

# Case Study: Application of UNFC–2009 in Malawi

Expert Group on Resource Classification  
Fifth session

Geneva, 29 April – 2 May 2014

Cassius Chiwambo  
(Mining Engineer)

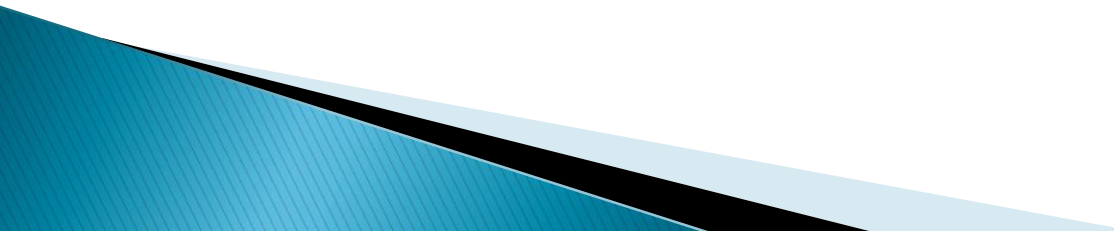
Ministry of Mining –Lilongwe, Malawi





Ministry of Mining Headquarters, Lilongwe, Malawi

# Presentation Overview

- ❑ **Basic Geographical Position-Malawi**
  - ❑ **Who we are**
  - ❑ **Current brief Mineral sector activities**
  - ❑ **Application of UNFC 2009**
  - ❑ **Challenges**
  - ❑ **Conclusion**
- 

# INTRODUCTION AND LOCATION

## Malawi:

- ▶ Is sandwiched between Tanzania, Zambia and Mozambique

## Main Export Routes:

- ▶ Railway to Nacala and Beira in Mozambique (Beira to Nacara corridor).
- ▶ Roads to Tanzania, Mozambique, South Africa, Zambia and Zimbabwe.




# 1. Who we are:

- We are a Ministry of Mining (MoM) which governs the Mineral Sector in Malawi.
- Does not participate in direct mining, unless through a government investment vehicle as proposed in the Mines and Minerals Policy. MoM is a regulatory body.
- The following Government Departments fall under this Ministry:-
  - (i) Department of Mines
  - (ii) Geological Survey
  - (iii) Office of Commissioner of Mines and Minerals

□ The MoM is primarily in charge of mineral resources promotion and facilitates formulation of appropriate policies and legislative frameworks to foster and accelerate sustainable mineral development in the country.

□ **The vision** of the Ministry is to become a globally competitive and transformed ministry that promotes generation of maximum socio-economic benefits from the mineral sector through sustainable exploration and exploitation of mineral and petroleum resources in Malawi.

□ **The mission** for the MoM is to provide reliable, adequate and efficient administrative services in order to promote participation of all stakeholders in the sustainable development and management of the mineral sector for the socio-economic growth and development of the country.





## Department of Mines

❑ **The Mandate** of the Department is to collect revenue from mining operations and provide safety, health and environmental inspectorate services in the mineral sector.

❑ **The vision** of the Department is to become a vibrant institution that promotes sustainable exploitation and management of mineral and petroleum resources.

❑ **The mission** is to facilitate, promote and enforce occupational health, safety and sustainable mining, utilization, and management of mineral and petroleum resources for socio-economic growth and development

□ The strategic objectives of Department of Mines comprise the following:-

- i. Dissemination of information and reporting on economic minerals availability;
- ii. Ensure submission of basic and geological reports by companies as required by Law;
- iii. Identification of mineral resources suitable for small-scale mining;
- iv. Facilitation of provision of technical and financial support through macro and micro- finance institutions;
- v. Facilitation of provision of appropriate mining legislation in order to improve country investment competitiveness;
- vi. Introduction of mineral value-addition services and promote marketing of resultant mineral products.
- vii. Enforcement of Explosives Act, Mines and Minerals Act and other attendant legislations

