Resources Namibia were the only two uranium projects that did not incorporate more than one of the mitigation hierarchy components since the inception of the SEMP.

Motivation of status: Because there is still a need for the Ministry of Environment and Tourism and the mining companies to address pending matters relating to either legislation or EIAs/EMPs to accommodate all components of the hierarchy, the indicator remain **IN PROGRESS**.

Indicator 8.1.1.3.	GRN keeps a record of all decisions made regarding prospecting and mining applications so that applications denied on biodiversity grounds are not awarded in the future, unless alternative approaches are adopted to avoid impact, mitigate or offset the impact.
Data Source	NERMU/NUA/MET
Status:	MET

The Ministry of Mines and Energy issued only one licence relating to nuclear fuels during the current reporting period i.e. Mineral Deposit Retention Licence granted to Zhonghe Resources. Records in this regard are kept with the Mining Directorate in MME. The Ministry of Environment and Tourism issued several and the relevant records with regard to decision and Environmental Clearance Certificate (ECC) conditions; which are available at the Environmental Commissioner's Office (see Table 17).

Table 17: List of Environmental Clearance Certificates granted by the Ministry of Environment and Tourism in 2014.

ECC's issued for uranium mining and related activities in 2014		
Environmental Clearance Certificate / Permit name	**Issued to (Name)**	**Date Issued**
Construction and Operation of an Emulsions manufacturing facility at the Husab mine	Swakop Uranium (Pty) Ltd	17-01-2014
Etango Project Pilot Plant EPL 3345	Bannerman Resources	17-09-2014

Motivation of status: The Ministries of Environmental and Tourism, and Mines and Energy keeps records on decisions made relating to uranium projects, the indicator is therefore **MET.**

Indicator 8.1.1.4.	Mines have specific programmes and projects to actively avoid, mitigate, restore or offset their impacts, with impact avoidance predominating.
Data Source	NERMU/NUA
Status:	MET

Although there were no new projects in 2014, operational mines indicated (in their EMPs) that they have specific programmes and projects to actively avoid, mitigate, restore their impacts and these are documented in their EIA and EMP and company-internal policies (NUA 2015). These internal environmental monitoring and rehabilitation initiatives are continued as part of the EMPs compliance requirements of individual mines. Avoidance is the preferred solution, but it is not always possible because mines have to disturb large areas to access and process the ore.

Motivation of status: EIAs and EMPs of most operational mines comply with the mitigation hierarchy as stipulated in the SEMP and MET's ECC application assessment process, thus the indicator is **MET**.

Indicator 8.1.1.5.	Sensitive areas are identified by mines and disturbance of these areas is minimized.
Data Source	NERMU/NUA
Status:	MET

All active mines have mapped sensitive areas within their licensed mining areas, and continued to explicitly minimize the size of their footprint on sensitive biodiversity (NUA 2015). Because mining companies cannot always avoid causing disturbances, they also make provisions for rehabilitation of disturbed areas. However, the challenge that remains is that there is currently no means to verify if rehabilitation is contributing to successful restoration of the disturbed habitats.

Motivation of status: All mines have mapped out sensitive areas within their MLs for which they continuously monitor impacts and mitigate accordingly, hence the indicator remains MET.

Indicator 8.1.1.6.	Infrastructure corridors are carefully planned to avoid ecologically sensitive areas, and demonstrate: - consideration of alternatives, - optimization of service provision; and - commitment to the 'green route'
Data Source	NERMU/NUA
Status:	MET

In the absence of new developments, the earlier assessment of this indicator remains relevant i.e. linear infrastructure developments of AREVA's Trekkopje and LHM in 2013 were carefully planned, while the Husab Mine could not avoid crossing sensitive areas by force of location (NUA 2014).

Motivation of status: Because there were no new EIAs or Linear Infrastructures commissioned during the current reporting period, the indicator is **MET**.

Indicator 8.1.1.7.	**Mines share infrastructure as much as possible, thus minimizing infrastructure proliferation.**
Data Source	**NERMU/NUA**
Status:	**MET**

With the cancellation of the NamWater Swakop South pipeline, mining companies continued upgrading their water infrastructures such as water pipelines independently, while they share connection to major (national grid) power lines infrastructure (EnviroDynamics, 2011). Hence, as far as water supply is concerned mines have not worked towards minimizing proliferation.

Motivation of status: Where possible the mines have shared the infrastructure. This indicator is **MET.**

Indicator 8.1.1.8.	**Infrastructure planning and investment takes into account future demand, thus reducing the need for additional impacts (e.g. 1 pipeline, not 3).**
Data Source	**NERMU/NUA**
Status:	**MET**

As reported previously in the SEMP reports, AREVA and Langer Heinrich Mine reported that their power lines and pipelines were planned to allow for additional users. Husab Mine remained the only mine under construction that preferred not to link their linear infrastructure to existing mine's ones.

Motivation of status: The existing mines infrastructure took into account future demands and therefore the indicator remains **MET**.

Desired Outcome 8.2.	**Mining industry becomes a conservation partner.**
Target 8.2.1.	**Mines and associated industries support conservation efforts in Namibia.**
Indicator 8.2.1.1.	**Mining companies (particularly those operating in the NNP) partner with conservation organisations to effectively manage their biodiversity impacts (both direct and indirect).**
Data Source	**NERMU/NUA/MET**
Status:	**MET**

Langer Heinrich Mine has established partnerships with Gobabeb to assist with some research activities in the Namib Naukluft Park (NNP). Rössing has partnered with BirdLife International. Swakop Uranium is working with NERMU, researching rehabilitation options, *Welwitschia mirabilis* ecology and the distribution of the Husab sand lizard.

Motivation of status: Mining companies mainly those operating within the NNP have partnered with conservation organisations, this indicator is therefore **MET**.

Indicator 8.2.1.2.	**Mining companies commit to sustainable offset initiatives to ensure a 'no net loss' to biodiversity as a result of their operations. This will involve partnering with long term conservation partners (GRN, NGOs and communities).**
Data Source	**NERMU/NUA/MET**
Status:	**IN PROGRESS**

There is lack of regulatory requirements for the uranium industry to comply with appropriate framework for the implementation of Offsets principle. Nevertheless, mining companies are committed to a 'no net loss' policy and sustainable offset initiatives. Langer Heinrich will investigate a biodiversity offset if irreplaceable biodiversity will be permanently lost and restoration is not possible, while Rössing is following the stated biodiversity strategy of all Rio Tinto operations (NUA 2015). The mines will establish partnerships with conservation partners once the offset opportunities have been defined in consultation with government and stakeholders (NUA 2015).

Motivation of status: Given the lack of regulatory obligations or requirements for the uranium industry to comply with appropriate framework for the implementation of Offsets principle, the indicator remains **IN PROGRESS**.

Indicator 8.2.1.3.	**Additional conservation projects are supported (e.g. wetland bird counts, wildlife surveys, Namib Bird Route, coastal management, research, public awareness) as part of the companies' social responsibility programmes.**
Data Source	**NERMU/NUA/MET**
Status:	**MET**

Mines in operation are involved in various additional conservation projects. Langer Heinrich is working to enhance public awareness, carries out soil and zebra studies, and supports students as part of Gobabeb's GTRIP project (NUA 2015). Rössing supports and sponsors the annual BirdWatch event through the Rio Tinto/BirdLife International partnership. Other informal understandings with institutions such as NBRI (plant surveys and annual monitoring of some species) and NACOMA (annual Coastal Environmental Week) exist (NUA 2015). Rössing is a member and sponsor of the Namibian Environmental and Wildlife Society (NEWS). Swakop Uranium assists with bird monitoring along power line routes, coastal management (fundraising) and Welwitschia research (NUA 2015).

Motivation of status: There is support from the uranium mining industry to the conservation projects. This indicator is therefore **MET.**

Indicator 8.2.1.4.	**Protection and management of key biodiversity offset areas is supported (e.g. NW Kunene, Messum, Spitzkoppe, Brandberg and other special areas in Namibia).**
Data Source	**NERMU/NUA/MET**
Status:	**IN PROGRESS**

The matter of biodiversity offset areas has to be discussed and agreed with government before mining companies can commit to supporting such offsets. The only progress in 2014 was that the establishment of biodiversity offsets was included as one of the targets of the second National Biodiversity Strategy and Action Plan (NBSAP2). The mining industry is represented on the NBSAP2

Steering Committee and has started engaging with the Ministry of Environment and Tourism on biodiversity offset mechanisms in 2015.

Motivation of status: There is still a need for government and the industry to agree on a framework through which the biodiversity offset concept will be implemented, thus the indicator is rated **IN PROGRESS.**

Desired Outcome 8.3.	**No species become extinct because of the Uranium Rush.**			
Target 8.3.1.	**Authorisation to mine is denied if the extinction of a species is likely.**			
Indicator 8.3.1.1.	**All EIAs and EMPs must consider national extinction possibility.**			
Data Source	**NERMU/NUA/MET**			
Status:			**MET**	

During the review period, there were no new EIAs and or EMPs published and thus no assessment in this regard was only for project implemented during this period.

Nonetheless, consideration for species extinction is observed in the Swakop Uranium scoping report (including impact assessment) for the proposed amendment to the Husab Mine water supply pipeline and northern associated power line. A risk to species such as Lithops and Welwitschia was identified, and hence the route of the pipeline was diverted to avoid areas of rich biodiversity (NAU 2015). For the power line the potential impact to the Ludwig's bustard population was raised. This concern applies to all power lines in Namibia and is receiving attention through a NamPower/Namibia Nature Foundation (NNF) research partnership. The EIA for the Bannerman Resources Demonstration Plant did not identify any likelihood of species extinction NUA 2015).

Motivation of status: Of the reviewed projects, a risk was only identified and addressed accordingly (avoided) in the Swakop Uranium scoping report, and none identified for the Bannerman Resources Demo Plant, the indicator is **MET**.

Indicator 8.3.1.2.	**Resources for a reasonable investigation are made available to manage species at risk of extinction**			
Data Source	**NERMU/NUA/MET**			
Status:			**MET**	

Swakop Uranium has conducted a Welwitschia census and study for several years in cooperation with NERMU and obtained new results on the ecology of this species that should assist with its conservation within the mining licence area. Other species were protected by rerouting infrastructure to avoid areas of rich biodiversity. The potential impact to the Ludwig's bustard population is being monitoring with support from the NamPower /Namibia Nature Foundation (NNF) wildlife-power line incidents monitoring programme. Bird mitigation measures have been installed where the power line crosses the Khan River.

Motivation of status: Because there were no direct risks of extinction to species identified within the operating exploration and mining projects areas, this indicator is considered **MET**.

Desired Outcome 8.4.	**No secondary impacts occur**			
Target 8.4.1.	**No secondary impacts occur**			
Indicator 8.4.1.1.	**Off-road driving, poaching, illegal camping, littering by mine personnel, are explicitly prevented by mining and exploration personnel and their contractors.**			
Data Source	**NERMU/NUA/MET**			
Status:		**IN PROGRESS**		

Companies operating within the national park confirmed that they were doing everything possible to avoid secondary impacts. All employees and visitors receive a site induction where the Namib Naukluft Park rules and regulations are shared with all. Reptile Uranium has the following additional measures in place (NAU 2015):

- Constant tight control measures of all exploration sites is implemented by the ECO and is supported by all staff and contractors
- Reporting to MET of all environmental incidents after internal investigation
- Incident investigation and reporting, with mitigation measures, are executed
- Refresher inductions and toolbox meetings are conducted regularly to improve awareness

Bannerman Resources have demarcated the roads leading to their Demonstration Plant and provided turn-around points every 400 metres to restrict the environmental footprint and prevent illegal off-road driving (NAU 2015). Contractors and employees were inducted in the rules of the National Park and no night work was allowed.

Langer Heinrich Mine distributes the park rules to all employees, contractors and visitors during environmental inductions. Strict waste management practices are applied in the mining licence and off-road driving is not allowed. Only existing roads are used and access roads required for mining-related activities are addressed during the EIA process and controlled as part of the mine planning function. All employees and contractors received training on the park rules and regulations (NAU 2015).

The companies are not in a position to patrol their areas and physically prevent access by rogue individuals who are intent on poaching or illegal camping. This is where Ministry of Environment and Tourism have the mandate and continued to monitor, investigate and enforce the relevant remedial measure (Table 18).

Table 18: Indications of transgressions record by MET during the current reporting period (2013) and their respective remedial measures taken, the tick (✔) in the first column represents recorded transgression and (✗) not recorded.

Type of Incident	✔/ ✗	Location (ML Area e.g. RUL)	Remedial action taken
Off-road driving	✔	Namib Section of NNP	Fines were issued*
Poaching	✔	Namib Section of NNP	Investigation on-going
Illegal Camping	✔	Namib Section of NNP	Fines were issued
Littering by Mining personnel	✗	–	–
Others_____	✗	–	–

*Statistics and Information pertain to transgressors is available at MET

Motivation of status: There are measures and efforts from both the mining industry and Ministry of Environment and Tourism; however incidents of secondary impacts are still evident. The indicator is thus **IN PROGRESS.**

Indicator 8.4.1.2.	**Improved vigilance and visibility of law enforcement personnel, with structured support from civil society (e.g. Honorary Wardens) reduces park/conservation transgressions.**			
Data Source	**NERMU/NUA/MET**			
Status:			**MET**	

Mines will welcome improved vigilance and visibility of law enforcement personnel and Honorary Wardens and hope that Ministry of Environment and Tourism will come up with a workable solution for the latter (NUA 2014). MET reported that there has been improved vigilance and visibility of law enforcement (Table 19) with support from the mines, public and members of MET from other units (pers. comm, R Solomon, MET, 2015).

