IMPACT ASSESSMENT CASE STUDIES FROM SOUTHERN AFRICA

Daniel Limpitlaw and Marie Hoadley, Turgis Consulting
Client: AREVA Resources Namibia Ltd.
(formerly UraMin Namibia Ltd.)

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TREKKOPJE URANIUM PROJECT
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

SAIEA

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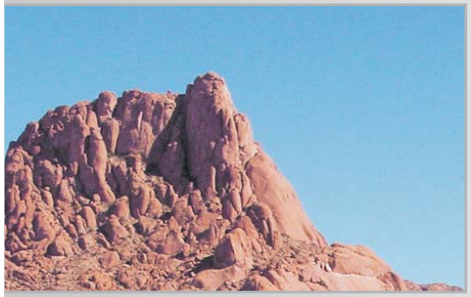

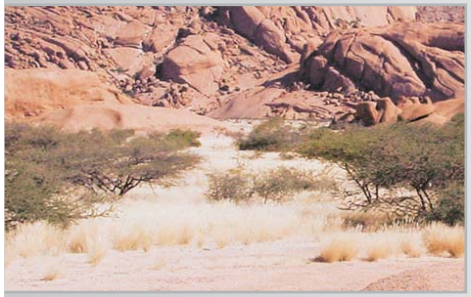

Aims of the Project

The Trekkopje Uranium Project aims to economically mine a shallow, large volume and low grade uranium deposit, in order to supply yellow cake to the international atomic energy industry. In the context of global concern about climate forcing through increased carbon emissions and increasing energy demand, uranium is in demand as nuclear fuel feedstock. Nuclear power plants typically produce only 10% of the CO_2 emissions of a similarly sized coal-fired power station. At the time of submission of the EIA, the Project was designed to produce 3.7 million pounds of uranium oxide annually to supply part of this demand.

The project will provide developmental benefits to Erongo Region, in particular, and to the wider Namibian economy. The environmental and social impact assessment (EIA) was designed to minimise the social and environmental impacts associated with the mine and to ensure that positive impacts were optimised.

Brief description of the development

The Trekkopje Uranium Project is located in the Central Namib, some 70 km inland from Swakopmund. The project lies within the #Gaingu Conservancy, in Erongo Region. The mining tenement covers an area of over 30,000 ha. Rössing Uranium Mine lies 35 km south of the property and the newly developed Langer Heinrich Uranium Mine lies 81 km to the south-south-east within the Namib-Naukluft Park (see Figure 1). Other uranium projects in the area include the Valencia Uranium Project, the Etango Project and Swakop Uranium.

The #Gaingu Conservancy is situated in communal land of the Oe-#Gân Traditional Authority. Communal land is held in trust by the State for the benefit of the Namibian people, particularly for the advancement of rural communities, and conservancies are established to further enhance the potential for rural communities to benefit from local natural resources, particularly through tourism. No settlements occur on the Trekkopje tenement, and the tenement and surrounding lands are wilderness lands, only rarely used for temporary grazing.

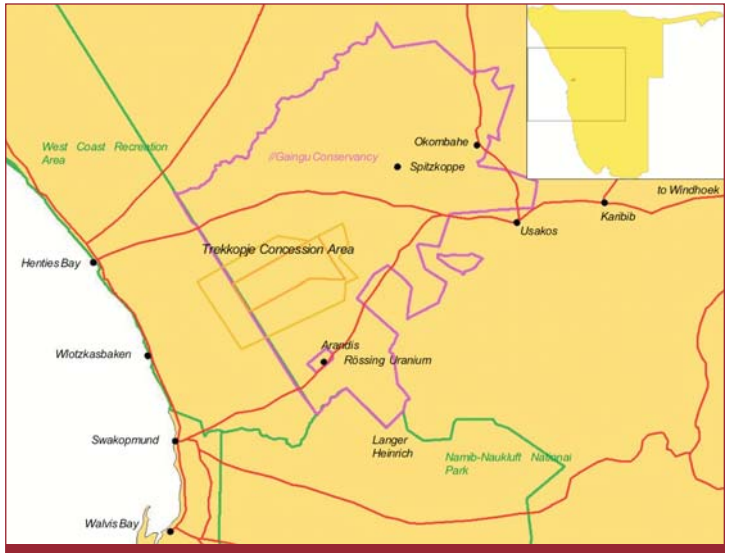

Figure 1: Regional setting of the Trekkopje Uranium Project.