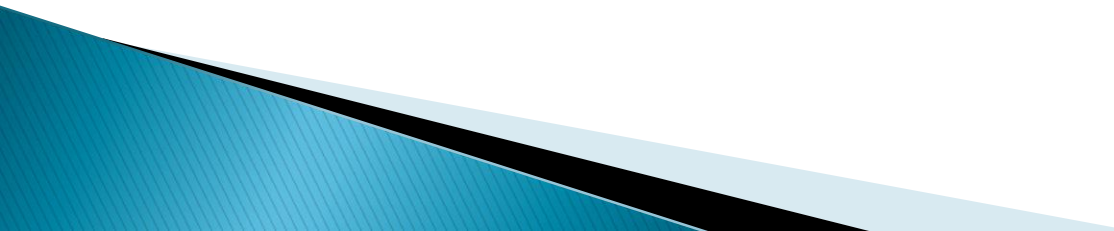


# Geological Survey Department

□ The mandate of the Department is to collect, assess, disseminate and archive all geo-scientific data related to geology and minerals resources of the country.

□ The vision of the Department is to be a dynamic institute of excellence that is innovative, self-motivated, development oriented and responsive to the clients' needs for geo scientific development.

□ The mission is to acquire, monitor, update, archive and disseminate geo-scientific information of Malawi in order to foster socio-economic development and contribute to poverty reduction through the utilisation and management of minerals and other geological resources.



# Core Functions

- Systematic mapping and documentation of the geology of Malawi.
- Carry out mineral exploration to unveil the mineral potential of the country.
- Map and document geological hazards for proper land use planning and instituting possible mitigation measures.
- Collect, update and disseminate geo-scientific data; and also mineral resources reporting during exploration phase.
- Work hand in hand with the Department of mines' Mineral Rights Division in reporting mineral resources to stakeholders during exploration and mining activities.

- Undertake collaborative geo-scientific research with local and international institutions.
- Provide technical and advisory services to the general public, other government institutions and the private sector on geo scientific matters.

## Office of Commissioner of Mines and Minerals

- ❑ This office is responsible for the administration of Mines and Minerals Act as well as the Mineral Explosives Act.
- ❑ The Office works hand in hand with Mines Department and Geological Survey in mining licensing and reporting matters.

## MINERALS IN MALAWI:

**Before the Airborne Geophysical Survey which is currently underway:**

### □ These include:

❖ Uranium, Pyrite, Limestone, Coal, Graphite, Monazite and Strontianite, Niobium, Apatite, Silica Sands, Vermiculite, Bauxite, Titanium, Heavy Mineral Sands, and various types of gemstones and ornamental stones  
EG: **Mkango Resources'** EPL indicates about 17 REEs as well as Strontium, Niobium, Iron Ore, Manganese, Fluorite, Phosphates, Monazite, Zircon, Tantalum, Kaolinite etc.

□ Some significant anomalies of alluvial gold, diamondiferous mineralization and other Platinum Group of Metals (PGMs) have also been reported in the country recently **(to be confirmed by the current rigorous Exploration Surveys underway).**

# OTHER MINERALS

## Industrial minerals include:

- ❖ Iron sulphides, Limestone, Glass Sands, Ceramic Clays, Vermiculite, Graphite, Corundum and Dimension Stone
- ❖ Alluvial gold in streams, source unknown
- ❖ Platinum and nickel in basic/ultrabasic rocks
- ❖ Also have Kimberlitic rocks which could host diamonds

- **Currently, Government has granted Oil Exploration Licenses to Companies in all its 6 Blocks. Blocks covering both **on and off shore** sections.**
- **Lake Malawi is in the **Great African Rift Valley** where Lake Albert and other Oil producing zones are situated in Africa**

# Brief Mineral Sector Activities

***The mineral sector activities covers many resources. Indicated here shows deposits for Uranium and Thorium only:***

- ✓ Kayelekera Uranium Project (currently suspended though still processing the stockpile)
- ✓ Resource Star's Livingstonia Niobium, Uranium and REEs exploration
- ✓ Kanyika Niobium and Uranium Exploration focusing on Uranium
- ✓ Machinga Heavy Rare Earths, Songwe, Mt.Mulanje, Illomba and Kangankunde REEs
- ✓ Tundulu Phosphates (Extraction of Uranium from Phosphates – Comprehensive Extraction)
- ✓ And many others which are under exploration



□ Kayelekera Uranium Mine: Rolled it operations in 2009.





