

MINISTRY OF ENERGY AND



MINERAL DEVELOPMENT



Commissioning of the Fertiliser Plant at Sukulu, Tororo District-Eastern Uganda. The Factory is owned and operated by Guangzhou Dong Song Energy Group Co. (U) Limited

DIRECTORATE OF GEOLOGICAL SURVEY AND MINES

PERFORMANCE REPORT FOR FY 2018/19

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DGSM TOP MANAGEMENT



AG. DIRECTOR/ DGSM



AG. COMMISSIONER/GSD



COMMISSIONER/MD



COMMISSIONER/GRD

ACRONYMS

AAS	Atomic Absorptions Spectrophotometer
ACP	African Caribbean Pacific
AGR	African Gold Refinery
ASM	Artisanal and Small-scale Miners
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe (BGR)
BOQs,	Bill of Quanties
DCIUNIN	Design, Construction and Installation of Uganda National Infrasound Network
DGSM	Directorate of Geological Survey and Mines
EAGER	East African Geothermal Energy Resource
ERA	Energy Regulation Authority
EU	European Union
GIA	Gender Impact Assessment
GMIS	Geological and Mineral Information System
GRD	Geothermal Resources Department
GSD	Geological Survey Department
ICGLR	International Conference of the Great Lakes Region
IDEP	International Development and Economic Planning for Africa
LTD	Limited
MD	Mines Department
MLA	Minerals Liberation Analysis
MW	Mega Watts
MWAMID	Mineral Wealth and Mineral Infrastructure Development
NEMA	National Environment Management Authority
PEPD	Petroleum Exploration and Production Directorate
REE	Rare Earth Elements
RINR	Regional Initiative on Fight against the illegal exploitation of Natural Resources

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SMMRP	Sustainable Management of Mineral Resources Project
TORs	Terms of Reference
TGW	Temperature Gradient Wells
UETCL	Uganda Electricity Transmission Company Limited
UGRD	Uganda Geothermal Resource Development
UNDP	United Nations Development Program
XRF	X-ray Florescence

EXECUTIVE SUMMARY

The Mandate of the Directorate of Geological Survey and Mines is to establish, promote the development, and strategically manage and safeguard the rational and sustainable exploitation and utilization of mineral resources for socio-economic development of the people of Uganda in line with the NDP II and Vision 2040. To realize its mandate, the Directorate continues to:

- i) improve the legal and regulatory framework,
- ii) establish Uganda's Mineral Potential,
- iii) license and regulate exploration and exploitation of mineral resources,
- iv) promote the mineral sector development,
- v) monitor and sensitize the community on geohazards preparedness and management,
- vi) develop the institutional capacity,

PROGRESS IN IMPROVING THE LEGAL AND REGULATORY FRAMEWORK

Policy, Legal and Regulatory Framework

Cabinet approved the Principles for the Mining and Minerals Bill 2019. Consequently, technical review of the Bill was carried out and modifications incorporated in the draft during the one-week workshop from 5th to 11th May 2019, at the Imperial Golf View Hotel, Entebbe. Consultative review meetings with other stakeholders in the various parts of the country are expected to take place during the first quarter of FY2019/2020.

The Mining Regulation

Review of the Mining Regulations 2018 was also concluded during a one-week residential work at the Victoria Mall - Best western Hotel, Entebbe from December 9th to 15th, 2019. Once passed, the regulations shall provide for online mineral licensing. The Mining Regulations 2018 shall also enable the implementation of ICGLR Regional Certification Mechanism, a regional initiative against illegal exploitation of Natural resources. The prevention of illegal exploitation and illicit trade in designated minerals regulations, 2018 is being developed.

E-government based mineral licensing system

Programming and upgrading of the mining cadastre to include an e-government based mineral licensing system is in advanced stages. Users including licence holders continue with registering to obtain user accounts that

will enable them to submit/receive applications, make payments, submitting reports and production returns, as well as undertaking renewals online. Launching of E-licensing is planned for the beginning of FY 2019/20

Establishment of a National Mineral Laboratory Services Policy

The National Mineral Laboratory Services Policy Draft was formulated and presented to the Ministry Top Management on 14th August 2018 and comments generated were incorporated. Undertaking of a regulatory impact assessment and assessment of financial implication is planned for the FY2019/20.

Geothermal Policy

A draft Geothermal policy is in advanced stages. A draft Cabinet Memo has been prepared. The Regulatory Impact Assessment is being finalized before submission to the Permanent Secretary, Ministry of Energy and Mineral Development for onward transmission to cabinet for approval.