However, the Ministry of Environment and Tourism could not provide statistical data or information for assessment on the extent to which vigilance and visibility of law enforcement has improvement. On the matter of honorary wardens, MET's respondent that there is currently no legal provision for such and thus could not be implemented (pers. comm, R Solomon, MET, 2015).

Table 19: Indicate the efforts by the industry or society that contributed to a reduction in transgressions recorded by MET in 2013, the tick (✔) in the first column represents applicable measure taken and (✗) not applicable.

Measure applied to reduce transgression	✔/ ✗	Any comments
Deployment of More MET Staff	✔	–
Appointment of Honorary Wardens	✗	No legal provision for this by the Namibian law
Reports of incident by the public	✔	–
Reports of incidents by Mining	✔	–
More Control/Check Points	✔	–

Motivation of status: There are evident efforts towards the minimization or reduction of secondary impacts from both the industry and Ministry of Environment and Tourism, therefore the indicator is **MET.**

Desired Outcome 8.5.	**Water quality and quantity does not decrease to the extent that it negatively affects biodiversity**			
Target 8.5.1.	**Water table levels, and water quality standards are described and ephemeral river ecosystems are monitored to ensure that these standards are not compromised**			
Indicator 8.5.1.1.	**Regular monitoring of indicator species in relevant ephemeral rivers is in place to detect any impacts on wetlands, phreatophytes and riparian vegetation**			
Data Source	**NERMU/NUA/MET**			
Status:		**IN PROGRESS**		

As before, there are still no formal initiatives by the Ministry of Environment and Tourism or other regulatory bodies to monitor the health of riverine ecosystems or of any other biodiversity components relative to potential impacts by mines. Regular monitoring is therefore still not in place, but the investigation of the best methods to use continues through a number of NERMU-led studies. In this regard, the baseline study completed in the previous SEMP report showed that the abstraction

of water was probably not having a direct impact on riverine vegetation (but it could not yet rule out longer-term effects or indirect impacts). More importantly, this study also showed high variability amongst individual plants to be a potential problem in the long-term implementation of a monitoring programme. Consequently, NERMU obtained funding to conduct a study designed to partition out the potential procedural sources of error. This study will be completed in 2015. Additionally, a pilot study, also planned for 2015, was planned to determine whether remote sensing approaches could deliver verifiable results.

Motivation of status: Numerous studies led by NERMU are being conducted to understand the impact of water abstraction on the riverine. This indicator is **IN PROGRESS**.

Indicator 8.5.1.2.	**Results from monitoring are fed back to regulators and impacting companies so that negative impacts on riverine vegetation, springs and pans can be dealt with appropriately.**			
Data Source	**NERMU/NUA/MET**			
Status:		**IN PROGRESS**		

This indicator depends on the development of an established monitoring programme (which is in progress; see Indicator 8.5.1.1) and follow-up monitoring surveys. It is therefore not yet possible to meet the intention of the indicator in this regard.

Efforts to foster a collaborative relation through a memorandum of understanding between NERMU and the Ministry of Environment and Tourism, through which long-term monitoring programmes could be initiated, were made. However, these discussions have not yet yielded any desired results and thus will have to be continued and reported on in the next report.

Motivation of status: The process to develop a regular monitoring programme is still in development, the indicator is **IN PROGRESS**.

Target 8.5.2.	**Uranium mining does not compromise surface and groundwater availability**			
Indicator 8.5.2.1.	**No unusual loss of wetland and riparian vegetation**			
Data Source	**NERMU/NUA/MET**			
Status:		**IN PROGRESS**		

The previous baseline study by NERMU (SEMP, 2013) showed higher mortality of Ana trees in the Langer Heinrich compartment of the Swakop River than in any other compartments or rivers investigated, but no effects of boreholes on trees' health status. Additionally, the time series is still too short to detect any changes that could be ascribed as "unusual loss". The significant effort involved in detecting these changes prompted the planning of a study to investigate the use of remote sensing for monitoring. However, this study, as well as any follow-up measurements of tree stress relative to borehole production figures will only occur in 2015.

Motivation of status: Baseline studies are still ongoing, they will require a couple more years' worth of data before any confident conclusions can be made, and this indicator is still rated as **IN PROGRESS**.

Indicator 8.5.2.2.	**No unusual loss of phreatophytes (deep-rooted plants dependent on water from the saturated zone of groundwater)**			
Data Source	**NERMU/NUA/MET**			
Status:			**MET**	

The Camelthorn (*Acacia erioloba*) is the most important phreatophyte (deep-rooted plant) in the ephemeral rivers and is therefore a good indicator of whether deep-rooted plants are affected. In the previous baseline study conducted by NERMU (SEMP, 2013), the Swakop River showed the highest levels of mortalities of this species, compared to the Kuiseb and Khan Rivers, suggesting that deep groundwater levels have been affected in the past and perhaps currently. However, the same study could not show a clear link of tree stress with abstraction of water, meaning that there is not yet a viable mechanism tying plant health (and therefore chances of dying) to abstraction. Follow-up studies are planned for 2015. Current groundwater levels, see Figure 9, and Table 10 in EQO 4, are also still well within reach of documented rooting depths of the Camelthorn (Schachtschneider, 2010).

Motivation of status: Because groundwater levels are still well within the reach of phreatophytes (see Indicator 4.2.1.2), this indicator is **MET**.

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Summary of performance: EQO 8

Total no. indicators assessed: 20

	NOT MET	**IN PROGRESS**	**MET**	**EXCEEDED**
Number of indicators in class:	0	8	12	0
Percentage of indicators in class:	0%	40%	60%	0%

Overall performance: overall performance in 2014 saw a slight improvement from the 2013 review period. Aspects of EQO 8 that remained a challenge relates to the rather slow progress in the development of the National Policy on Prospecting and Mining in Protected Areas (NPPMPA). The NPPMPA will be instrumental in the implementation of the "Red" and "Yellow" flagged areas principle assessed through the eight (8) indicators that remained In Progress throughout the past three reviews of the SEMP.

EQO 9. Education

Aims of this EQO: In the Erongo Region, people continue to have affordable and improved access to basic, secondary and tertiary education, which enables them to develop and improve skills and take advantage of economic opportunities.

The New Era daily newspaper reported that free secondary education should start in the Erongo region because it is the richest region in the country with mining and fishing resources (https://www.newera.com.na/2014/07/02). This was a statement was made by a Namibian youth leader in the New Era newspaper, indicating that there are expectations from the public that the mining industry should improve the regions social issues. The Ministry of Education (MoE) made a decision in March of 2014 to make all necessary arrangements so that no Namibian parent or guardian is required to pay school fees at secondary education level from 2016. Primary school education was made free in the 2013. This of course will influence the performance of the schools depending on whether the government can sustain the decision made for free education. A generally observed that the performance of the Erongo region in the national examinations has declined. The education EQO keeps track of the evolution of the education sector in the Erongo region, to ensure that the learners and the industry receive quality products.

Desired Outcome 9.1.	**Improved quality of school education.**
Target 9.1.1.	**Improved results.**
Indicator 9.1.1.1.	**75% of grade 1 enrolments complete grade 10.**
Data Source	**MoE**
Status:	**NOT MET (NO DATA)**

All contact with the EMIS department at the Ministry of Education (MoE) remained unanswered and the SEMP Office was unable to obtain any data to assess this indicator.

Motivation of status: There was NO DATA from the Ministry of education to assess this indicator.

Indicator 9.1.1.2.	**75% of grade 12 graduates obtain 25 points in six subjects with a D in English**
Data Source	**MoE**
Status:	**NOT MET (NO DATA)**

The Ministry of Education (MoE) does not have records of the data needed to assess this indicator.

Motivation of status: MoE does not have data to measure this indicator. This indicator is currently not measurable

Indicator 9.1.1.3.	National examination results in Grade 10 and 12 in maths, English and science are a D or better for more than 50% of learners from public (GRN) schools.
Data Source	MoE
Status:	IN PROGRESS

This indicator assesses the results of Grade 10 and Grade 12 ordinary and higher level together.

Out of 35 592 candidates who registered for the Grade 10 examination in 2014, 19264 have qualified for admission to Grade 11 in 2015, representing 54.1% of the candidates who have qualified for Grade 11. The Ministry of Education has kept since 2000 the minimum points at 23 and F grade as a minimum symbol in English for admission to Grade 11 in 2014. On average, since 1993 the percentage of learners qualifying for admission has increased steadily from 37 % to 54% in 2014.

A total of 12 164 of the 57 096 candidates (full-time and part-time combined) entered for one or more NSSC Higher Level subjects. The number of Higher Level candidates increased by 439 (3.7%) if compared to 2013. The graded entries increased from 95.8% in 2013 to 96.0% in 2014. A total of 44 932 candidates comprising of 19 392 full-time and 25 540 part-time candidates were registered for the 2014 Grade 12 ordinary level examination at 176 NSSC schools and 125 part-time tuition centres. Erongo region was ranked 8th in the National grade 12 O-level examinations in 2013 and in 2014. Figure 25 and Table 20 below shows the National results for Science, mathematics and English as a second language.

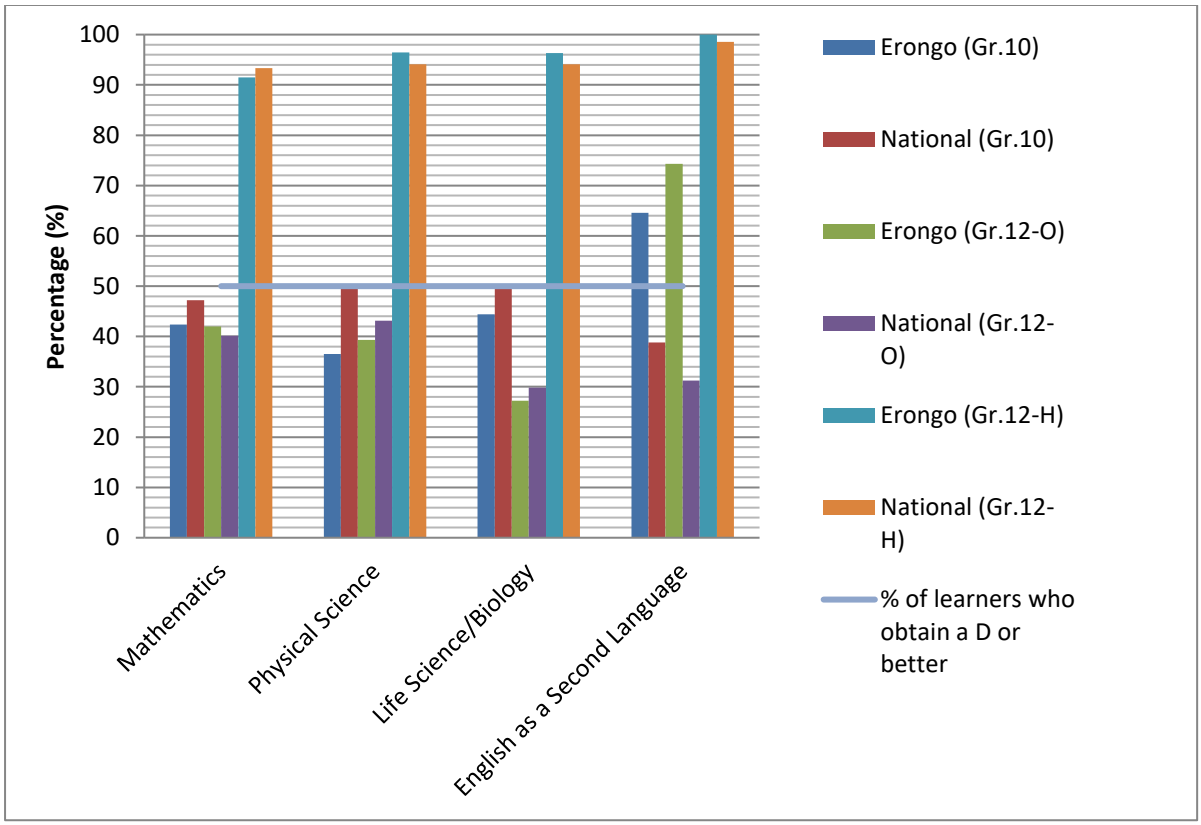

Figure 25: National Results for Science, Mathematics and English Subjects

Table 20: National Results for Science, Mathematics and English Subjects

National Results for Science, Mathematics and English Subjects	*% of learners who obtain a D or better*	Status
	Erongo / National	
Grade 10 (2014)		
Mathematics	42.4/ 47.2	NOT MET
Physical Science	36.5/50.2	MET
Life Science	44.4/50.3	MET
English as a Second Language	64.6/38.8	NOT MET
Grade 12		
NSSC Ordinary Level of 2014 (Grade from A* - G)		
English as a Second Language:	74.28 /31.25	NOT MET
Biology	27.23 /29.84	NOT MET
Physical Science	39.33 /43.11	NOT MET
Mathematics	41.99 /40.16	NOT MET
NSSC Higher Level of 2014 (Grades from 1 - 4)		
English as a Second Language:	100.00 /98.58	MET
Biology	96.30 /94.09	MET
Physical Science	96.43 /94.08	MET
Mathematics	91.49 /93.34	MET

Motivation of status: For the grade 10 subjects 2 out of 4 were MET, for the Grade 12 ordinary level subjects 4 out of 4 were NOT MET and for the Grade 12 higher level subjects 4 out of four were MET. Overall 6 out of 12 (50%) subjects were NOT MET. In 2013 only 5 out of a total of 12 subjects (41.7%) met the indicated requirement and 7 out of 12 subjects (58.3%) did not meet the requirement. This shows a slight improvement in the results and the indicator is therefore rated as **IN PROGRESS**.