# Livingstonia Uranium and REE Prospect

- ❑ Mineralisation at Livingstonia was discovered by Globe and as announced to the ASX on 16 March, 2010, Resource Star and Globe signed a joint venture agreement to explore the Livingstonia Project.
- ❑ Globe had drilled 95 holes at Livingstonia for a total of 11,000 metres, during 2007-08 using both reverse circulation ('RC') and open hole percussion with a combination of either or both laboratory analysis or down-hole gamma probing.
- ❑ Drilling targeted three prospects, with the majority occurring at the Chombe Prospect.



Source: Mines Department (2011)

## Livingstonia Uranium and REE Prospect ...

- ❑ By July 2010, on the basis of the historical Globe drilling, CSA Global (an out sourced company) completed a Mineral Resource estimate on the Chombe Prospect, and defined an Inferred Resource of 7.7Mt @ 270 ppm  $eU_3O_8$  using a 150 ppm cut-off.
- ❑ Currently, CSA Global's updated estimate of the Inferred Resource is 8.3 Mt averaging 325 ppm  $eU_3O_8$  of contained 6.0 Mlbs of  $eU_3O_8$  (or approximately 2,700 tonnes of contained  $eU_3O_8$ ) at a lower cut-off grade of 150 ppm  $eU_3O_8$
- ❑ Govt. renewed the Exploration License for Resource Star for the next two years (as per application) to allow for other activities such as EIA. The project is very 'promising'.



Works in Progress at Livingstonia Site

## GMM's Kanyika Niobium Mine

❖ Kanyika Niobium and U Prospect – an EPL was granted to Globe Metals and Mining of Australia in 2005.

❑ Investor's initial interest was in Niobium, tantalum and Uranium

❑ Uranium component dropped due to non-viability of the project if included (100 ppm), and replaced Uranium with Zircon.

Category	Million Tonnes	Nb <sub>2</sub> O <sub>5</sub> ppm	Ta <sub>2</sub> O <sub>5</sub> ppm	U <sub>3</sub> O <sub>8</sub> ppm	ZrSiO <sub>4</sub> ppm
Measured	5	3,900	180	110	5,300
Indicated	18	3,100	140	80	4,800
Inferred	37	2,700	130	80	5,100
Total	60	2,900	140	90	5,000

**Table 1: Mineral Resource Estimate for Kanyika (1,500 ppm Nb<sub>2</sub>O<sub>5</sub> lower cut)**

Category	Million Tonnes	Nb <sub>2</sub> O <sub>5</sub> ppm	Ta <sub>2</sub> O <sub>5</sub> ppm	U <sub>3</sub> O <sub>8</sub> ppm	ZrSiO <sub>4</sub> ppm
Measured	3	5,400	250	160	6,600
Indicated	7	4,400	200	110	5,900
Inferred	11	3,600	160	90	5,600
Total	21	4,100	180	110	5,800