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Brief description of the development

The Trekkopje deposits will be extracted by shallow, surface (open pit) mining methods, as 80% of the mineralization is shallower than 20 m. The surface topsoil (growth medium) will be removed and stored for later replacement in the rehabilitation phase. Hydraulic shovels will mine the ore at a rate of 100,000 t/d and load the ore directly into off-highway trucks which will then transport the ore to a mobile primary crushing plant in the pit. Ore will be conveyed to secondary crushers and then to the on-off heap leach pad (OOHLP). The OOHLP consists of a number of cells which are sequentially loaded using a stacker, irrigated and then reclaimed once the leaching process is complete. This is a continuous process with some cells being irrigated while others are stacked or reclaimed. The OOHLP was designed to store 30 million tons (Mt) of ore for 300 days with an average solution application rate of 10 l/h/m^2. The uranium bearing solution will be collected and recirculated in a closed loop system through the heap until it has a sufficiently high uranium concentration. The fluid, now termed a pregnant leach solution (PLS), is pumped from the PLS pond to an ion exchange plant for further uranium recovery.

Modular mining areas (pits) are planned, and as far as the mining sequence will allow, the mined-out pits will be used for dumping spent ore from the OOHLP, minimizing residual landscape impacts and facilitating concurrent reclamation. In the event that the mine sequence does not allow for in-pit backfilling, waste will be placed on to a dump outside of the pit. Extensive use is made of conveyors to reduce dust generation at the mine site, since one of the largest sources of dust in open cast mining is the loading of ore and its subsequent transport in off-highway trucks.

The EIA commenced in January 2006 and the scoping component was conducted via an extensive public participation programme. A series of baseline investigations commenced in March 2006. The draft report was submitted for public review in November 2007. Once the comments from stakeholders had been received and the final public meetings held in Swakopmund, Arandis and Windhoek, the report was updated and submitted to MET. A positive record of decision was issued by MET in January 2008.

The Trekkopje Uranium Project is currently in the construction phase. At the time of the EIA (2007), the design called for the prestripping of 223 ha of land in 2009 to facilitate the creation of a 32 ha pit and 72 ha dump surface. The mining operation would effectively cease in 2020, by which stage the pit would be 56 ha and the cumulative area covered by backfilling and dumps would be 5,690 ha. (The design has been optimised subsequent to the completion of the EIA report.)

There are two economically defined ore bodies at Trekkopje. The Klein Trekkopje deposit, which is approximately 15 km long by between 1 and 3 km wide, and the Trekkopje deposit which is approximately 5.5 km long and of a similar width to the Klein Trekkopje deposit. Both deposits extend to a maximum depth of 30 m and are covered with a layer of topsoil and overburden that is 1 to 2 m thick. The Klein Trekkopje deposit will be mined first and is the subject of the EIA.

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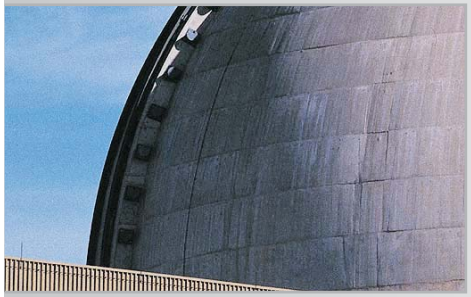

