Strategic Environmental, Social and Economic Assessment for the Central Namib Uranium Rush

SEA “Uranium Rush”

Dr Rainer Ellmies (BGR-GSN-Project)

1. Uranium exploration and mining in Namibia
2. Uranium commodity market
3. SEA background
4. Methodology and set-up for SEA “Uranium rush”
5. Practical issues: Water, electricity, health...
6. Way forward
1. Uranium mining and exploration in Erongo Region

Two types of uranium deposits: primary “leucogranite-hosted” and secondary “calcrete-hosted”
Langer Heinrich Mine (October 2008)

“calcrete-hosted” carnotite ore
Direct footprint of Rössing Uranium Ltd

Open Pit = 431 ha
Rock dumps = 584 ha
Tailings dam = 730 ha
Ore stockpiles = 107 ha
Total direct footprint = 2441 ha
Rössing licence + accessory works area = 18410 ha
Uranium mines
1. Rössing (1976)
2. Langer Heinrich (2007)
3. Trekkopje (2009)
4. Valencia (2011)
5. Etango (2012)
6. Rössing South (2013)
8. Namura
9. Marenica
10. Erongo
11. …
Will the “URANIUM RUSH” continue?

Nov'08-Aug'09: Uranium spot price trades between 40 – 55 US$/lb

Current long term contract prices 60 – 70 US$/lb

Boom and bust?
SEA ‘uranium rush’ scenarios

Scenario 1: Below expectation
<5 mines will be operational by 2020

Scenario 2: As expected
5 – 7 mines will be operational by 2020

Scenario 3: Above expectation
>7 mines will be operational by 2020

Scenario 4: Boom - bust
5 – 10 mines become operational, and various factors lead to their hurried closure before 2020
What is a SEA?

UNDP (2002): “Strategic Environmental Assessment is a process of systematic analysis of environmental impacts which extends the aims and principles of EIA upstream in the decision making process, beyond the project level and when major alternatives are still open”
Levels of Environmental Assessments

Potential to influence sustainable development

High

International conventions, agreements, programs etc.

National Development Plans, sector policies, plans & programmes

SEA “Central Namib Uranium Rush”

Regional, provincial and local authority (and community) land use plans

Individual projects

Low
Key objectives of the SEA “Uranium Rush”

1. Analyse environmental, economic and social impacts of uranium exploration and mining and assess cumulative, synergistic and antagonistic aspects

2. Formulate development options to avoid or minimize negative impacts and to enhance positive impacts

3. Provide recommendations in the form of Strategic Management Plans (which indicate actions, responsible actors and timeframes) for sustainable development and trigger their implementation.
Facts & Figures

- Initiative of Chamber of Mines Namibia
- Independently conducted by Ministry of Mines and Energy, Directorate Geological Survey and its German Cooperation partner BGR
- First ever SEA & SMP for a mineral province
- Voluntary SEA: No existing plan on which SEA may focus
- Integrated SEA: Planners, industry and governmental authorities strongly involved in the process
- Direct costs: US$ 1,000,000
- Time frame: 1.5 years
Institutional set-up

**Steering Committee (SC)**
GSN/MME (Chair), BGR, MME-DM, MET, MLRGHRD, NPC, MoHSS, MLR, MAWF, Erongo Regional Council, Chamber of Mines, Municipalities, NACOMA, NamWater, NamPower, NGOs, NaTIS, NMWU

**External Reviewer**
Dr B Dalal-Clayton

**SEA Team**
Consultant team under SAIEA, specialists and key persons from Government

**Selected Expert Studies**
(12 focal areas)

**Additional Baseline Studies and Models**
(Groundwater quality, abstraction model, radiation and air dispersion model, land use study, health baseline)

**Consultation process**
international and local experts, political decision makers, mining and exploration companies, NGOs, regional planner, town planner
Key issues

1. Water
2. Power
3. Infrastructure
4. Land use and regional economy
5. Health, radiation and safety
6. Environment, heritage
7. Mine closure, rehabilitation and post-mining land uses
1. WATER

- supply (desalination)
- distribution
- consumption/recycling
- groundwater protection
- waste water management

<table>
<thead>
<tr>
<th>Year</th>
<th>Water required by uranium mines (Mm³/a)</th>
<th>Current water supply of NamWater nationwide = 67 Mm³/a</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>48 (64)</td>
<td></td>
</tr>
</tbody>
</table>
1. WATER

- Groundwater quality baseline study
- Fingerprinting of mine effluents
- Water balance model
- Disaster management plan
Drainage for tailings dump at Langer Heinrich, October 2008
1. BGR Hannover: Thomas Himmelsbach (overall scientific coordination, contribution to final report, subcontracting for uranium isotope studies of up to 10 samples), Frank Wagner and Robert Kringel (sampling and analysis for major, minor, trace elements including uranium)