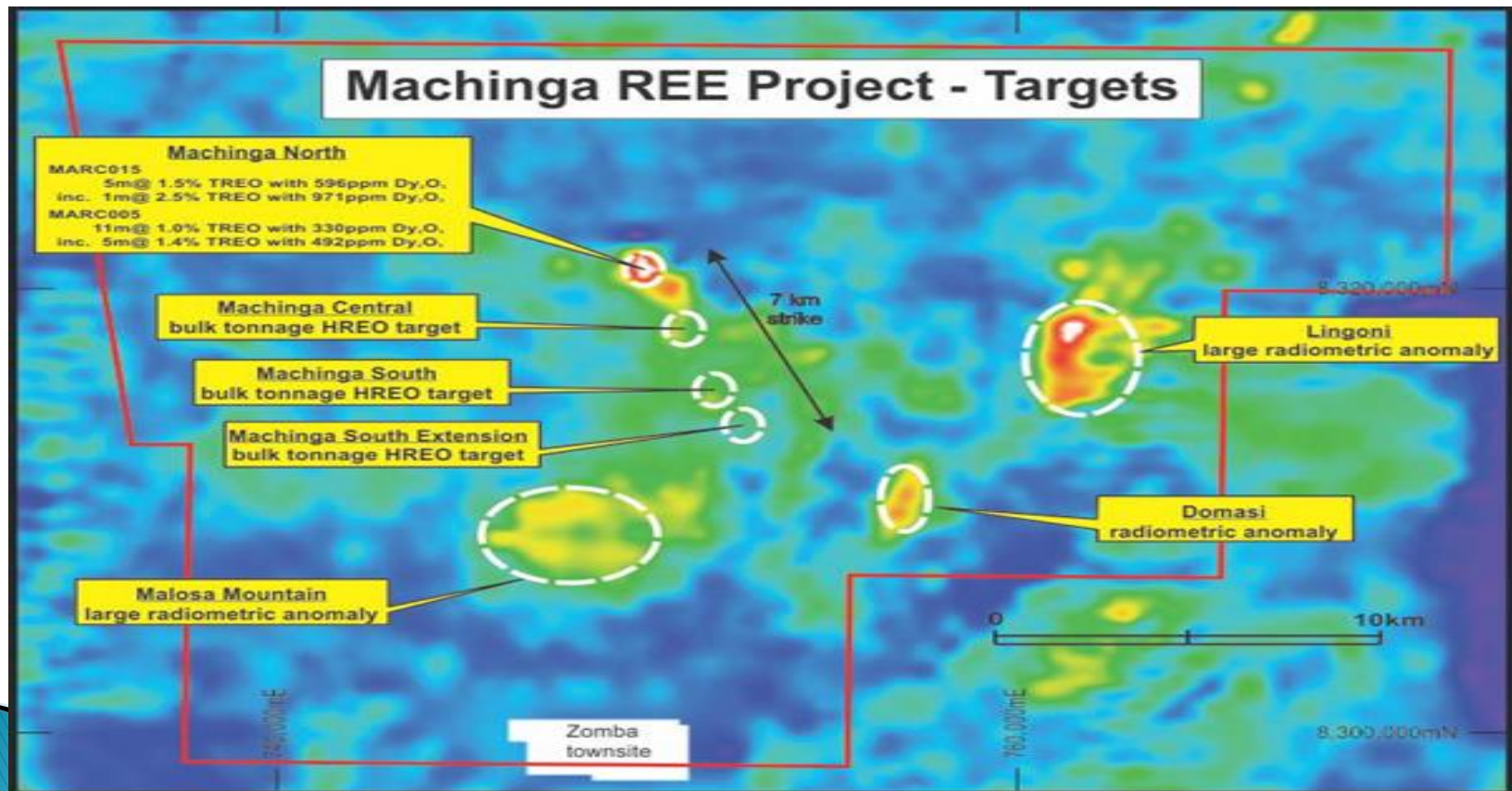
**Table 2: Mineral Resource Estimate for Kanyika (3,000 ppm Nb<sub>2</sub>O<sub>5</sub> lower cut).**

❑ Currently, an EIA has been completed, presented to stakeholders and inputs taken and now in the DA negotiation phase.



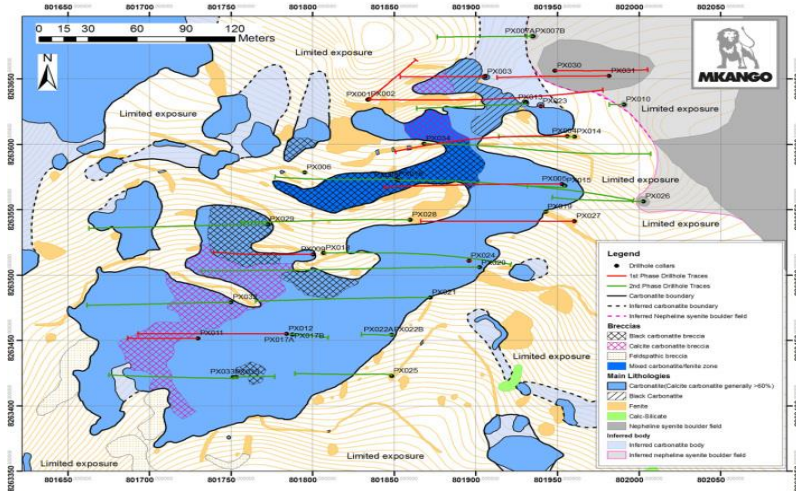
# Machinga Heavy Rare Earths Project

- The project has demonstrated heavy REE potential in Machinga, and in particular, very high grades of dysprosium that have been encountered. Thorium is also present in this location. This can be viewed as below:



# Brief History of Uranium and Thorium Exploration and Extractions in Malawi ...

- Mkango Resources of Songwe REE (with also interests in Uranium and thorium resources) has is also conducting a pre-feasibility study in Phalombe District.