Indicator 9.1.1.4.	**Region improves performance in reading and mathematics.**
Data Source	**MoE**
Status:	**MET**

The Ministry of Education (MoE) conducts annual assessments through the Namibian National Standardised Achievement Tests (SATs) to provide the esteemed stakeholders with diagnostic information regarding learners' achievement of key learning competencies in the curriculum at Grades 5 and 7. One of the fundamental objectives of the SATs system is that of providing information regarding what learners know and able to do in key competencies in English Second Language, Mathematics and Natural Science.

The competency-based outcome of the SATs includes reports on achievement at three levels: national, regional and school with the key aim to assist teachers to identify content areas in which learners failed to achieve optimum results. In 2014, the SATs were administered concurrently at Grades 5 and

7 for the first time in order to provide a particular cohort of learners with the opportunity to be assessed twice prior to exiting the primary phase.

Since the implementation of baseline for Grades 5 and 7 in 2009 and 2010 respectively, the Directorate of National Examinations and Assessment (DNEA) has since been implementing a national census-based assessment in English Second Language and Mathematics at Grade 5 as well as in English Second Language, Mathematics and Natural Science at Grade 7. This implies that all Grades 5 and 7 learners from around 1179 primary and combined secondary schools in Namibia were tested and a comprehensive competency-based report is prepared and dispatched to each school timely. The report is meant to inform classroom instruction for improved learner performance and monitoring the school's progress from one assessment year to another.

For Grade 5 on averages, the performance in English Second Language across the fourteen regions has shown a fluctuating pattern. When compared to 2013, 28.5% of the regions have improved their performance, 43% retained the same performance while another 28.5% decline in their performance in 2014. The regional improvements range from 1% to 4% while the decline ranges from 1% to 2%. Since the baseline in 2009, only 21.4% (3 out of 14) of the regions have constantly scored an average of 50% and above (Figure 26). The Erongo Region had the second highest performance in the country but their performance deceased from 57% in 2013 to 55% in 2014. The EQO in this regard is NOT MET.

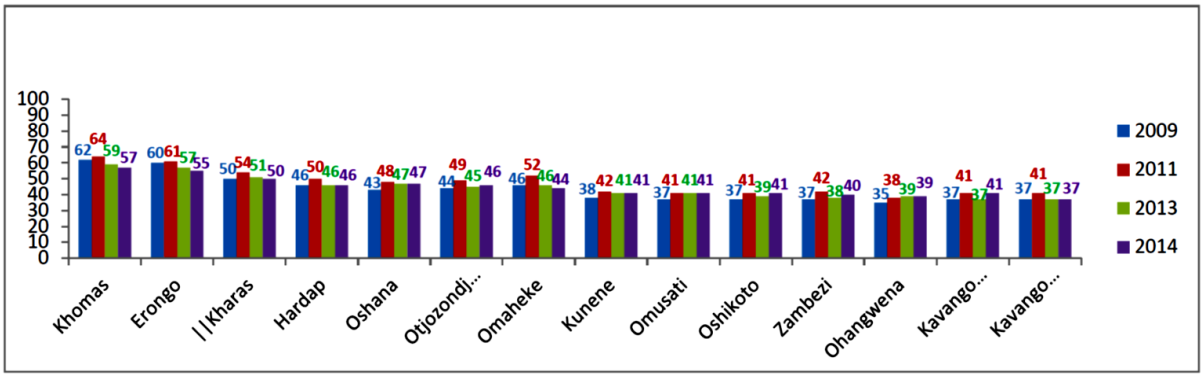

Figure 26: Average percentage scores – Grade 5 English Second Language

The regional average performance in Grade 5 Mathematics shows an improvement. When compared to 2013, all regions have recorded an improvement of 1% to 6% in Mathematics in 2014. However, such improvements remain below 50% for the majority of the regions. Only 28.6% (4 out of 14) of the regions have achieved an average of 50% and above in 2014. The Erongo Region obtained second place in the ranking and their performance increased from 54% to 56% from 2013 to 2014, indicator in this case was MET as there is improvement in that mathematical skills of the region. These results (Figure 27), although minimal improvements have been achieved, indicate that many of the schools continue to minimally achieve the basic competencies prescribed in the subject syllabus.

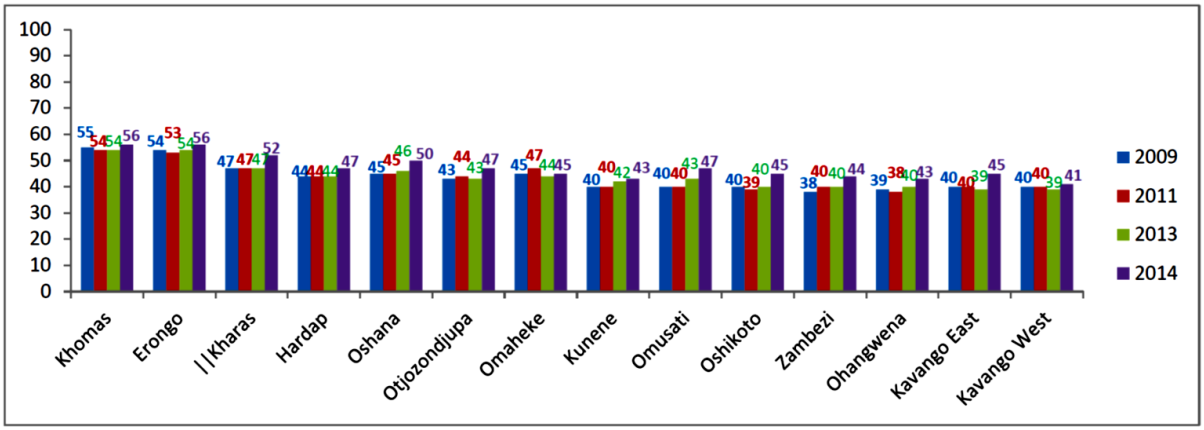

Figure 27: Average percentage scores – Grade 5 Mathematics

Figure 28 below shows the overall Grade 7 English SATs percentage scores of all 14 regions. Since the overall national scores for Grade 7 English in 2012 and 2014 show an average difference of 4%, it was expected that there would be variation in regional performance. Moreover, the regions performed very differently and had scores ranging from 40% to 64% with two regions retaining and declining their performance, respectively. The magnitude of such improvement ranged between 2% to 6% with the highest enhancement (6%) coming from two regions only. Erongo was the best performer for Grade 7 English SAT's. The region increased their performance from 59% in 2012 to 64% in 2014. The indicator in this regard is MET

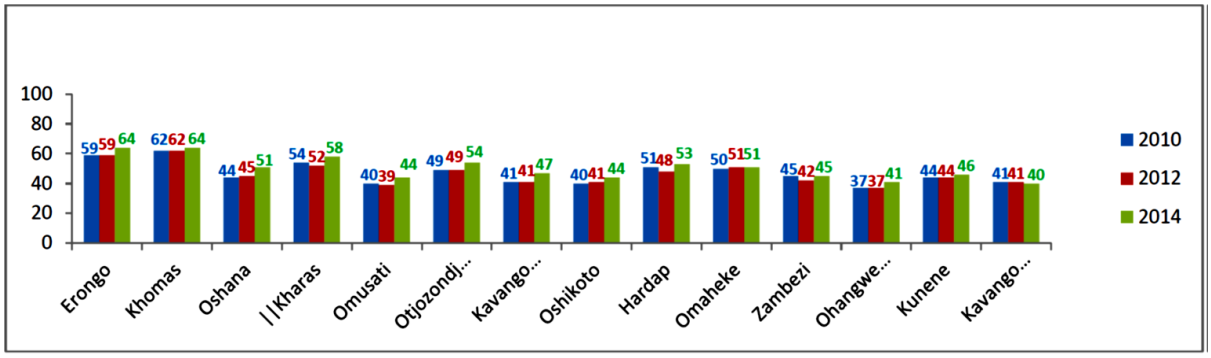

Figure 28: Average Percentage Scores – Grade 7 English

Figure 29 shows the overall Grade 7 Mathematics percentage scores of all 14 regions. When considering the regions individually, a wide range of results could be observed; regions obtained average percent scores of 42% to 53%. Furthermore when regions' performance in 2012 was compared with 2014, 11 regions showed improvement of 1% to 5% in 2014 compared to 12 regions which recorded an improvement of 1% to 4% in 2012. The magnitude of such improvement differs with 1% score point in 2014 compared to 2012. This clearly indicates that there is minimal achievement difference between the cohorts of learners from one year to another. Erongo Region performed the best and the scores increased from 51% in 2012 to 53% in 2014. This indicates improvement and the indicator is MET in this regard.

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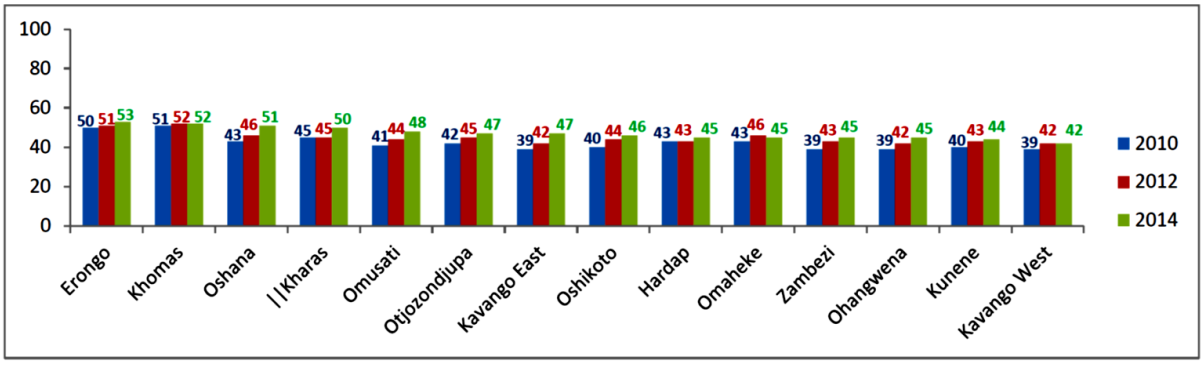

Figure 29: Average Percentage Scores – Grade 7 Mathematics

Motivation of status: This indicator is assessed using Grade 5 and 7 SATs results for Math and English. The SATs 2014 results reveal that learners in Grades 5 and 7 have made substantial improvement particularly in Mathematics as compared to the previous years. Erongo Region performed really well as it obtained second place in the Grade 5 SAT's and first place in the Grade 7 SAT's. This is an improvement from 2013 as the came second in both the grade5 and 7 SATs, the indicator is therefore rated as **MET**.

Desired Outcome 9.2.	**Increased availability of technical skills in Erongo.**
Target 9.2.1.	**More qualified artisans, technicians, geologists, accountants and engineers.**
Indicator 9.2.1.1.	**Increasing number of graduates from NIMT, Polytechnic of Namibia, proposed VTC facility in Walvis Bay and UNAM.**
Data Source	**SEMP Office/ UNAM/Poly/VTC/ NIMT**
Status:	**MET**

Indicator 9.2.1.1 aims to assess whether the mining industry in the Erongo region is being supplied with the necessary skills that is required. Qualify artisans, technicians, geologists, accountants and engineers are needed in the uranium mining industry. The different institutions cater to these careers and an increasing number of graduates from these institutions show that the skilled workers are being made available to the industry on an annual basis. The figure below (Figure 30) indicates clearly that there is a gradual increase in the number of graduates every year.

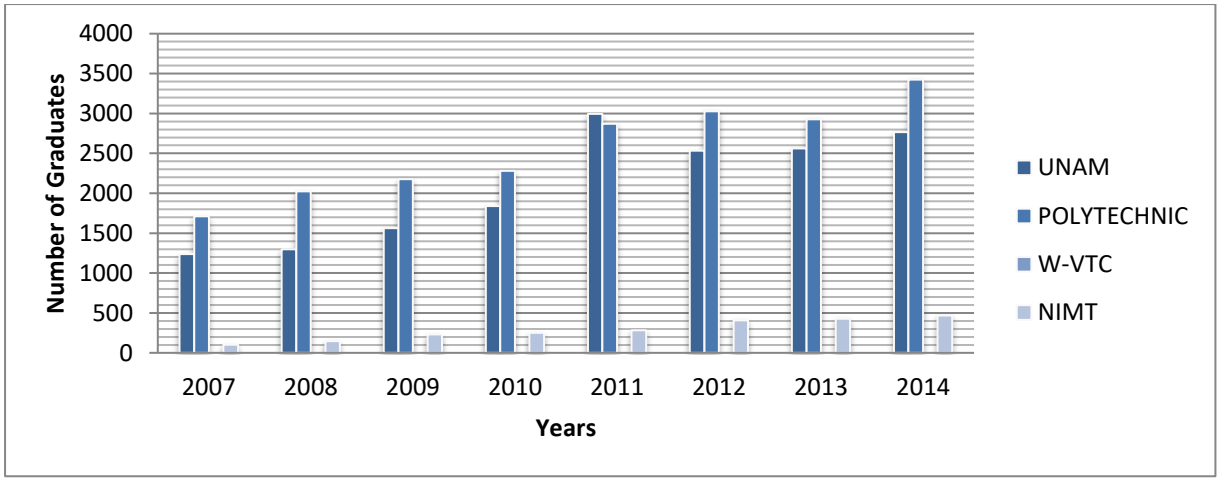

Figure 30: Total number of graduates from NIMT, VTC (no data), UNAM and the Polytechnic of Namibia.