2. DWA: Technical support, provision for 3 licenses of ModflowSurfact for the time of the study

3. UFZ Leipzig: Michael Schubert (sampling and analysis for stable isotopes and radionuclides; radon in groundwater and sediment, radionuclides in sediments)

4. University Freiburg: Vera Marx and Christoph Kuells (sampling and analysis for CFC; integration of CFC data into model)

5. Geological Survey of Namibia (BGR-GSN-Project): Rainer Ellmies (overall coordination), Israel Hasheela (compilation of existing data)

6. BIWAC: SEA “URANIUM RUSH” WATER TEAM

Groundwater protection for GROUNDWATER MODEL and WATER BALANCE ASSESSMENT FOR THE SWAKOP-KHAN SYSTEM

Inception and field planning meeting 10th June 2009

Sampling campaign: 11th June – 6th July 2010

Draft Report: 20th November 2009

Final Report: 15th January 2010
2. Power

- Consumption, generation, distribution

<table>
<thead>
<tr>
<th>Year</th>
<th>Power required MW</th>
<th>Current generation capacity of NamPower</th>
</tr>
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<tr>
<td>2007</td>
<td>45</td>
<td>393 MW</td>
</tr>
<tr>
<td>2008</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>90 (170)</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>195 (240)</td>
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</table>

Add: 150-300 MW

Legend
- Uranium Mines
- Uranium mining licences
  - Exploring
  - In production
  - Under construction
  - Planned powerlines
  - Existing power lines
  - Main towns
  - Towns
  - Tarred roads
  - Secondary roads
  - Track roads
- Kunene
- Otjozondjupa
- Komas
- Hardap
- Erono region

<table>
<thead>
<tr>
<th>Year</th>
<th>No. Employees</th>
<th>Year</th>
<th>No. Dependents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>2,200</td>
<td>2007</td>
<td>8,000</td>
</tr>
<tr>
<td>2008</td>
<td>2,900</td>
<td>2008</td>
<td>10,000</td>
</tr>
<tr>
<td>2011</td>
<td>4,500</td>
<td>2011</td>
<td>18,000</td>
</tr>
<tr>
<td>2015</td>
<td>7,000 (12,000)</td>
<td>2015</td>
<td>28,000 (48,000)</td>
</tr>
</tbody>
</table>

Population after NPC 2001:
- 7156
- 10289
- 12064
- 16293
- 26310
- 27941
- 28,000

Geographical map showing locations such as Henties Bay, Spitzkoppe, Etosha, Karibib, Wilhelmstal, and Usakos.
3. Infrastructure

- transport (roads, railways, pipelines), housing (regional and local town planning)
- social infrastructure (health facilities, schools, recreation facilities)
FACILITIES IMMEDIATELY IMPACTED BY URANIUM RUSH

Usakos
- 3 x Primary schools (state)

Henties Bay
- 1 x Primary school (private)

Swakopmund
- 7 x Primary schools (state)
- 3 x Primary schools (private)
- 5 x Secondary schools (state)
- 1 x Secondary school (private)

Walvis Bay
- 6 x Primary schools (state)
- 3 x Primary schools (private)
- 4 x Secondary schools (state)

Arandis
- NIMT
- Kolin Secondary School (state)
- 2 x Primary schools (state)

Maternal Mortality per 100,000 live births

No data
+7%
449

HIV prevalence rate 16.4% (women Erongo)
ARV receiving rate 63%

MDG
56
4. Current land use and economy

Benefits and threats to local businesses:
- Building and construction,
- Tourism industry,
- Farming...

Benefits for national economy
- Export value of 18,000 tU: N$ bn16
- Contribution to fiscus: N$ bn1.5
- N$1.4 bn will annually be paid to employees of the mines
5. Health and safety

- Air quality (dust natural vs mining induced): *Air dispersion model*
- Radiation (natural background, mining induced, cumulative dose): *Radiation model*
- Medical baseline study and projections (HIV, TB…): *Health Baseline Study*
- Central medical lab for dose and uranium testing
- Mine safety, road safety
6. Environment

- Ecological sensitivities of Namib environment: Endemic species etc.
- Landscape integrity of Namib Naukluft National Park and Erongo Region
VISUAL IMPACT Scenario 2
VISUAL IMPACT Scenario 3

LEGEND
- TOWNS
- TRUNK ROADS
- APPROX. MINE EXTENT
- MAIN ROADS
- DISTRICT ROADS
- RIVERS
- CURRENT EPLs
- PENDING EPLs
- NSCNP