Geological Map of Songwe Hill Project. [Courtesy of Mkango Resources](#)

- **Uranium in the Tundulu Phosphates (local laboratories and Tunisia labs)**
- ▶ **There are many exploration projects in the U and Thorium areas as well as other minerals taking place in Malawi.**

## OUTLINE OF OTHER U AND REE EXPLORATION PROJECTS IN MALAWI

<b>MINERAL</b>	<b>AREA</b> (Potential ore type)	<b>TONNAGE</b> (million tonnes)	<b>STATUS</b>	<b>COMPANY</b>
Uranium	Mhuju (Karoo)	Not Yet Available	EPL (Early Exploration)	Globe Metals (Australia)
Uranium/ REEs	Rumphu District (Karoo)	Not Yet Available	EPL (Early Exploration)	HBKD EMWAW Mining Co. Ltd)
Uranium	Chilumba and Extension of Kayerekera & Mwanjenja areas	Not Yet Available Drilling in progress (Karoo)	EPL (Mid Exploration)	Paladin Africa
Uranium	Nsanje (Granitic)	Not Yet Available (Baseline study)	EPL	Orapa (UK-RSA-Zw)
REEs	Kangankunde	2.5Mt @ 4.2% TREO	EPL (Advanced Exploration and delineation)	Lynas Co. Ltd
REEs	Songwe	Indicated R. of 13.2 Mt grading 1.62% TREO; 6.2 Mt grading 2.05% TREO and Inferred R. AT 18.6%, 1.38% TREO	EPL (Advanced Exploration and delineation)	Mkango Resources (a Canada listed Co.)
REEs	Mt. Mulanje	Not Yet Available	EPL (Early Exploration)	JOGMEC/ Gold Canyon



# Challenges being faced in reporting these minerals

1. Like many other African countries, Malawi Government has NO unique reporting template which **itself** and **all** companies could be using for reporting its mineral deposits.
1. Companies use the templates most favorable to them such as CRIRSCO, The JORC Code, Pan-European Reserves & Resources Reporting Committee (PERC), South African Code for Reporting of Exploration Results, Mineral Resources and Mineral Reserves (SAMREC) etc.  
(E.g. Paladin Africa Limited uses Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (**JORC Code**) and the Canadian National Instrument (**NI**) 43-101 to report Kayelekera's resources)
3. Government faces challenges to use such varied way of reporting

## CONSEQUENCES:

- ✓ Government's poor management of its mineral resources;
- ✓ Lack of reliable Government-Sourced Geological Information



# INTERVENTIONS...

- ❖ Lack of uniform reporting system and considering the sector's fast growth as evidenced by the Issuing of New Exploration Licenses both is Solid and Liquid Minerals (Oil and Gas Blocks 1-6) and Renewals of existing ones, Government has made the following strides;
  
- ❖ With keen interest, Government would like to have one uniform reporting format for itself and Companies, hence easy interpretation and reporting to relevant bodies;
  - *Discussed internally at the possibility of harmonising the reporting arrangements*
  - *Following the Jordan and Tunis INT/2/015 Workshop's report recommendations government opted for UNFC 2009.*
  - *High level meetings conducted since this is seemingly a policy issue (Malawi Government Perspective)*

# INTERVENTIONS (continued)...

## WHY UNFC?

- ❖ Considered an easy document to understand and follow
- ❖ Readily available technical people to build the country's reporting team
- ❖ Origin of the document is authentic and reliable
- ❖ Also has numerous advantages over the existing ones and the ability to have others such as CRIRSCO and SPE-PRMS bridged to it