Motivation of status: Even though there was no data from the Walvis Bay Vocational Training Centre (W-VTC) the indicator was rated as **MET** because there is a clear and consistent increase in the number of graduates in at least three of the four institutions over the last eight years.

Indicator 9.2.1.2.	**Every mine has funds/ a skills development programme for employees (3% of wage cost).**
Data Source	**NUA**
Status:	**IN PROGRESS**

This indicator is only applicable to operating mines, though AREVA, Bannerman, Swakop Uranium and Valencia also made contributions as shown in Table 21. The percentages allocated to skills development programmes varied from 0.02% at Swakop Uranium to 4% at Bannerman. The figure of 1.5% for Rössing excludes the funds that were provided to the Rössing Foundation for external training and development purposes. The average percentage of wage cost for Langer Heinrich and Rössing was 1.45%, which was not bad for a year when both companies were fighting for survival, though it fell short of the 3% target for employee skills development.

Table 21: Uranium Industry's contribution to skills development in 2014

Company	**Skills development in 2014 (internal and external)**			
Number of:	NIMT apprentices	Work permits	Bursary holders	% of wage cost
AREVA Namibia	5	0	2	3.1%
Bannerman	5	0	0	4.0%
Langer Heinrich	96	8	2	1.4%
Rio Tinto Rössing	22	4	36	1.5%
Swakop Uranium	10	tbc	12	0.02%
Valencia	0	1	2	1.6%

tbc = to be confirmed

Motivation of status: Only 2 out of the 6 listed mines MET the indicator. The two operating mines did not meet the requirements of the indicator. Considering that the operating mines were fighting of survival in 2014 but still managed to contribute to skill development this indicator is rated as **IN PROGRESS**.

Indicator 9.2.1.3.	**Each mine has 10% more bursary holders than work-permit holders.**			
Data Source	**NUA**			
Status:				**EXCEEDED**

The operating mines exceeded this target: Langer Heinrich and Rössing together had 12 work permit holders and 38 bursaries, i.e. over 200% more bursaries. The exploration companies also did better than expected. Six AREVA Resources Namibia bursary holders completed their studies in 2014 and two new bursaries were awarded, though the company employed no work permit holders. Valencia exceeded its target by having two bursary holders for one work permit. Bannerman had neither work permit holders nor bursaries. Swakop Uranium awarded 12 bursaries, but did not report the number of work permit holders.

During the year, the industry supported a total of 138 apprentices at NIMT. Langer Heinrich did very well with 96 apprentices. Many companies also made additional contributions to education in 2014. AREVA introduced an educational outreach programme involving schools in the Erongo region based on a series of booklets that AREVA has produced especially for African learners. The first booklet about water use and conservation was launched to 850 children at primary schools in Arandis. The topic of safety will be introduced in 2015. Other education-related projects included the upgrading of the library at Mondesa Youth Opportunities and training in arts and crafts production and marketing for unemployed youths at the Community Skills Development Foundation (COSDEF) in Swakopmund.

Bannerman Resources donated school uniforms to primary schools within the Erongo Region and made donations to various school funds in 2014. They also supported the Lianshulu Joint Venture Lodge in the Zambezi Region to develop the skills of the employees coming from the Mashi Conservancy. Marenica Energy supported a Namibian student in a mining-related field through the Marenica Millenium Community Trust. The bursary holder graduated during the year and no new bursaries were allocated. Rössing invested more than N$21 million in its neighbouring communities in 2014, either directly or through the Rössing Foundation. These programmes targeted: Improved primary and secondary education through learner and teacher support programmes; local workforce and specialised vocational skills development; local economic diversification and strengthening through the support of SME development. Reptile Uranium supported MYO (Mondesa Youth Opportunities) with some stationery, redundant machinery and furniture, and gave redundant computer appliances to IIT (Institute of Information Technology) for training.

Motivation of status: The operating mines exceeded this indicator. : Langer Heinrich and Rössing together had 12 work permit holders and 38 bursaries, i.e. over 200% more bursaries.

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Summary of performance: EQO 9

Total no. indicators assessed:	**7**			
	NOT MET	**IN PROGRESS**	**MET**	**EXCEEDED**
Number of indicators in class:	0	2	2	1
Percentage of indicators in class:	0%	29%	29%	14 %

Overall performance: In 2013 the indicator had 14% NOT MET, 29% IN PROGRESS, 43% MET and 0% EXCEEDED. This indicates that the EQO performed a slightly weaker in 2014. This is mainly due to lack of data for indicators 9.1.1.1 and 9.1.1.2. and therefore could not be measured. These indicator will be aligned to what the Ministry of education annually measures so that they still fulfil the objection of the education EQO.

EQO 10. Governance

Aims of this EQO: Institutions that are responsible for managing the Uranium Rush provide effective governance through good leadership, oversight and facilitation, so that all legal requirements are met by all parties involved, either directly or indirectly, in prospecting and mining of uranium.

"Can Namibia Balance Mining and Nature?" an article written by Amrei Von Hase. This article reported that the Ministry for Environment and Tourism commissioned a Landscape-Level Assessment for the Central Namib to help make sound decisions on economic development while retaining the desert's special character and people's livelihoods. Investments that result from uranium mining will assist with the development of other sustainable industries and hence human capital for so it is there for beneficial for long term national development. Although the development of mining activities is important, these activities need to be monitored in order to ensure sustainable development.

There are a number of institutions that are responsible for the governance of the uranium industry. The two main ones consulted for this EQO are the Ministry of Mines and Energy (MME) and the Ministry of Environment and Tourism (MET). Governance is the process of decision-making and the process by which decisions are implemented (www.unescap.org cited in Strategic Environmental Assessment (SEA) for the central Namib, 2010). According to the Annual Report of the NUA 2013/14 Namibia is viewed as a country with a secure and comprehensive regulatory safety net.

Monitoring of Mines and Advanced Projects. The MME 2013/14 Annual Report states that several visits to various mining companies and operations were undertaken to collect information, verify and discuss issues of mutual concern with the intent to improve on statutory obligations as per the Minerals Act, and to strengthen cooperation with the industry.

Safeguards continue to be implemented in line with the provisions of the Safeguards Agreement with the International Atomic Energy Agency (IAEA). This is done through scrutinising uranium sales and uranium oxide purchase and sales agreements to provide assurance that uranium of Namibian origin is exclusively exported for peaceful applications.

Desired Outcome 10.1.	**Prospecting and mining avoids environmentally high value, sensitive areas.**			
Target 10.1.1.	**Sensitive areas in need of protection are not generally available for prospecting or mining.**			
Indicator 10.1.1.1.	**Declared 'red flag' areas undergo the required high level of scrutiny before mineral licenses are considered**			
Data Source	**SEMP Office/MME/MET**			
Status:		**IN PROGRESS**		

The LLA (Landscape Level Assessment) of Biodiversity and Landuse in the Central Namib of 2012 that was cited in the 2013 SEMP is currently still used (Tjiuoro, 2016, MET). The outputs of the central Namib Landscape Assessment form a decision support tool that can be used to inform policy development around integrated and sustainable landuse planning and help identify areas that should not be subject to exploration and development.

In the context of the Environmental Management Act, for example, the Landscape Level Assessment DST is used to assist the application of best practice principles for the granting of exploration and mine licenses – avoiding impact to highly sensitive and/or irreplaceable areas for biodiversity and ecosystem services. The DST can also be used to help define the criteria against which Exclusive Prospecting License applications are reviewed.

Figure 31 below was produced by the LLA study shows Biodiversity Priority Areas of high to low vulnerability (Irreplaceability) with the green being high irreplaceability and white being low

irreplaceability. The figure also shows areas of high to moderate ecosystem threat status. Biodiversity Priority Areas efficiently contribute towards conservation goals *and* are considered vulnerable (threatened) in the landscape were identified outside *and* within formal Protected Areas. Priority areas include the coastal strip, areas of high topographic variability, movement corridors (e.g. rivers and ridges) and climatic gradients between the coast and inland areas (e.g. Cape Cross to Messum Crater).

Biodiversity Priority Areas can be used to strengthen the conservation area network to ensure that it is comprehensive and adequate for meeting conservation goals. Maps distributing these economic values across the landscape provide an important tool for comparing areas of environmental and socioeconomic significance in the landscape.

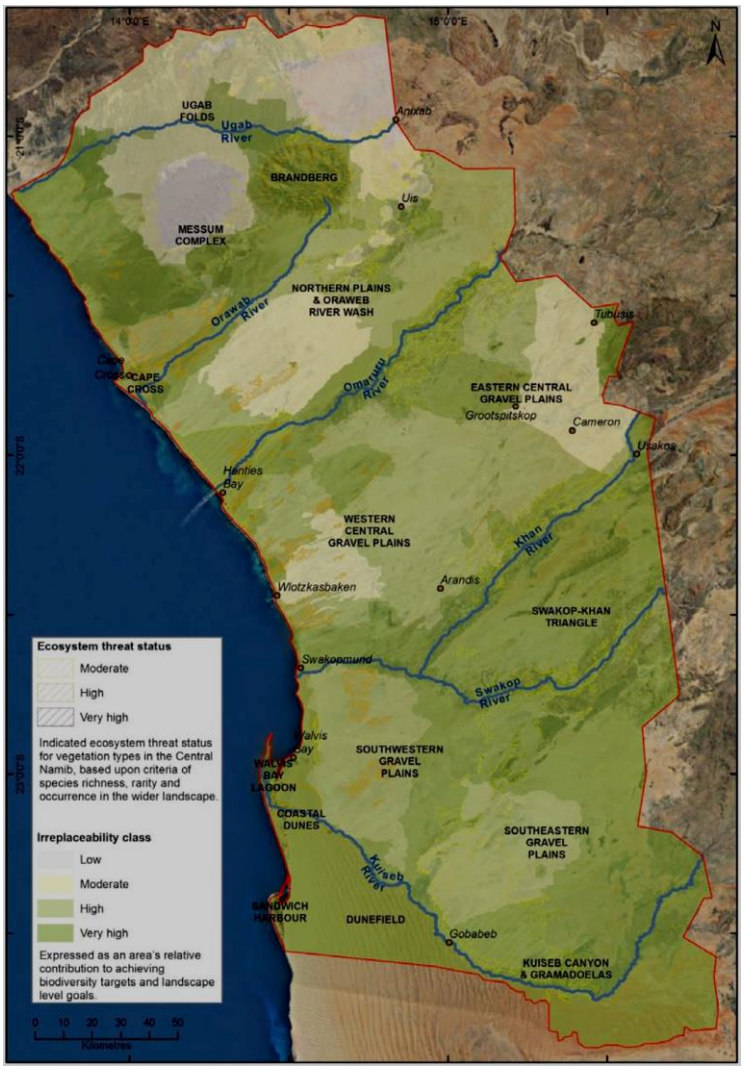

Figure 31: Biodiversity Priority Areas as indicated by areas of high threat (vulnerability) status and high irreplaceability (LLA, 2012).

The policy that is referred to in the 2013 SEMP, the Exploration and Mining in Protected Areas policy, is now is it final stages and sitting with Ministry of Mines and Energy for final approval (Angula, 2016). This policy makes provision for excluding mining from biodiversity hotspots, archaeological and paleontological sites and highly sensitive and fragile areas.

Motivation of status: This indicator is rated as **IN PROGRESS** because the policy for exploration and mining in protected areas is in its final stages but not yet final.

Indicator 10.1.1.2.	**Where possible, red flag areas remain undisturbed by mining or other developments that have high impacts on biodiversity, heritage and or sense of place.**			
Status:		**IN PROGRESS**		
Indicator 10.1.1.3.	**If development (especially mining) is to take place in a yellow flag area, strict conditions are attached with the approval certificate.**			
Data Source	**SEMP Office/MME/MET**			
Status:		**IN PROGRESS**		

The Policy for Mining and Prospecting in Protected Areas and National monuments that was originally published in 1999 was amended to strengthen the conditions under which mining and prospecting might be permitted in protected areas and ensure application of environmental best practice to promote sustainable development (NUA, 2013/14). Most of the uranium exploration and mining activities occur in the Central Namib, an ecologically-sensitive area containing parts of the Namib Naukluft National Park and Dorob National Park. Mining in these areas are strongly regulated by the government under the Minerals act of 1992, the Atomic Energy act 2005 and the Environmental Management Act 2007 (NUA, 2013/14).

Motivation of status: Because the policy on Mining and Prospecting in Protected Areas and National monuments is in its final stages but not yet finalised and the Ministry of Environment and Tourism current Environmental Management Act does not fully cater to the protection of yellow and red flagged areas, these indicators are therefore rated as **IN PROGRESS**.