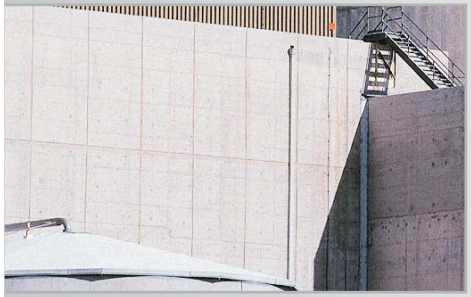

Brief description of the development

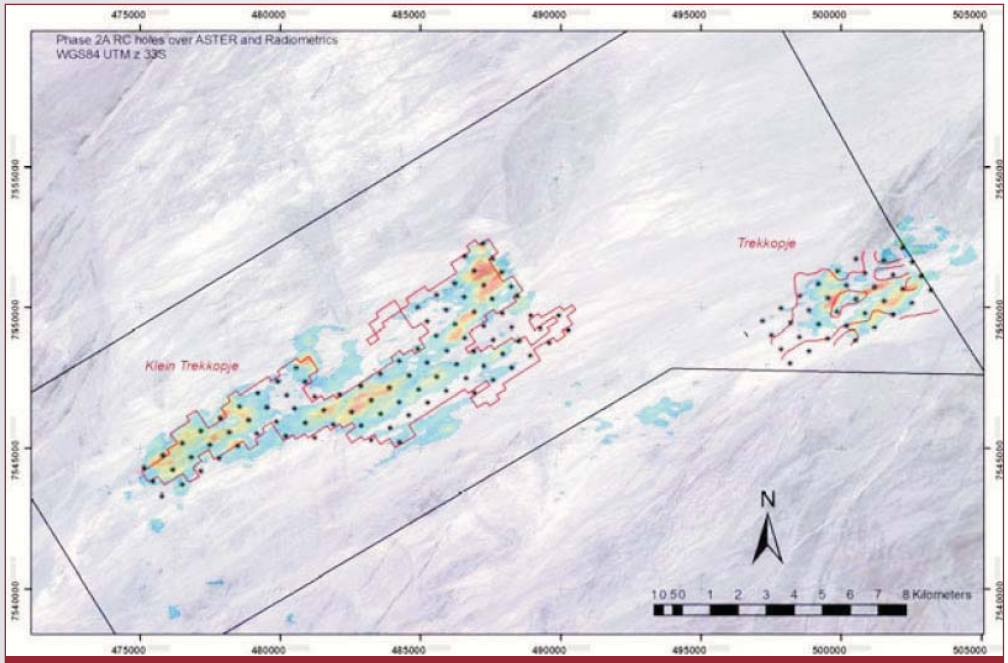

Figure 2: Current extent of the ore bodies at the Trekkopje Uranium Project (Mapping: SRK Consulting).

The low grade ore requires a cost effective means of extracting the uranium, and heap leaching was selected as the preferred approach. While a project of this scale requires assessment of a large number of alternatives, the two alternatives with the most striking differences in environmental impact are the permanent heap leach pads (HLPs) versus the OOHLP configuration. A permanent single lift heap leach pad (HLP) would have covered an area at least as large as the pit, as spent ore is retained on the leach pad and recontoured on closure of the facility. Using an OOHLP, the crushed ore is leached and then returned to the pits, minimizing the footprint. This allows concurrent reclamation of the mine by backfilling mined areas and returning the land surface to its pre-mining condition. The final landforms arising from this approach are closer to the original land surface relative to a permanent HLP, and the total area disturbed is significantly smaller.

In the 2007/8 Life of Mine plan, all spent ore is returned to the pit and approximately 30% of waste (or overburden) mined can also be deposited in the pit. The balance will be stacked in carefully sited and designed waste dumps adjacent to the pit limits. Due to swell of the ore in the mining process the final topography on the pit footprint will be above original elevations, but the final surface has been designed so that the maximum elevation will be 26 m above original topography.

Similarly waste dumps are being designed to not exceed a height of 30 m. The OOHLP method coupled with in-pit stacking provides a unique

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opportunity to design the entire operation to reduce the surface footprint of the mine and improve the prospects for post mining rehabilitation.