PROGRESS IN ESTABLISHING UGANDA'S MINERAL POTENTIAL

Geothermal Resources exploration

Detailed exploration at Panyimur and Buranga geothermal prospects was carried out and subsurface models of the two prospects developed. The models were used for locating sites for Temperature Gradient Drilling at the two prospects. procurement of a contractor to drill the sixteen (16) TGW is underway and drilling is planned for January to February 2020.

Development of a Geothermal database and website, and Direct use application pre-feasibility studies of Kibiro and Panyimur were also done.

Geochemical survey of Katara Uranium Anomaly

Geological survey and Ground gamma-ray spectrometry were carried out on the Katara uranium anomaly. Uranium was found to be associated with an unconformity of Proterozoic Quartzitic sandstone with older pelitic metasediments.

Geochemical Survey of Muko iron ore anomaly to determine minerals associated with iron mineralization

Muko has a high gold potential that is highlighted by artisanal workings. Massive sulphides with possible gold were observed in beddings of sheared graphitic schist and quartz veins. The prospect also has potential for tantalite

A Resistivity/Induced Polarization survey of Kamena and Bukimbiri Iron ore targets.

Resistivity/Induced Polarization survey outlined the lateral and vertical/depth extent of the iron ore lenses over Kamena and Bukimbiri Iron ore targets

Assessment of infrastructure for drilling of iron ore targets

Preliminary assessment for drilling iron ore targets within Rutenga, Kabale-Katuna and Muko anomalies shows that most of the prospects are located on top of the ridges and water must either be pumped uphill for over 1km or carried by a track.

PROGRESS ON LICENCING AND REGULATION OF EXPLORATION AND MINING OPERATIONS

Licensing Status

Establishment of a Mining Cadastre and Registry System has registered a lot of improvement in the licensing process. The number of active licences stands at 675, and a 32.2% improvement in processing of mineral rights was realized. Also, production licences in 2018/19 increased by 30.9% compared to FY2017/18, thereby projecting a future increase in revenue collection from both annual mineral rent and monthly production returns.

Sukulu Polymetallic plant

Phosphate plant was commissioned by H.E the President of the Republic of Uganda on October 23th, 2018. Construction of the first phase of the steel plant, slag cement factory, glass factory and a baking-free brick factory is still ongoing.

Kilembe Mines

Termination Notice terminating Tibet Hima Mining Company Limited Concession Agreement was terminated. ToR's for the selection of a new operator for were prepared and Twenty-one (21) parties have expressed interest in taking over Kilembe Mines under a restrictive bidding process.

Mineral Production Statistics

FY2018/2019 recorded a 6.9% increment in production compared to the previous FY2017/0218. This is attributed to increased exploitation of pozzolana and syenitic aggregates for the manufacture of cement in the newly

established Simba Cement and Kampala Cement factories. Reduced the rate of smuggling of minerals out of the country also increased quantities of Wolfram declared as returns.

Non-Tax-Revenue (NTR)

A 4.02% NTR collection shortfall in FY2018/19 (UGX. 16,031,523,348) compared to FY2017/18 (UGX. 16,702,115,814) was recorded. This is attributed to the drop in Loyalties as result of the Presidential ban of raw mineral exports.

Mineral exports

Mineral exports dropped by 60.24% from UGX. 690,131,321 in FY2017/18 to FY2018/19. This was due to a Presidential ban on raw mineral exports during the FY2018/19.

Mineral Traceability and Certification

All required tools for mine inspection, export, evaluation process, road map to the implementation process and training have been accomplished. Establishment of the “Uganda-ICGLR Certification Unit”, based at DGSM in Entebbe is underway to document production. BGR has Expressed Interest to provide technical assistance and capacity building to Uganda on to the ICGLR-RCM implementation in Uganda. DGSM and BGR are in the process of signing an MOU.

Sensitization and registration of ASMs

Mapping of ASM commenced in Mubende, Namayingo, Buhwezu, Busia, Moroto, Nakapiripirit, Amudat Kabong, Abim, Ntungamo, Isingiro, Kabale, Kisoro, Kasese, Rubanda and Bugiri Districts. Registration and formation of Associations is ongoing, and over 40 (forty) associations have been formed so far.

PROGRESS ON PROMOTING OF THE MINERAL SECTOR DEVELOPMENT

Communication strategy

The Procurement process for a consultant to design a communication strategy for DGSM is ongoing. The process commenced on 10th June 2019 and was anticipated to end by mid July 2019.

Integrated Information Management Systems (GMIS)

Designing of the GMIS to facilitate geoinformation, capture and sharing is till ongoing. The system was to be completed, installed and users trained by April 30th, 2019 but delays into the Consultant led to delay in the launch of the GMIS system. Another date for the launch shall be communicated in Quarter 1 of FY 2019/2020.