Indicator 10.1.1.4.	**No new power lines, pipelines or roads linked to the Uranium mining are routed through red flag areas, and preferably also not through yellow flag areas, nor interfere with ecological processes (such as migration routes for example)**			
Data Source	**SEMP Office/MET/NUA**			
Status:		**IN PROGRESS**		

The 2013 SEMP report reported that no new power lines and roads where constructed. In 2014 the new Husab project constructed a new 22 km road, which includes a 160m bridge over the Khan River. Since the area is environmentally sensitive with desert flora and fauna, the route was carefully selected and well-positioned to prevent significant impact on the environment. By 2014 infrastructure like power lines, the permanent access road and reservoirs were in place, and a permanent water pipeline construction was progressing well.

Motivation of status: Although new powerlines, pipelines and roads were constructed to support the new Husab project that passes through an environmental sensitive area and the Khan River, and the route was carefully selected and well-positioned to prevent significant impact on the environment. This indicator is rated as **IN PROGRESS**.

Desired Outcome 10.2.	**Good governance is maintained in the issuing of mineral licenses.**
Target 10.2.1.	**The defined process is always followed in the allocation of all kinds of mineral licenses and the establishment of supporting infrastructures.**
Indicator 10.2.1.1.	**Mineral licenses are given only after full consultation of, and consensus within, the Mineral Rights Committee and the relevant status of areas in question (red and yellow flag areas).**
Data Source	**SEMP Office/MME/MET**
Status:	**MET**

All licences are issued subject to the applicant after consulting the Mineral Rights Committee and obtaining an Environmental Clearance Certificate (pers com, Ms Flaviano, Directorate of Mines 2016).

Motivation of status: This indicator is rated as **MET** because mineral licenses are given only after consultation of the Mineral Rights Committee and the Ministry of Environment and Tourism.

Indicator 10.2.1.2.	**No evidence of corruption in the allocation of mineral licenses.**
Data Source	**SEMP Office/MME**
Status:	**MET**

During 2014 no reports of corruption where reported. According to Ms Frieda Flaviano this indicator is a bit difficult for us to answer and would be better left to the public to judge. The main reason why the MPMRAC (Mineral prospecting and mining Rights Advisory Committee) committee was set up is for transparency purposes (pers com, Ms Flaviano, Directorate of Mines 2016).

Motivation of status: Since there have been no reports of corruption in 2013, this indicator is **MET**.

Indicator 10.2.1.3.	**No prospecting, mining or major infrastructure projects are permitted (anywhere) before full EIAs are completed and approved. Minimum EIA standards as in the EMA and regulations, are adhered to, including:** **- Clear TORs** **- Use of independent consultants** **- Public consultation** **- Specialist studies** **- Consideration of alternatives** **- Avoid and/or minimise adverse impacts** **- Include an EMP and closure and restoration plan** **- Professional review of EIA and EMP.s**
Data Source	**SEMP Office/MME/MET**
Status:	**MET**

All licences are issued subject to the applicant getting an Environmental Clearance from Ministry of Environment and Tourism (pers com, Ms Flaviano, Directorate of Mines 2016). No prospecting or mining is permitted before the EIA is completed and approved.

Motivation of status: Since full EIA's are required before any prospect and major infrastructure projects are issued, the status of this indicator is **MET**.

Desired Outcome 10.3.	**Prospecting and mining activities are properly monitored.**
Target 10.3.1.	**Post-implementation monitoring is regular, efficient and outcomes-based.**
Indicator 10.3.1.1.	**GRN agencies (notably MME, MET, MAWF, MoHSS) inspect active mines at least once per annum, and closed mines at least once every 3 years.**
Data Source	**SEMP Office/MME**
Status:	**MET**

Various government institutions are responsible for the implementation of this EQO, while the SEMP office reports on compliance. As stated in the 2013 SEMP report the Division of Engineering and Environmental Geology (DEEG) in the Geological Survey of Namibia (GSN) and the Mines Inspectorate in the Directorate of Mines, both of which are under the Ministry of Mines and Energy are mandated to monitor current and abandoned mine sites.

DWAF's Directorate of Resource Management (DRM) inspects mines for compliance with groundwater abstraction permits and industrial and domestic wastewater discharge permits. They collect water samples for independent analysis. The Ministry of Environment and Tourism requires regular reports on the status of the environment and does spot checks. The MoHSS inspects and licenses health-care personnel and facilities at mines, e.g. first-aid stations or clinics. The National Radiation Protection Authority (NRPA) conducts inspections for compliance with the relevant legislation and the mines' radiation management plans. The Ministry of Labour is also involved, particularly in inspecting working conditions. Table 22 shows the inspection conducted at mines and exploration sites by government institutions in 2013.

Additional information from mines regarding indicator 10.3.1.1 is summarised in the table below.

Table 22: Government Inspections of Uranium Mines and Projects in 2014

Company	Government Agencies
AREVA Namibia	MET/DEA Environmental Commissioner visit on 8 Aug 14 MAWF/DWAF Water Environment inspection on 3 Nov 14, samples taken MHSS inspected First Aid station and ambulance in Jul 14
Bannerman	MET/DEA visit by the Environmental Commissioner, Aug 14, no measurements taken
Langer Heinrich	MAWF Legal department, Aug-14, waste water sample MAWF/DWAF Water Planning Division, Aug 14, Natural Resource Accounting Project Data MAWF/DWAF, Swakop River water quality sampling, Aug 14 MET/DEA Environmental Commissioner, to verify compliance with the Environmental Management and Mitigation Plans, Aug 14
Marenica	None
Reptile Uranium	All EPLs are in current and good standing with relevant authorities, all statutory reports completed and submitted as prescribed

	Inspection of drill sites by MET staff, regular interaction with NNP park wardens On 2 April 2014, MET personnel observed and signed off on rehabilitation work on EPL4604 & EPL4605. Rehabilitation work on other RUN-controlled EPLs was signed off by MET prior to 2014 Radiation Management Plan approved by NRPA
Rio Tinto Rössing	NRPA, Jul 14, radon, gamma and water samples taken MET/DEA Environmental Commissioner, Aug 14 Visits by the Organisation for Economic Co-operation and development (OECD) / Nuclear Energy Agency (NEA) and International Atomic Energy Agency (IAEA) uranium group visit, Oct 14
Swakop Uranium	None reported for 2014, NRPA site visit in Jul 15 to conduct baseline radiation assessments
Valencia	None
Zhonghe	No info provided

Motivation of status: Since active inspection is taking place, the indicator is considered to be **MET**.

Indicator 10.3.1.2.	**Honorary conservators are appointed by MET to assist with monitoring, including of unauthorized secondary (off-mine) activities such as off-road driving, poaching and littering.**			
Data Source	**SEMP Office/MME/MET**			
Status:	**NOT MET**			

The 2013 SEMP reported that there was no legislative provision for the appointment of honorary conservators. The Ministry of Environment reported that this is currently not done (pers. Com Hiwana, Ministry of Environment and Tourism).

Motivation of status: Because there is no legislative provision allowing for the appointment of honorary conservators this indicator is considered to be **NOT MET**.

Indicator 10.3.1.3.	**International agencies regularly inspect mines and provide independent opinion on their performance**			
Data Source	**SEMP Office/MME**			
Status:		**IN PROGRESS**		

There were no international agency inspections of Namibian uranium mines in 2014. An international delegation from the Organisation for Economic Co-operation and Development (OECD), the Nuclear Energy Agency (NEA) and the International Atomic Energy Agency (IAEA) visited Rössing Uranium in October 2014. The group was in Namibia to conduct training for mine inspectors from other countries.

Motivation of status: This indicator is rated as **IN PROGRESS** because although there were no international agency inspections of Namibian uranium mines in 2014 an international delegation came to conduct training for mine inspectors from other countries so capacity building is taking place in order to inspect mines at an international level .

Indicator 10.3.1.4.	**Results of monitoring improve practice and are disclosed to the public through existing channels and in an annual SEMP report, or more regularly.**
Data Source	**SEMP Office**
Status:	**MET**

The annual SEMP Report covers all the various monitoring aspects of mines. The report's freely available to the public through the SEMP office, NERMU and the NUA. Moreover, the SEMP assessment findings are also presented to stakeholders through Roadshows.

Motivation of status: Annual SEMP Reports are freely available to the public, the indicator is **MET**.

Desired Outcome 10.4.	**Non-compliance is rectified.**
Target 10.4.1.	**Transgressions are noted and acted upon timeously.**
Indicator 10.4.1.1.	**The activities of proponents / developers / service providers, who have caused unauthorised negative impacts, are suspended, and they are forced to remedy impacts.**
Status:	**MET**
Indicator 10.4.1.2.	**If impacts are not remedied, the operation is closed and the project authorisation is cancelled.**
Status:	**MET**
Indicator 10.4.1.3.	**Fines are issued for non-compliance.**
Data Source	**SEMP Office/MME/MET**
Status:	**MET**

Indicators 10.4.1.1, 10.4.1.2 and 10.4.1.3 are assessed together as they are similar. MET issues compliance orders to parties that do not comply and are given 14 days to comply before their clearance is revoked and because of this process no cases of clearances being revoked have been reported. When a compliance order is issued all activities should be stopped until compliance is cleared pers. Com Hiwana, Ministry of Environment and Tourism).

Motivation of status: All three indicators are rated as **MET** as no revoke cases have been reported because the guilty parties are issued with a compliance order and are given 14 days to comply before their clearance are revoked.

Indicator 10.4.1.4.	**All incidences of non-compliance are publicised through the media and noted in the annual SEMP report.**
Data Source	**SEMP Office**
Status:	**IN PROGRESSS**

Currently no non-compliance cases are reported to the media by MET but plans are in place to table this as part of the environmental clearance process pers. Com Hiwana, Ministry of Environment and Tourism).

Motivation of status: This indicator is rated as **IN PROGRESS** because although no incidences of non-compliance are currently reported to the media, plans are being discussed to include it in the clearance process.

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Summary of performance: EQO 10

Total no. indicators assessed: 15

	NOT MET	IN PROGRESS	MET	EXCEEDED
Number of indicators in class:	1	6	8	0
Percentage of indicators in class:	7%	40%	53%	0%

Overall performance: The EQO performed lesser than the previous year (2013). In 2013 73% of the indicators were MET and only 7% NOT MET, with 20% IN Progress. The indicators that are NOT MET relate to no legislation to appoint Honorary conservators that assist with monitoring, including of unauthorized secondary (off-mine) activities such as off-road driving, poaching and littering.

EQO 11. Heritage and Future

Aims of this EQO:

- **Namibia's international image is maintained and enhanced, as the 'Namib Uranium Province' builds a good international reputation as a result of generally reliable, ethical, trustworthy and responsible practices/behaviour and more specifically, because of environmentally, socially and financially responsible uranium mining operations.**
- **Uranium exploration and mining - and all related infrastructure developments - will have the least possible negative impact on archaeological and paleontological heritage resources.**
- **Survey, assessment and mitigation will result in significant advances in knowledge of archaeological and paleontological heritage resources, so that their conservation status is improved and their use in research, education and tourism is placed on a secure and sustainable footing.**

A review of local and international online publications revealed several public concerns on social, environmental health and economical challenges on uranium mining in Namibia during 2014. The media reviewed consist of reputable local publications such as The Namibian, The Namib Times and Confidante daily newspapers and the international consisted amongst others the Mining Journal and Nuclear Monitor publications.

A number of environmental compliance concerns were reported, which includes the halted Rössing Uranium mine's preparation of the Social and Environmental Impact Assessment for the Z20 deposit Namib Times 2013. Other issues relating to the EIA regulation for which a complaint was raised by EarthLife Namibia regarding the lack of public involvement was the Zhonghe Resources EIA process. The concern by EarthLife was that the EIA report was only made available to the public two years after it was completed and four months after the license was issued. This created an impression of doubt on the credibility of the Namibian mines licensing process, as Earth-Life Namibia claims that the Zhonghe Resources EIA report only qualifies to as a scoping rather than an EIA report (Nuclear Monitor 2013).

Other environmental impacts entails the switch from dry to wet tailings disposal at Swakop Uranium's Husab mine resulting in an increase of 400 hectares footprint in the NNNP, and the start of construction works while the comment period for the EIS amendment was still open. The issue that re-occurred in several of the publication attention was the Rössing Uranium mine's structural failure of a leach tank causing a major spill of acidic ore slurry (Namib Times 2013, Nuclear Monitor 2013 and Mining Journal 2013a). Overall, none of the issues raised hindered the archaeological conservation or presented a risk to the Namib's archaeological heritage.

On a positive side, several of the operating companies exhibited commitment towards contributing through corporate support of local social and economic development initiatives. Construction works of the multi-million dollar Swakop Uranium's Husab Mine commenced creating employment opportunities and academic scholarships were awarded to support local young Namibians obtain qualifications in mining fields (Mining Journal 2013c and Confidante 2013). The Rössing uranium mine also entered into a supply agreement for sulphuric acid from a domestic source to replace imports. All these and other commitments contributed greatly to both the local and national economies.