While not all dumps will be placed within the pit, all the dumps envisaged under the OOHLP scenario are established within the maximum pit limits established during the feasibility study (Figure 3). This is in contrast to the initial design for the permanent rock dump (assuming no backfilling) that was originally located outside of the pit limits, representing the worst case disturbance footprint scenario.

The difference in surface area disturbed is summarized in Table 1.

Water to supply demand in the Erongo coastal region is derived from various aquifer and other ground water sources that have limited capacity to allow for any additional sustainable abstraction. The water requirements for the Trekkopje Project have been estimated to be approximately 20 Mm^3/a and had to be met from some other source. Desalination of sea water was the best option. The desalination plant at Wlotzkasbaken was the subject of a separate EIA process. This bulk water supply system is made up of three major components, as follows:

- A sea water extraction system is required to extract approximately 45 Mm^3/a of sea water, feed it to the desalination facility and return brine from the desalination facility to the sea.
- The desalination plant has been sized to treat 45 Mm^3/a, with the mine using 20 Mm^3/a. The remaining 25 Mm^3/a was intended for local water supply by the water utility /municipalities.
- A water transfer pipeline from the desalination facility to the mine will be about 50 km long and requires booster pump stations along its length.

	Permanent Pads	*OOHLP*
Maximum pit area	4,600 ha	4,600 ha
Permanent waste rock dumps outside of maximum pit area	1,500 ha	1,090 ha
Area permanently disturbed by pads	6,100 ha	0 ha
Total	**12,200 ha**	**5,690 ha**

Table 1: Disturbed areas associated with each heap leach configuration considered

At the time of compiling the EIA, NamPower had been requested to supply 15 MVA as permanent supply to the mine. Power for the mine is to be sourced from the Khan substation on the farm Namibfontein, 34 km SW of Usakos, and will be reticulated along the existing Khan-Henties Bay power line servitude. For both the water pipeline and the power line, existing utility servitudes were used wherever possible to reduce further dissection of the Namib landscape.

The socio-economic considerations for such a large project were considerable. Numerous employment opportunities would be created, both during construction and operation. The expectations raised by this possibility had to be

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managed against a background of a large but low- or unskilled labour pool. The benefits of such employment, however, are numerous: remittances to labour-sending areas, increased revenue bases for local authorities, greater consumer spend and inflows to central government through employees taxes and contributions to the Social Fund.

Housing was a critical consideration in an area where accommodation and land for development is scarce. The recommendations about housing the workforce also had to take into account the nature of the economy of the various towns. Walvis Bay and Swakopmund both have diversified economies, which could sustain the negative impacts of closure. Arandis does not have a diversified economy, and unless this evolves, the town will be severely impacted by the loss of jobs and revenue on closure. Inward migration results from the announcement of any large development project, and the Trekkopje Project is no exception. Most inward migrants are unemployed and settle in informal settlements, backyard shacks or houses occupied by multiple families. The consequences of this lifestyle are severe: alcohol abuse, domestic violence and enhanced environments for tuberculosis and HIV. Considerable strain is placed on social services such as health and education. The EIA proposed a housing policy to mitigate these effects. This policy was intended to promote home ownership for the workforce.

Environmental setting

Biophysical environment

The Trekkopje Project is located in the hyper-arid Namib Desert. Hot dry conditions during the day and cool nights are common. There is no surface water on the site, except during rare periods of exceptional rainfall. Major rivers in the region, such as the Swakop River, flow less than five times in a decade. Limited quantities of highly saline ground water are present within the tenement.

Trekkopje lies in the Central Namib vegetation zone. Desert environments are typically very sensitive to disturbance and require long recovery times (sometimes thousands of years). For this reason, and the presence of many endemic species, careful management of the sensitive ecosystems surrounding the ore deposit is required. The EIA required the identification of rare and keystone species. Where buffer zones could not be created to protect individuals, suitable species were to be removed for replanting.