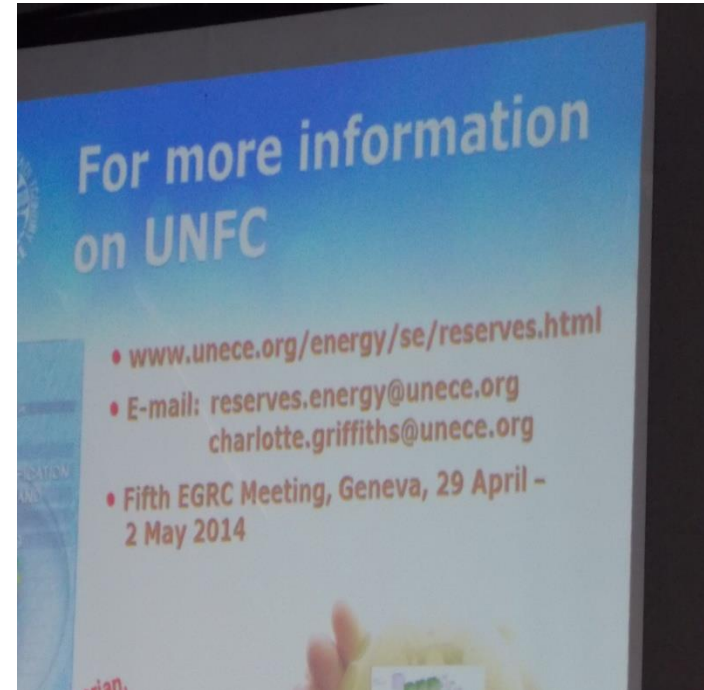
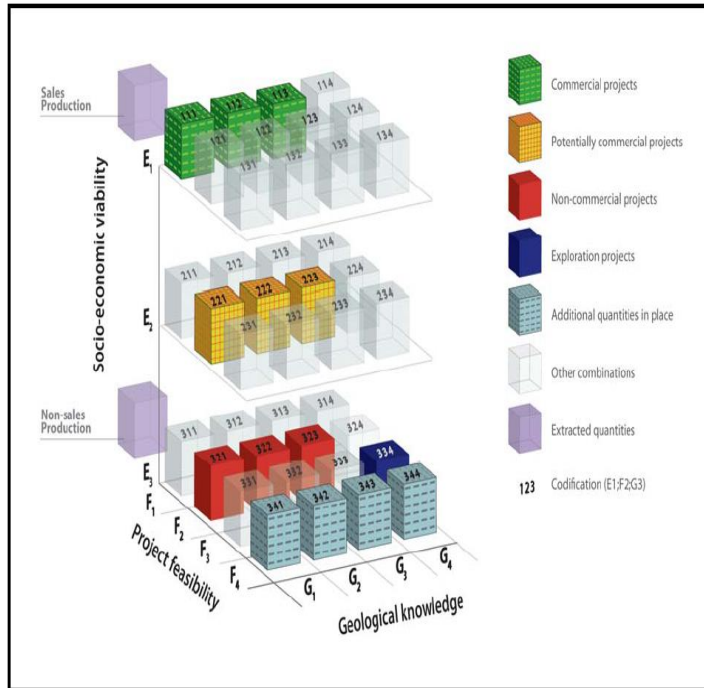
## NEXT ACTION:

- Plans on how to implement UNFC 2009 are underway
- Slow progress due to the need for comprehensive information on UNFC 2009 template and its regulations
- Further capacity building is required for fear of being defeated due to suspicions/speculations by investors upon introducing such a new format (Case of Minerals Survey Exercise in progress)

# Malawi Example(Using basic knowledge available)

NO	DEPOSIT	OPERATOR	RESOURCES (TU)	AVERAGE GRADE (%U)	UNFC CLASS	UNFC SUB CLASS	E	F	G
1	Kayelekera	Paladin Africa Limited	15,670	0.09	Commercial Project	Production	1	1	1
2	Chilumba and Mwanjenja	Paladin Africa Limited	unknown		Exploration Project		3.2	3	4
2	Livingstonia and Chombe	Resource Star	8.3 Mt (Inferred Resource)	0.035	Potentially commercial project	Feasibility Studies underway EIA to commence soon	3.2	2.1	1
3	Illomba	Resource Star	unknown	Unknown (historically 2000 ppm to >1% U <sub>3</sub> O <sub>8</sub> )	Exploration Project		3.2	3	4
4	Kanyika	Globe Metals and Mining	117 t/a	0.010	Potentially Commercial	Development on hold	2	2.2	1,2,3
5	Machinga	Globe Metals and Mining			Exploration Project		3.2	3	4
6	Mhuju	Globe Metals and Mining			Exploration Project		3.2	3	4
7	Songwe	Mkango Resources			Exploration Project		3.2	3	4
8	Tambani	Mkango Resources			Exploration project		3.2	3	4
9	Nsanje	Oropa (UK-RSA-Zw)			Exploration project		3.2	3	4

# Thank You For Your Attention



***UNFC 2009: Improving Mineral Reporting System!!!***