The Oxford English Dictionary defines 'heritage' as 'property that is or may be inherited; an inheritance', 'valued things such as historic buildings that have been passed down from previous generations', and 'relating to things of historic or cultural value that are worthy of preservation'. Therefore for the future generation to know historical and evolutional history of the Erongo region the is a need to know the areas of Archaeological and Paleontological importance and this can only be done by inheriting this site. The Erongo Region is home to a rich archaeological history, that record and preserves the occupation and evolution of the Namib during the Pleistocene and Holocene periods. The exploration and mining of mineral resource in the region are making these sites are

susceptible to damage. Consequently, there is a need to protect these sites and this EQO aim to measure the impact the Uranium Mining is having in the region. Furthermore The EQO11 requires that all mining and related developments are subject to archaeological assessment and that no unauthorised impacts occur. Additionally this EQO11 aim to assess Namibia's image in terms of social, environmental and economic ethical conduct on the international scale.

Desired Outcome 11.1.	**Namib uranium is regarded as a 'green' product.**
Target 11.1.1.	**The 'Namib Uranium Province' is regarded internationally as an area where reliable, trustworthy, ethical, and environmentally, socially and financially responsible companies prospect and mine for uranium.**
Indicator 11.1.1.1.	**<10% critical international voices about the operations and performance of the Namib Uranium Province among any key international stakeholders (other than those international stakeholders opposed to uranium mining and/or nuclear power anyway, in principle/on ideological grounds).**
Data Source	**SEMP Office**
Status:	**MET**

To assess the image of uranium mining in Namibia, there is a need to know what the international community is reporting about the mining activity in the Erongo region. This was achieved by using Google News and other prominent relevant media as sources for articles that paint a negative picture about the Uranium mining and exploration in the Erongo region. The search was run using the terms," Uranium Mining Exploration Namibia 2014", results revealed articles from many sites including World Nuclear New, Mining Journal, The Guardian, EJOLT, etc. Most articles generally talks about the general operations and new developments taking place in the Erongo Uranium provinces, and made a positive assessment of the region. However, there were several articles that voice criticism of the mining operations, namely negatively towards the Rössing Uranium. These articles includes an article on the 15th April 2014, by John Viral, of *The Guadian* entitled "Uranium workers dying after time at Namibia mine, report warns", On the 17 April 2014, by *Facing finance* group entitle "Radiological Impact of Rössing Uranium Mine" and an article by Marta Conde of the EJOLT organisation entitled" Namibia's Rössing – Rio Tinto mine causes environmental and health problems" published on their website on the on May 12th, 2014. A further analysis of these articles has revealed that these articles were written based on research studies conducted by CRIIRAD (Commission de Recherhe et d'Information Independantes sur la Radioactivite) and Earthlife Namibia.

Motivation of status: Although the two organisations seek out for a better environment, they did fit in the category of stakeholders opposing uranium mining and/or nuclear power anyway, in principle/on ideological grounds. On the other hand, criticism recorded was less than 10%. Based on the evaluation criteria this indicator is **MET**.

Indicator 11.1.1.2.	**There is <10% evidence of unreliable, unethical and/or environmentally, socially and financially irresponsible conduct by operating uranium mines or prospecting activities.**
Data Source	**SEMP Office**
Status:	**MET**

On the research done, the report by Kohrs and Kafuka (2014) of Earthlife Namibia, painted a picture of unethical behave of Uranium Mines, more specifically Rössing Uranium towards the health of the current and ex-workers. This article claims the workers are paying a high price for working for uranium

and being exposed to radiation. Furthermore, the article seem to implies that the workers and mines are playing a blaming game, with the mine blaming the poor health of the miners to bad health lifestyle such as eating habits, tobacco smoking and alcohol and not because of exposure to radiation. On the other hand the workers blame the mines and mine's Dr for not being honest with them about their health, here is what one worker said in the study by Earth life Namibia:

> *"Doctors were told not to inform us with our results or tell our illness. As you know she is also just working for the company and she just has to obey to what she is told. These have become a very dangerous issue since you are sick and never informed about your sickness. They only supply you with medications until you are totally almost finished up or about to die it's when they will tell you what your sickness is. I even had a friend who died of cancer but he was never told about his results. They were supposed to tell him. It was very painful news to hear that he died of cancer while he has been going for the test and was never informed."*

Apart for the allegations levelled by the Earthlife Namibia report, the rest of the mining and mineral exploration worked in the confines of the regulating laws and procedures. No environmental, social or financial irresponsibility's was reported to the regulating authorities during 2014.

Motivation of status: The one incident reported by Earthlife is only such criticism encountered in this research and makes up less than 10% of the articles written on the Erongo uranium province. Therefore the indicator is **MET**.

Desired Outcome 11.2.	**The integrity of archaeological and paleontological heritage resources is not unduly compromised by the U-rush.**			
Target 11.2.1.	**Mining industry and associated service providers avoid impacts to archaeological resources, and where impacts are unavoidable, mitigation, restoration and /or offsetting are achieved.**			
Indicator 11.2.1.1.	**All mining and related developments are subject to archaeological and paleontological assessment** **No unauthorised impact occurs**			
Data Source	**NERMU/MET/NUA**			
Status:			**MET**	

The only archaeological and palaeontological studies relevant to the reporting period were carried out by Reptile Uranium Namibia and Swakop Uranium. Reptile commenced an EIA in 2013 and continued in 2014 on the Ongolo and Tumas Projects. A report by Dr John Kinahan is available (Archaeological survey and assessment of the proposed Ongolo ML, QRS Job 178, completed 18 July 2013). Dr John Kinahan also provided archaeological services to Swakop Uranium for various aspects of the Environmental Impact Assessment. This work is continuing in 2015. None of the mines reported any unauthorised impact on archaeological or palaeontological sites.

Motivation of status: All the EIA studies conducted in the area included the archaeological and palaeontological studies, therefore this indicator is **MET**.

Indicator 11.2.1.2.	**Mining companies adhere to local and international standards of archaeological assessment.**
Data Source	**NERMU/MET/NUA**
Status:	**MET**

Mining companies employed Dr John Kinahan who is a reputable archaeologist and applies local and international standards of archaeological assessment.

Motivation of status: The use of Dr John Kinahan by the mines to do archaeological work means the mines are adhering to international standard of assessment and therefore can be regarded as **MET**.

Desired Outcome 11.3.	**Integration of archaeological and environmental knowledge in a balanced working model of Namib Desert environmental processes.**
Target 11.3.1.	**Development of a general research framework to identify gaps in scientific knowledge.**
Indicator 11.3.1.1.	**Research in progress.**
Data Source	**NERMU/MET**
Status:	**MET**

The assessment of this indicator focuses on whether there is archaeological research in progress conducted in the Namib Desert. Information obtained from the 2014 permit register of the National Heritage Council and the previous (2012) SEMP report, about four studies (Table 23) on archaeology were conducted within the uranium province (B Karipi, NHC, pers. comm., 2015).

Table 23: Records of permits issued for archaeological studies in the Central Namibia, though not directly linked to nuclear projects.

Applicant Name	Permit Date	Preliminary Report Date	Final Report Submission	Research Site	Research Conducted
1.Prof Brigitte Senut	29 /03/2014	None	April 2015	Sperrgebiet and Namib-Naukluft	Paleogene and Neogene sedimentary deposits
2. Prof. Brigitte Senut	07/05/ 2014	NONE	NONE	Sperrgebiet and the Namib-Naukluft Park	Paleontological Research: Environments during the Palaeogene and Neogene period to understand the deposition of the sediments from those Eras
3. Prof. Brigitte Senut	07/05/ 2014	NONE	Aug 2015	Sperrgebiet and the Namib-Naukluft Park	Temporary Export of Palaeontological Remains
4. Dr John Kinahan	25/06/2014	None	July 2014	Swakop Uranium	Chance find of a possible grave site (remains) during excavation preparatory works Construction of the Husab Mine - Tailings Storage Facility (TSF)

Motivation of status: Research work on the Namib heritage/archaeology remained ongoing even beyond the uranium province. Therefore, this indicator is **MET**.

Indicator 11.3.1.2.	**Working model of Namib Desert developed.**			
Status:		**IN PROGRESS**		
Indicator 11.3.1.3.	**Model providing information to guide decision making about development in the Namib desert.**			
Status:		**IN PROGRESS**		
Indicator 11.3.1.4.	**Development of diachronic models to determine the effects of climatic and other environmental changes.**			
Data Source	**NERMU/MET/NUA**			
Status:		**IN PROGRESS**		

Again, these indicators (11.3.1.2, 11.3.1.3 and 11.3.1.4) are clustered and reported on here because they are related. Although the models are not yet developed, a large number of archaeological research were conducted and publications produced, these are according to Dr John Kinahan (one of the drivers of the concept) leading to the development of the models (J Kinahan, QRS, pers. com., 2014).

Motivation of status: Because there were archaeological research conducted, which is aiming at generating the necessary data/knowledge need to develop the models, the indicator is rated as **IN PROGRESS**.

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Summary of performance: EQO 11				
Total no. indicators assessed: 8				
	NOT MET	**IN PROGRESS**	**MET**	**EXCEEDED**
Number of indicators in class:	0	3	5	0
Percentage of indicators in class:	0%	38%	62%	0%
Overall performance: The EQO performed worse than the previous two reporting years, with the MET decreasing from 75% to 62.5% while the IN PROGRESS indicators increased from 25% to 37.5%.				

EQO 12. Mine Closure and Future Land Use

Aims of this EQO: To maximize the sustainable contribution mines can make post closure to society and the region, and to minimize the social, economic and biophysical impacts of mine closure.

The EQO aims to maximize the sustainable contribution that mines can make to society and the region post mining. Mine closure is one of the mining industry's toughest sustainable development challenges. It's therefore necessary for mines to incorporate socio-economic aspects, along with the more physical aspects, into the mine planning process. Closure plans should be drawn up as early as possible and be an integral part of the mining plan such that it is undertaken progressively during the life of the mine.

Sufficient personnel and resources must be allocated during mining to enable progressive closure and final costs at closure without impeding production. Even though mining companies may not have sole responsibility for addressing the socio-economic impacts of mine closure, they are key players with significant power, influence and resources.

The Namibian Mine Closure Framework that was finalized by the Chamber of Mines of Namibia (CoM) in May 2010 has the primary purpose of providing guidance for the Namibian mining industry on how to develop relevant, practical and cost effective closure plans and to lay down minimum requirements for all members of the CoM bound by the Chamber's Code of Conduct and Ethics (COC) (CoM, 2010). Thus at the end of mine life, companies and the government are well prepared and have the necessary resources to carry out the mine closure plan; ensuring that the negative social, economic and biophysical impacts of mine closure are minimized.

Desired Outcome 12.1.	**Companies have approved closure plans in place which ensure that there are no significant post-closure long term negative socio-economic, health and biodiversity effects from the mine. These plans should address planned as well as premature closure.**			
Target 12.1.1.	• **The planning process is initiated early (in the feasibility study stage) to ensure that reasonable opportunities for post closure development are not prevented by inappropriate mine design and operations.** • **Mine closure plans need to be based both on expert and stakeholders input, and consider site-specific risks, opportunities and threats as well as cumulative issues. These must include socioeconomic opportunities for nearby communities and the workforce, demolition and rehabilitation and post closure monitoring and maintenance.** • **The plan needs to contain accepted and agreed objectives, indicators and implementation targets.** • **The plan needs to be subjected to periodic critical internal and external reviewed, must have written GRN approval.**			
Indicator 12.1.1.1.	**The contents of the plan are consistent with the IAEA guidelines, Namibian regulations and policies and the Namibian Mine Closure Framework.**			
Data Source	**SEMP Office/CoM/MME**			
Status:			**MET**	

Operational mines are required to have a closure plan, while exploration companies just need a plan and financial provisions for items such as site rehabilitation and retrenchments. All companies

reported that the contents of their plans were consistent with the Namibian Mine Closure Framework (see last item in Table 24). The framework was developed based on IAEA guidelines and international good practice, while Namibian regulations and policies are not yet place.

Feedback on the individual targets varied according to the history of mine development (Table 24). For instance, Rössing's feasibility study was done in the early 1970s when closure planning was not considered in mine development and stakeholder involvement was unheard of. All other companies started the closure planning process at the feasibility study stage. The plans were generally based on expert input, though some companies also obtained stakeholder input. Most plans considered site risks, opportunities and threats, as well as cumulative issues. Socioeconomic opportunities for communities and the workforce were included in all plans, except for Swakop Uranium's. Most companies have looked at demolition, rehabilitation and post closure monitoring and maintenance.

Table 24: Feedback from Mines Regarding Compliance with Closure Planning Requirements

Closure plan:	AREVA	Bannerm.	LHM	Rössing	Swakop U	Valencia
Planning process started at feasibility study stage	Yes	Yes	Yes	No	Yes	Yes
Was based on expert and stakeholders input	Y/N	No	Yes	Yes	Yes	Yes
Considers site risks, opportunities, threats, and cumulative issues	Y/N	Yes	Yes	Yes	Yes	Yes
Socioeconomic opportunities for communities and workforce	Yes	Yes	Yes	Yes		Yes
Demolition, rehabilitation and post closure monitoring, maintenance	Yes	Yes	Yes	Yes		Yes
Contains accepted and agreed objectives, indicators and targets	No	No	Yes	Yes		No
Subjected to internal and external review	Yes	Yes	Yes	Yes		Yes
Written GRN approval	No	No	Yes	No		Yes
Consistent with IAEA guidelines	Yes	Yes	Yes	Yes		Yes
Namibian regulations and policies	N/A	N/A	Yes	Yes		N/A
Namibian Mine Closure Framework	Yes	Yes	Yes	Yes		Yes

A formal process to obtain approval is not yet in place because there are no Namibian regulations and policies specific to mine closure. The companies that responded "yes" to this item were referring to the existing mining legislation. In the absence of specific regulations it is impossible to set accepted

and agreed objectives, indicators and targets. At this stage companies rely on corporate head offices or consultants to review the closure plans as there are no external reviews by government agencies.