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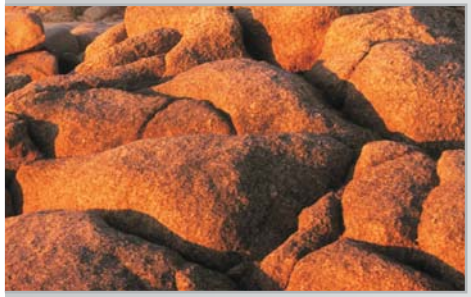

Environmental setting

Socio-economic environment

The Trekkopje Uranium Project has two principal communities of impact, Arandis and Spitzkoppe, and a third, Swakopmund, where the possible impacts of closure will not be as serious but where the immediate demand for services such as accommodation, education, water and energy could put a strain on the delivery capacity of local and regional authorities.

All three communities are characterised by high unemployment rates. In Swakopmund, unemployment figures are increased by the large number of migrant job seekers who come to the town in the hope of finding employment in either the fishing or mining industries. Since 1992, when Rössing Uranium handed the town over to the Namibian Government, the Arandis economy has been stagnant and very few job opportunities have been available.

Spitzkoppe is extremely underdeveloped and the chances of developing an economy in the community, which could provide significant employment, are remote. It is cut off from the mainstream economy by its remoteness, lack of communication and the absence of most factors that are required for economic development, such as markets and sources of raw materials.

EIA process followed

A decision was made to engage at an early stage with the people in the communal lands of the Oe-#Gân Traditional Authority, their traditional leaders and with the #Gaingu Conservancy Committee. The Spitzkoppe community had no experience of large mining companies, and it was necessary to provide them with information on what they could expect and what not. This management of expectations, which proved to be one of the most difficult aspects of the EIA process, was ongoing, as was consultation with the community. A development project for the supply of potable water to the community was undertaken by UraMin, and this was only done after the community had been guided through a needs assessment and had decided on their own priority. This project, unexpectedly, became part of the Public Participation process.

Early and continued consultation had a number of positive results: unrealistic demands, such as for regular payments of cash, were averted; the community and the Conservancy were empowered with knowledge of the impacts, both negative and positive, of the proposed project, and are today far more confident in dealing with other project proponents in their area. The Public Participation

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EIA process followed

process for this community was designed to empower them, to minimise impacts and to show respect for their leadership structures. Currently the community and AREVA have a sound and mutually respectful relationship, in spite of the fact that the hopes of multiple employment opportunities will not be realised.

The Arandis community was engaged in an intensive series of public and focus group meetings – with women, the youth, local development agencies and actors. Management of expectations – particularly of employment – proved even more difficult in this community, which had experience of mining operations. Very few people voiced any opposition to the project or asked any questions, except when it would start employing people. In this case it was necessary to change the focus of awareness raising to the number of employees the mine would eventually need and, more importantly, the education and skills levels that would be required for employment. The possibility of becoming a service provider was stressed, with the concomitant opportunity for also working in non-mining related sectors. Training, completing schooling and skills acquisition were emphasised repeatedly. It is doubtful whether any great measure of success was achieved in this respect, with the exception of some women who formed SMEs and are doing well, although some of them are still dependant on mines as their main or only client.

A particular decision was made to engage with a broad range of NGOs. This was because of events where NGOs had not been engaged, which resulted in poor public perception of the proponent and active NGO opposition to the project. In addition, some NGOs did not have a strong platform to voice their concerns, and the Public Participation process gave them such an opportunity. This particular series of engagements had tremendous value for the EIA process, because NGOs, although fundamentally opposed to the project, became partners rather than opponents, provided information and raised red flags about critical issues.

A real partnership developed between the EIA team and stakeholders. This was possible because:

- All comments and queries from stakeholders were responded to and, where feasible, included in project considerations,
- The project proponent gave full support to the greatest possible degree of transparency in stakeholder transactions,
- Stakeholders were advised as soon as possible of any major deviations from the original project description, and
- The EIA team frequently asked for, and received, information from stakeholders.