MINE SCENARIOS APPROX. LOCATIONS
- SCENARIO 3
- APPROX. VIEWSHED SCENARIO 3
- NOT VISIBLE
- SINGLE
- DOUBLE
- TRIPLE
- QUADRUPE

HIGH EXPOSURE AREAS
- SCENARIO 3
7. Mine closure, rehabilitation and post-mining land uses
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## Chamber of Mines: Rehabilitation and Closure Committee (RCC)

<table>
<thead>
<tr>
<th>Closure strategy</th>
<th>Content</th>
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<tbody>
<tr>
<td></td>
<td>➢ key objectives (e.g. housing, community integration, future use of disturbed areas)</td>
</tr>
<tr>
<td></td>
<td>➢ main closure aspects and associated components</td>
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<tr>
<td></td>
<td>➢ closure risks analysis</td>
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<tr>
<td></td>
<td>➢ stakeholder expectations</td>
</tr>
<tr>
<td></td>
<td>➢ evaluation of alternatives</td>
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<tr>
<td></td>
<td>➢ identification of preferred alternatives</td>
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<table>
<thead>
<tr>
<th>Closure plan</th>
<th>Content</th>
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<tbody>
<tr>
<td></td>
<td>➢ social plan (employees and communities)</td>
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<tr>
<td></td>
<td>➢ decommissioning plan</td>
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<td></td>
<td>➢ Rehabilitation plan</td>
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<td></td>
<td>➢ monitoring plan</td>
</tr>
<tr>
<td></td>
<td>➢ detailed closure costing</td>
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SEA team workshop
Assessment of cumulative, synergistic and antagonistic aspects

Assessment of positive and negative impacts according to 38 criteria for 57 activities in the prospecting, construction, mining, planned closure and unscheduled abandonment for all scenarios.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Human and socio-economic health</th>
<th>Infrastructure</th>
<th>Aesthetics &amp; sense of place</th>
<th>Biophysical environment</th>
<th>Institution aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7. Availability and affordability of services in towns</td>
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<td>32. Aquatic ecology</td>
<td></td>
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<td></td>
<td>8. Access to desert for recreation by locals</td>
<td></td>
<td>33. Water resources</td>
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<tr>
<td></td>
<td>9. Local and regional economic development</td>
<td></td>
<td>34. Human resources</td>
<td></td>
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<td></td>
<td>10. Quality of life</td>
<td></td>
<td>35. Cultural resources</td>
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<td></td>
<td>11. National economy</td>
<td></td>
<td>36. Natural resources</td>
<td></td>
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<td></td>
<td>12. Training and skills</td>
<td></td>
<td>37. Cultural dynamics</td>
<td></td>
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<td></td>
<td>13. Social cohesion and demographics</td>
<td></td>
<td>38. Economic resources</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>15. Health &amp; STIs, occupational health</td>
<td></td>
<td>40. Social cohesion</td>
<td></td>
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<td></td>
<td>16. Air quality (including radiation)</td>
<td></td>
<td>41. Local governance</td>
<td></td>
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<td></td>
<td>17. Road safety</td>
<td></td>
<td>42. Regional governance</td>
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<td></td>
<td>18. Capacity of non-hazardous landfills</td>
<td></td>
<td>43. International Image</td>
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→ Qualitative and quantitative assessment of threats and opportunities
→ Tool to minimize or avoid negative and enhance positive effects

The Southern African Institute for Environmental Assessment (SAIEA)
SEA Flow Chart

1. Understanding the forces and dynamics of the ‘Uranium Rush’ (4 scenarios)

2. Description of current and expected new uranium mines
   - Assess vulnerable components of the central Namib environment (socio-economic, ecological, physical, ‘sense of place’)
   - Assessment of international and local safeguards/regulatory frameworks
   - Identification of stakeholders and partners

3. Design and undertake a PP process

4. Determination of sustainability parameters (EQOs)

5. Assessment of cumulative impacts

6. SEA Report +SEMP

SEMP Implementation: Planning framework for uranium rush in Erongo Region

7. Planning for individual mines

8. Monitoring and Evaluation of individual mine

9. Auditing of individual mines

10. Planning and guidance for sector development

11. Monitoring and Evaluation of sector against sustainability parameters

12. Sector and region-wide auditing
CONCLUSION

- Complexity of issues, limited time, pioneer character, pilot character for other mining provinces
- ...to design sustainable development based on a comprehensive, assessment, integration of results into planning processes and subsequent implementation
- Avoid or minimize negative impacts & enhance positive effect

SEA “Central Namib Uranium Rush”