In addition, Bannerman Resources explained that their mine closure planning was done at a high level at this stage and included input from consultants. Items such as ongoing groundwater monitoring, fencing and berming of excavations, covering of the ripios pad etc. have all been taken into consideration. Once approval to develop the mine is obtained a more detailed closure plan will be developed. The Valencia closure plan was contained within the EIA/EMP approved as part of the environmental clearance granted in 2008.

Motivation of status: All operating Mines have closure plans consistent with the Namibian Mine Closure Framework and IAEA Guidelines. Therefore the Indicator is **MET.**

Desired Outcome 12.2.	**Mines have adequate financial resources to close operations responsibly and to maintain adequate aftercare.**
Target 12.2.1.	**The financial provision for mine closure needs to be based on cost calculations including:** • **employee costs (retrenchment provision, new employment opportunities, re-training costs);** • **social aspects (sustainability of associated communities), an exit strategy (that is, the process by which mines cease to support initiatives), social transition (that is, communities receiving support for transition to new economic activities);** • **demolition and rehabilitation costs (infrastructure break-down, salvage and/or disposal at the site or transition to end uses), ecosystem rehabilitation costs of the site;** • **post closure monitoring and maintenance; and** • **project management (administration and management costs during the decommissioning period).** **Companies, in conjunction with regulators, need to establish an independent fund to provide adequate financial resources to fully implement closure**
Indicator 12.2.1.1.	**Closure cost estimations contained in the closure plan.**
Status:	**MET**
Indicator 12.2.1.2.	**Financial sureties are available.**
Data Source	**SEMP Office/CoM/MME**
Status:	**MET**

Closure cost estimates are contained in the all closure plans and include the aspects listed in Target 12.2.1 as shown in the table below (Table 25). Mines in the development phase or under construction do not have to comply with these two indicators (Bannerman, Reptile, Swakop Uranium, Valencia).

Table 25: Feedback from Mines Regarding Compliance with Closure Cost Provisions

Closure financing:	AREVA	Bannerm.	LHM	Rössing	Swakop U	Valencia
Includes employee costs	Yes	N/A	Yes	yes	N/A[1]	Yes
Social aspects, exit strategy	Yes	N/A	Yes	yes	N/A[2]	Yes

Demolition and rehabilitation costs	Yes	N/A	Yes	yes	Yes	Yes
Post-closure monitoring and maintenance	Yes	N/A	Yes	yes	Yes	Yes
Project management	Yes	N/A	Yes	yes	Yes	Yes
Closure cost estimations contained in the plan	Yes	N/A	Yes	yes	Yes	Yes
Financial sureties are available	Yes	N/A	Yes	yes	No[3]	N/A

Remarks related to Swakop Uranium's input in Table 25:

1- Swakop Uranium is currently in the construction phase, as the average employee tenure at the company is less than 1.5 year. The value of this portion in the rehabilitation and decommissioning provision is currently immaterial.

2- Swakop Uranium is currently in the construction phase, the full closure plan needs to be presented and approved by GRN, this will includes full socio-economic aspects and exit strategy. It is important to note that the current indicated Life of Mine exceeds 21 years.

3- A financial provision performed by independent external expert is used as basis for accounting provision in the financial records of Swakop Uranium. Financial surety is currently not a regulatory requirement nor preferred due to the significant Life of Mine.

Bannerman Resources' closure costs have not yet been estimated and although the risk assessments do take into account the social aspects and post-closure monitoring and maintenance; provisions have not been allowed for at this stage. Langer Heinrich remarked that the mining industry needs clear legislative guidance to govern review and approval of mine closure plans, financial guarantees and sureties, implementation review, expectations about rehabilitation outcomes, post-decommissioning monitoring and maintenance requirements, and relinquishment and transfer of liabilities to the subsequent land owner (refer to Indicator 12.3.1.1).

Motivation of status: All operating mines in 2014 had closure cost estimations in their plans and financial sureties. Therefore the two indicators are rated **MET.**

Desired Outcome 12.3.	**The Government has appropriate mechanisms in place to approve mine closure plans, financial instruments chosen for implementation and to effect relinquishment back to the state.**
Target 12.3.1.	**Adequate regulations applicable to mine closure are contained in the relevant legislation.**
Indicator 12.3.1.1.	**Mine closure regulations are adequate to govern:** • **review and approval of mine closure plans;** • **financial guarantees and sureties;** • **implementation review,** • **Relinquishment and transfer of liabilities to the subsequent land owner.**
Data Source	**SEMP Office/CoM/MME/ Ministry of Environment and Tourism**
Status:	**IN PROGRESS**

The government is in the process of updating the relevant legislation in order to establish adequate regulations applicable to mine closure. The mining industry needs closure regulations that are adequate to govern review and approval of mine closure plans, financial guarantees and sureties, implementation review, as well as relinquishment and transfer of liabilities to the subsequent land owner.

Motivation of status: The indicator is **IN PROGRESS** because the government is in the process of updating the relevant legislation in order to establish adequate regulations applicable to mine closure.

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Summary of performance: EQO 12

Total no. indicators assessed: 4

	NOT MET	IN PROGRESS	MET	EXCEEDED
Number of indicators in class:	0	1	3	0
Percentage of indicators in class:	0%	25%	75%	0%

Overall performance: The EQO performance is the same as in 2013, 75% of the indicators are rated MET while 25% are IN PROGRESS.

GENERAL COMMENTS AND RECOMMENDATIONS

EQO 4:

- Limited input from DWAF (Raw data provided as opposed to entirely interpreting and writing up on the water data)
- Sampling and assessing radionuclides in the water remains a challenge
- The eew Husab monitoring boreholes to be added to the SEMP monitoring boreholes?

EQO 5:

- Indicator 5.1.1.1 to be changed to receptor locations it only states ambient PM10 concentration at Swakopmund.
- Desired outcome 5.2; should be omitted from the next SEMP report. Dust monitoring network were stopped after sufficient baseline data was collected during the SEA.

EQO 7:

- Indicator 7.2.1.1. and 7.2.1.2: The use of surveys to assess these indicators remained a challenge, as the sample size matter is not addressed. Also efforts by NERMU to get the Directorate of Tourism within MET as a key partner in the SEMP proofed futile.
- A sustainable assessment method for this EQO thus remains a need.

EQO 8:

- There is a need to develop a sustainable long-term monitoring programme to continue the riverine ecosystem health monitoring activity. NERMU has championed a pilot and two follow-up studies to define the basic framework for this activity but it may not have the resources necessary to carry-on the monitoring.

EQO 11:

- There is still a great need to re-defining indicators 11.3.1.2, 11.3.1.3 and 11.3.1.4, and or clarifying what the “Model” to be developed entails, and who is accountable for the delivery of these indicators.

DISCUSSION and CONCLUSION

The overall performance of the 2014 SEMP is slightly better than the preceding years. **Table 26** below shows that 7% of the indicators were NOT MET, 33% are IN PROGRESS, 58% are MET and 2% EXCEEDED. Compared to previous years (**Figure 33**) the indicators performed slightly better in 2014 as 2% was exceeded in 2014 and 1% in 2013 to 2011.

The 2014 SEMP operational table consisted of 122 indicators, 45 targets and 37 desired outcomes. The Socio-Economic development (EQO1) Employment (EQO2) and Air Quality (EQO6) all had 100% performance. These are followed by EQO12 Mine Closure and Future Land use, Heritage and the Future (EQO11), Effect on Tourism (EQO7) and Governance (EQO10); although these also carry indicators that are IN PROGRESS. The IN PROGRESS indicators increased from 30% in 2013 to 33% in 2014. Most of the NOT MET indicators are from the Infrastructure (EQO3), Education (EQO9), Health (EQO6) and Governance (EQO10).

Indicators 5.2.1.1 and 9.1.1.2 had no data to assess them and should be regarded as obsolete. There is no statistical data currently available from the Ministry of Education to access indicator 9.1.1.2. Although it was recommended in 2013 SEMP report that the indicator that measure road accidents attributed to the uranium mines be re-evaluated, it was assess this year.

There are more indicators that exceeded the performance compared to the past years. One of the indicators' that was rated as exceeded was in the Education EQO and it stated that the mines reported more bursary holders than work-permit holders at mines. Langer Heinrich and Rössing Mines together had 12 work permit holders and 38 bursaries, meaning over 200% of bursaries awarded. Another EQO that reported an exceeded indicator was the Infrastructure EQO. The indicator states the average waiting time for ships to obtain a berth is <12 hours and it was reported by NamPort that the average waiting time for ships to obtain a berth is < 1.0 hour. The third EQO that reported an exceeded indicator was EQO 7. The indicator measures whether the tourists' expectations are 'MET OR EXCEEDED' by more than 80% of the time in terms of their visual experience in the Central Namib. The overall tourist's responses regarding their interests and quality of experience in the central Namib was highly satisfactory. An overall 83% and more of the respondents scored the overall expectation across all categories as MET or EXCEEDED.

Table 26: EQOs performance in 2014

Summary of performance:				
Status (%)	**NOT MET**	**IN PROGRESS**	**MET**	**EXCEEDED**
2014	8 (7%)	40 (33%)	71 (58%)	3 (2%)
2013	12 (10%)	36(30%)	70(59%)	1(1%)
2012	21 (18%)	37 (32%)	57 (49%)	1 (1%)
2011	14 (11%)	44 (36%)	64 (52%)	1 (1%)