It was the response of the stakeholders to this form of engagement that made the EIA process 'different'. They had a clearly defined entry point for expressing their concerns about the project, and their comments covered all components of the EIA. They provided information about crucial I&APs who had been overlooked in the original stakeholder mapping, about particularly sensitive landscapes and species – there was not an aspect of the project where stakeholders did not comment, ask for explanations or offer advice. It was therefore relatively easy to ensure that cross-cutting issues in the final EIA were reflected as such in the various components. The information obtained during the Public Participation process could not have been gained in any other way.

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Main environmental impacts & issues

Positive

The proposed Trekkopje Project will contribute not only towards the achievement of national development objectives, but more directly to the alleviation of poverty and unemployment in local communities. A particularly significant contribution could be the raising of skills levels in both Arandis and Spitzkoppe in technical, conservation and management fields.

Negative

Liabilities that may be anticipated and need to be addressed through management plans include environmental impacts, including potential pollution, environmental degradation and disruption of ecosystems over large areas, increased demand for and use of natural resources, including water, potential radiation hazards, potential social dislocation, unsustainable economic development, and loss of land use. The challenge is to provide measures that manage social impacts and growth, while minimizing long term damage to ecosystems. The last issue is particularly important for closure planning. The creation of dependency on mine revenue is of concern regarding Arandis, and the EMP makes provision for measures to avoid or mitigate this. These measures include issues of housing, skills training of the workforce before closure and the development of alternative economic activities.

Cumulative

Several impacts have historically occurred in the environment surrounding the Trekkopje Project. Expansion of nearby cities and towns, and the infrastructure attendant on large development projects in a fragile desert environment, result in negative environmental impacts. The net result is a fragmentation of landscapes by water, road and power line servitudes. Further impacts arise from increased access, and the escalation of activities such as game poaching and illegal species collection. All of these impacts can constrain future productive land-use for activities such as tourism and small-scale agriculture.

Large scale uranium mining already occurs close to the site, at Rössing Uranium and at Langer Heinrich, and several exploration companies are prospecting nearby. These activities increase dust loading in the atmosphere and remove water from aquifers. Water consumption by Trekkopje and neighbouring mining companies reduces the amount available to ecosystems and communities. Current information indicates that a number of mines in Erongo Region will close within a few years of each other. This will intensify the negative impacts of job losses and a decline in revenues.

In-migration of work seekers places increased strain on social services and on existing communities.

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Decision-making process

The EIA process fed into the decision making process of the client and the design engineers (SRK). This enabled strategic decisions, such as the alteration of the heap leach configuration, to be made before the EIA was completed, thereby reducing the resistance to implementation. An external reviewer was used. Results of this review were presented at the public meetings at the end of the public review period. Recommendations in the independent review report were incorporated into the final version of the EIA submitted to MET.

A number of critical comments were lodged during the EIA process. These included objections to uranium mining and to the inadequate review periods. These were dealt with in meetings, either key informant or focus group, or through the issues trail. Where feasible, these were addressed in the EIA report. No appeals were lodged.

Implementation of the EMP & compliance auditing

An EIA compliance audit was conducted, at the request of the client, nine months after the Record of Decision came through. The audit was also conducted against international good practice and found that management systems were appropriate to control environmental performance at the desired level, but that the EIA had not fully anticipated the changes in the project as a consequence of increased engineering detail and should have specified the requirement for development of specific environmental codes of practice more clearly. Fortunately, the client had established an environmental policy and broad guidance action was available for areas not clearly delineated in the EIA. This was also supported by clearly designating accountability and responsibility in the EMP: responsibility for environmental management rests with the Environmental Superintendent and through the line management to the General Manager.

A dedicated post for a Community Development Officer should be created. The scope of work falls under the authority of the Manager, External Relations, and is undertaken by the Corporate Communications Officer. Regular meetings are held with the Arandis Town Council, the leadership of the Spitzkoppe community and the #Gaingu Conservancy. A communication strategy is currently being drawn up.

Measures are taken to monitor environmental performance with quarterly reports being produced. A suggestion that was not in the EMP, but should have been, is that these reports should be incorporated into an overall sustainability report issued annually. These reports can provide a framework for environmental reporting by the company and are an effective tool for communicating with stakeholders. The public nature of such reports often results in greater resources being directed towards environmental and social monitoring by the mine, with concomitant potential for improved environmental performance.

Another useful suggestion is the compilation of an environmental management manual – this is essentially a compendium of the mine EMP, regulatory requirements and the environmental operating procedures already in place at Trekkopje. These can be continually updated and can be augmented by new procedures required by the operation.

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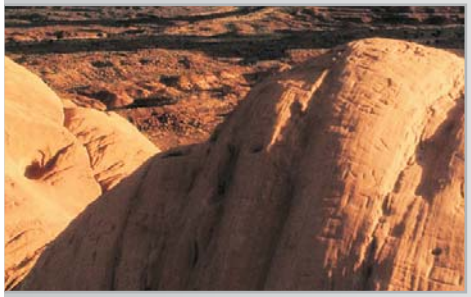

Main elements of excellence in this EIA

The closure strategy for the Trekkopje Project is being developed with the specific objective of minimizing disturbance and long term environmental impacts, leaving the post mining land in a useful, safe and stable configuration capable of supporting native plant communities, wildlife habitat, watershed functions and limited livestock grazing. This is an outcome of the Public Participation process, influencing the design through the EIA process.

The reduced footprint area means that there is a possibility of later using the mine license area for alternative activities. It also reduces the impacts on areas surrounding the mine, areas that are part of the #Gaingu Conservancy and intended for community-based ecotourism and other natural resource-based activities.

The EIA was a leader in raising awareness of the cumulative effects of uranium mining in the Erongo Region. These were considered for all relevant components, including the socio-economic, both with regard to operational and closure impacts.

Lessons learnt

The EIA team must be an integral part of the design process. Through the interaction between the EIA team and the design engineering, the mine design changed radically, resulting in an appreciably smaller final footprint.

Stakeholder engagement is not just about informing I&APs about a project and answering their questions. It is about raising awareness about potential impacts, informing people of their rights and helping them to articulate their concerns. It is a process which should empower communities. You can never engage too soon. Early engagement creates problems, but these are negligible compared to the benefits of having stakeholders as partners throughout the process;

An EIA process has three clients – the proponent, the environment and the community. It is the proponent's best interest to ensure that the two 'silent' clients are given due attention. Transparency is the overarching principle. Stakeholders will co-operate when they are told of events, changes and impacts. They will not do so if they find out about them through other sources.

The independence of the EIA practitioners must be fiercely guarded. This engenders trust on the part of the stakeholders, and enables the practitioners to use different and creative ways of conducting the EIA process.

Pubs and coffee bars are wonderful places for stakeholder engagement.

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Lessons learnt

What could have been done better?

- Expectations could have been better managed.
- More time and effort could have been spent on engaging with the extremely marginalised and with those who have no access to modern communication methods.
- It is important to ensure the legitimacy of community representatives, that they are recognised as such by the community and will articulate the community's concerns. This acts as a control on attempts to 'hijack' the process for narrow personal or political agendas.
- More time could have been made available upfront for more detailed baseline biophysical studies. The paucity of data on certain aspects of the biophysical aspects of the Namib was underestimated.
- The public review process should be more sympathetic to the constraints and patience of stakeholders.
- The entire process needs to be more user friendly.
- The time allowed for public review of the draft EIA was not sufficient. This meant that stakeholders were not fully informed and ready to engage at the final round of public participation meetings.
- When the final notification of a public review of an EIA is disseminated, a copy of the non technical summary should accompany it. Most stakeholders will read a succinct summary, and follow up on their own particular interest in the main report. Few will read a voluminous and comprehensive report in the hope of finding their own concerns addressed in it.