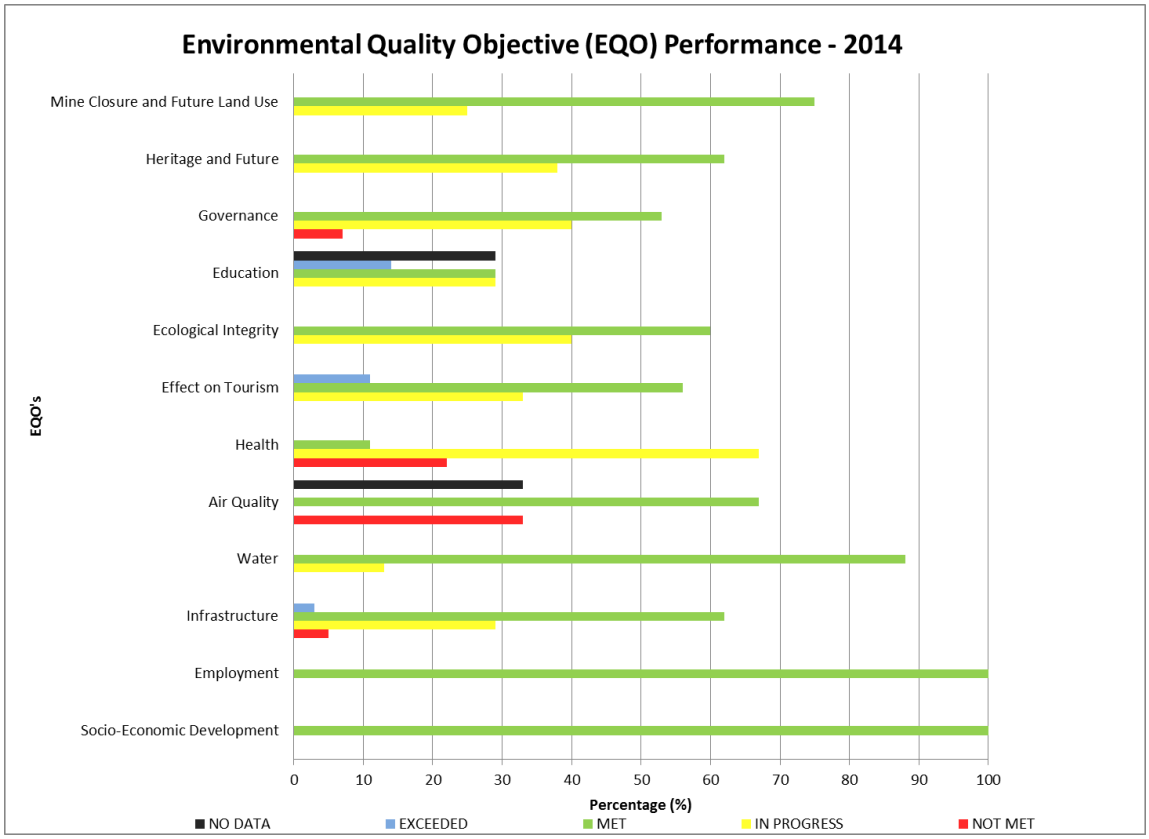

Figure 32: 2014 EQO performance

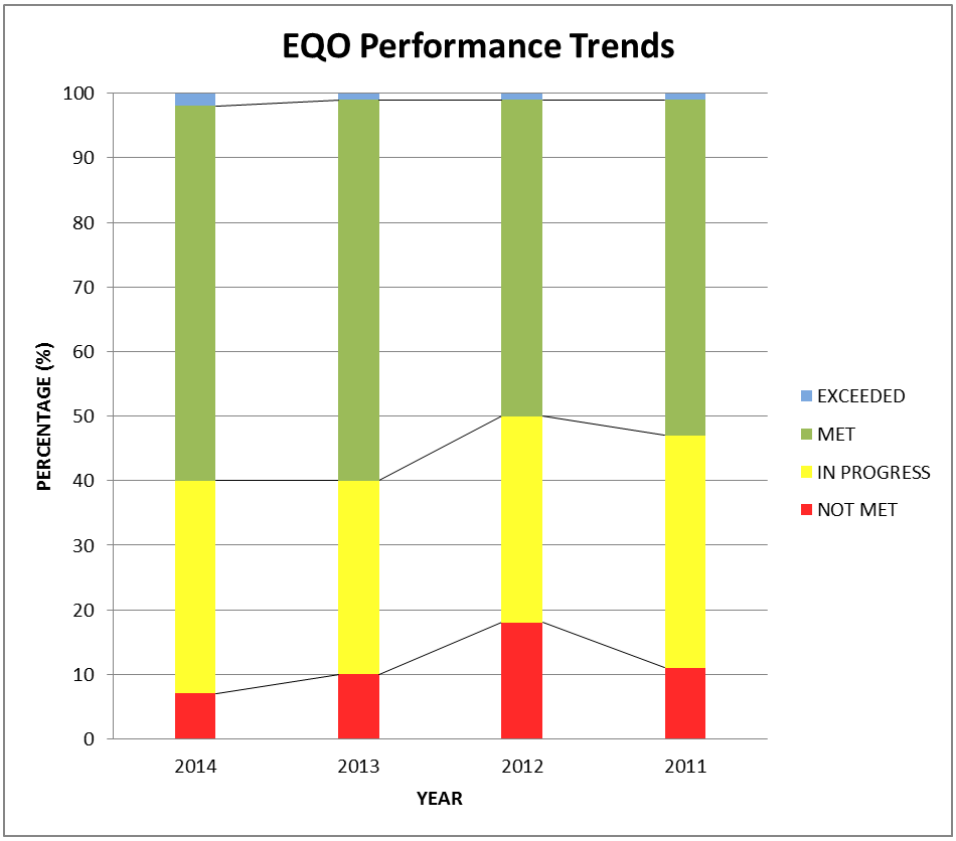

Figure 33: EQO Performance Trends

Feedback from the three previous SEMP reports confirms that the Strategic Environmental Management Plan's objective remains a priority, and cumulative efforts by both the regulating authorities , the uranium industry and other land users are made to enhance the economics of uranium mining and mitigation measures are put in place and implemented to minimize the impact of mining on the environment.

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Appendix

EQO 4

Appendix 1:

Table 27: Namibian Water Quality Standards and Groups

	Recommended maximum limits for:			
	Human consumption			Livestock watering
	Group A	Group B	Group C	
pH	6-9	5.5-9.5	4-11	
Electrical conductivity	150	300	400	
Turbidity	1	5	10	
Total dissolved solids				6000
Total Hardness as $CaCO_3$	300	650	1300	
Ca-Hardness as $CaCO_3$	375	500	1000	2500
Mg-Hardness as $CaCO_3$	290	420	840	2057
Chloride as Cl^-	250	600	1200	1500-3000
Fluoride as F^-	1.5	2.0	3.0	2.0-6.0
Sulphate as SO_4^{2-}	200	600	1200	1000
Nitrate as N	10	20	40	100
Nitrite as N				10
Sodium as Na	100	400	800	2000
Potassium as K	200	400	800	
Magnesium as Mg	70	100	200	500
Calcium as Ca	150	200	400	1000
Arsenic as As	0.1	0.2	0.4	
Cadmium as Cd	0.01	0.02	0.04	
Lead as Pb	0.05	0.1	0.2	
Uranium as U	1.0	4.0	8.0	

APPENDIX2. CHEMICAL ANALYSES OF GROUNDWATER

The SEMP project monitors 15 boreholes in the lower Swakop and Khan rivers to ensure that no pollution is emanating from the uranium mines (see Figure below). DWAF collected samples from these boreholes in January and October 2013 and in September 2014. This report compares the analyses carried out in January and October 2013 with those of September 2014. The 2013 results had not been included in the previous SEMP report. The January 2013 samples were analysed for the whole suite of aesthetic/physical and inorganic components, including trace metals and radionuclides. The other two sets were only analysed for aesthetic/physical parameters and major ions.

It is clear that from these results that the water is unsuitable for human consumption due to its high salinity. It is however used for livestock farming and horticulture. To assist with the data interpretation graphs were compiled to show the concentrations of total dissolved solids (TDS), chloride, sodium and sulphate (in milligrams per litre, mg/L). These graphs depict some noteworthy trends related to recharge from floods in 2011.

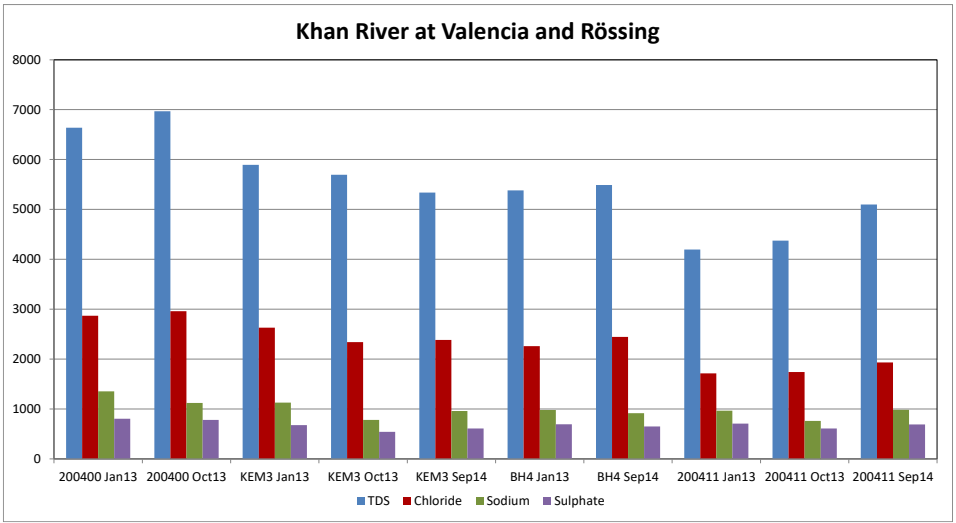

Figure 34: Water Quality Indicators for the Khan River at Valencia and Rössing Mines

For instance in the Rössing area, the groundwater at borehole WW200411 was diluted with flood water and the resulting TDS of just over 4000 mg/L slowly rose back to the level of 5000-6000 mg/L that is typical for this area. Interestingly, borehole WW200400 at Valencia (shown as MH1 on the map) has a higher salinity than the sites at Rössing. This is caused by evapotranspiration from a wetland in the vicinity. Clean water evaporates while the dissolved salts remain behind and are relatively enriched.

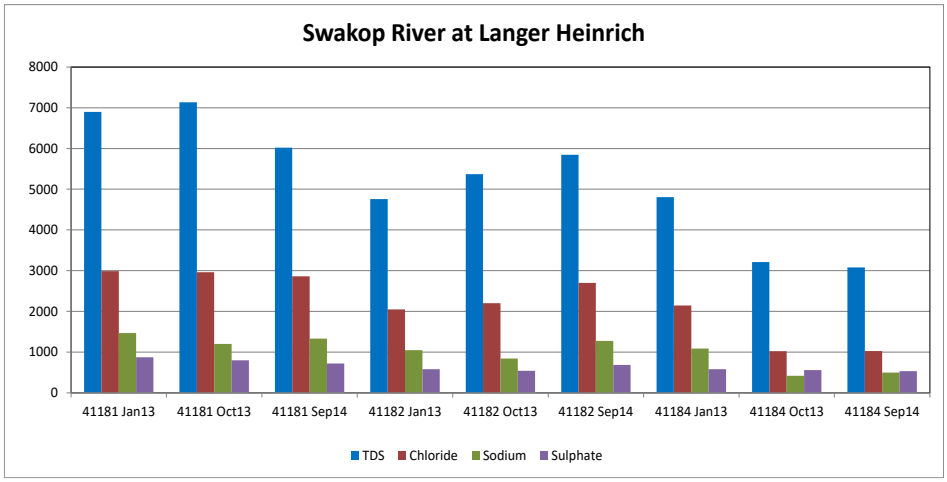

Figure 35: Water Quality Indicators for the Swakop River at Langer Heinrich Mine

The graph for the Swakop River in the Langer Heinrich area shows the upstream borehole WW41184 on the right, followed by the two sites downstream of the mine, WW41182 and WW 41181. The water quality at WW41184 showed an improving trend during 2013 that seemed to level out in 2014. The opposite trend was observed at WW41182, where the quality improvement was already visible in January 2013 and which showed a return towards pre-flood salinities in 2014. WW41181 was stable in 2013 and improved in 2014. The difference in response time was not due to the depth of the water table, since the water levels at all sites were 2-4 m below surface. It may instead be related to the horizontal distance from the main flood channels, i.e. fresh recharge takes longer to reach a borehole on the banks of the river, while a borehole in the main channel can be flooded and immediately filled with runoff water.

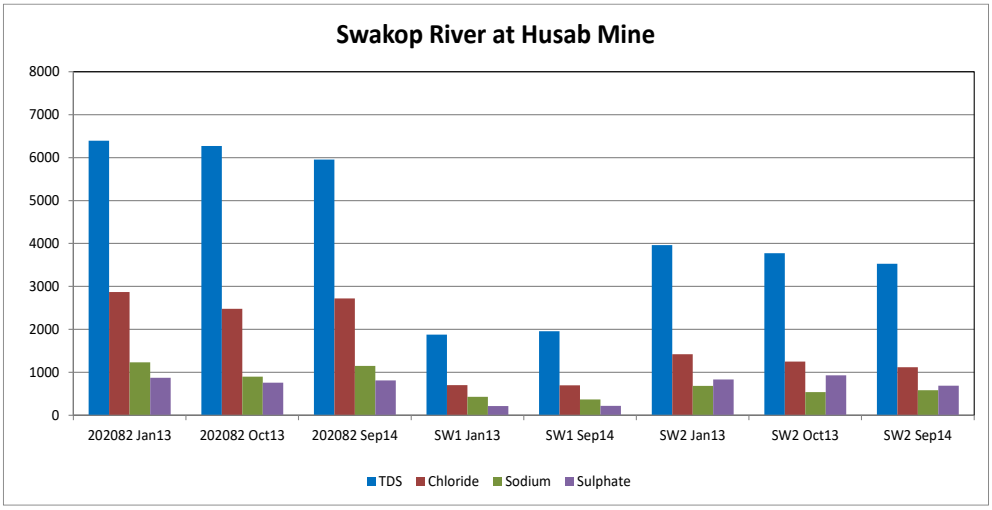

Figure 36: Water Quality Indicators for the Swakop River at Husab Mine

This effect is very noticeable in the Husab compartment, where borehole SW1 almost reached potable water quality (2000 mg/L TDS) in 2013 and 2014. The salinity at SW2, on the other hand, was still dropping in 2014, while WW202082 maintained a high TDS around 6000 mg/L throughout.

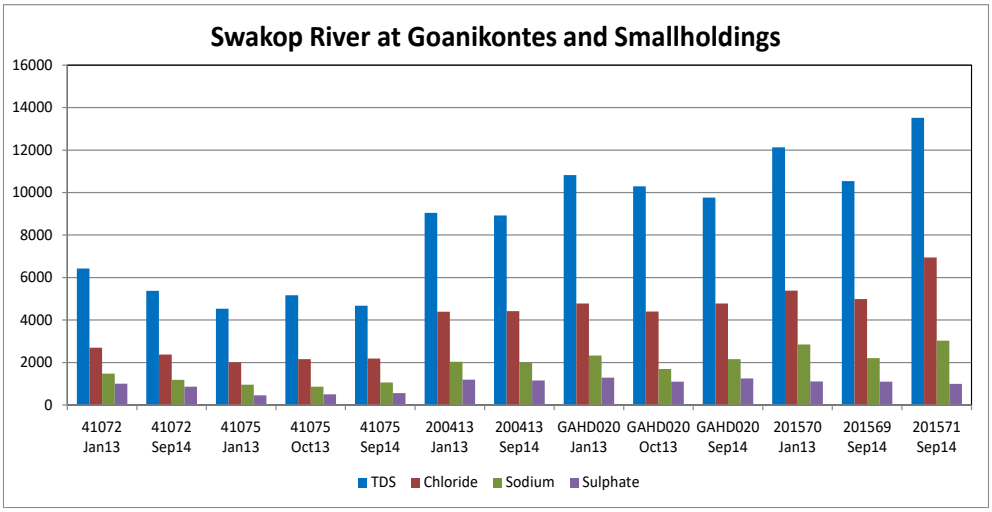

Figure 37: Water Quality Indicators for the Swakop River at Goanikontes and the Smallholdings

The lower reaches of the Swakop River from the Khan confluence to the coast are characterised by an increase in salinity to a maximum of close to 14,000 mg/L. Bannerman's boreholes WW41072 and WW41075 upstream of Goanikontes display salinities around 5000 mg/L similar to the Khan River and Swakop River at Langer Heinrich and Husab. There is a step change downstream of Goanikontes to TDS levels of 9000-11,000 mg/L at boreholes WW200413 and GAHD020, and a further increase in the area of the smallholdings (WW201569-201571). A significant and unexpected finding from these analyses is that the runoff in 2011 did nothing to improve the water quality in this reach of the river.