African Resource Geoscience initiative (ARGI) – Uganda Pilot project.

All legal and technical requirements for piloting the ARGI geodata portal in Uganda are over. Developed under the leadership of the Africa Union Commission, ARGI is a pan-African initiative for spearheading the consolidation, interpretation and effective dissemination of national and regional geodata on an appropriate platform

Exhibitions

The Mineral sector was promoted at various forums including the MEMD Joint Sector Review, Uganda Mineral Wealth 2019, Ministry of Finance, Planning and Economic Development National Budget Month 2018/19 Exhibition Week at Kololo Independence grounds from 5th- 7th June 2019. Documents and other materials on minerals, and mining and Mineral laws were shared.

PROGRESS ON MONITORING AND SENSITIZATION ON GEOHAZARDS

Earthquake monitoring and Advisory Services

Monitoring of seismic activity using the National Seismic Network at Entebbe (ENTD/TEBE), Hoima (HOID), Nakauka (NAKD), Kilembe (KILD) and Mbarara-Kyahi (MBAR recorded six (6) earthquake events in the region, with three (3) events located within the rift valley areas of Uganda.

PROGRESS IN CAPACITY DEVELOPMENT

Refurbishment of Kabale regional Mines office

The regional office for Kigezi region mining operations was refurbished by Painting, buying curtains, tiling and procuring of office furniture.

Laboratory Information Management System

Contract for design, implementation, maintenance and support services of a Laboratory Information Management System (LIMS) for the DGSM Laboratories was signed.

Construction of Mineral Beneficiation Centre

Engineering designs, BOQs, and approvals were for Ntungamo carried. procurement documents were submitted to the Procurement and Disposal Unit for initiation of procurement. Submission (to PDU) for procurement of a contractor for Tooro Offices and Mineral Beneficiation Centre were also made.

Rewiring of DGSM office

Modified electrical wiring and installations drawings, BOQs and procurement documents were finalized, and submissions made for initiation of procurement and for approval by Entebbe Municipal Council

Human Resource Development

One officer completed an MSc in analytical chemistry. Five other officers are pursuing MSc degrees in Earth resources engineering, Informatics, analytical chemistry and mining engineering in Japan, South Korea and the UK. They are all expected to be back by end of 2021.

KEY CHALLENGES AND RECOMMENDATIONS

Challenges

- i) Understaffing due to several vacant positions in the Directorate which makes the few available Officers overloaded thereby DGSM not performing to its full potential
- ii) Inconsistent power supply due to defects in the power infrastructure leads halting activities

iii) Poor facilitation of staff in undertaking daily duties. For example, staff having to use private transport means to undertake government business out of duty station in Kampala.

Recommendations

- i) All vacant positions should be filled as soon as possible lessen the gap.
- ii) Increase in budgetary allocation to DGSM to allow for financial facilitation of the planned activities.
- iii) The procurement process of the rewiring DGSM blocks should be quickened to get enough and consistent power supply for service delivery efficiency.

1 INTRODUCTION

The Directorate of Geological Survey and Mines is mandated to establish, promote the development, and strategically manage and safeguard the rational and sustainable exploitation and utilization of mineral resources for socio-economic development of the people of Uganda, in line with the NDP II and VISION 2040.

2 INSITUITIONAL FRAMEWORK

The Directorate of Geological Surveys and Mines is composed of three Departments, namely: Department of Geological Surveys; Mines Department; and Geothermal Resources Department. The directorate is headed by a Director and each Department is headed by a Commissioner.

Geological Survey Department (GSD) is responsible for establishing the mineral potential of Uganda and promoting the development of the established mineral targets. This is done through geological, geochemical and geophysical surveys, Laboratory services and geoscientific data dissemination. The Department is also in charge of geohazards mapping and advisory services.

Mines Department is mandated to license and regulate exploration and exploitation of mineral resources, ensuring compliance with the mining legislation and promotion of sustainable mining and development of the mineral resources.

The Geothermal Resource Department Focuses on exploration, promotion and development of the country's geothermal resources whose potential stands at 1,500MW (Uganda Vision, 2040).

DGSM works very closely with other MDAs such as MFPED, NFA, UWA, PEPD, and the Uganda Police Force to realize its mandate.

3 PERFORMANCE OF THE DIRECTORATE

3.1 Geological Survey Department

3.1.1 Policy, Legal and Regulatory Framework

The National Mineral Laboratory Services Policy Draft was formulated and presented to the Ministry Top Management on 14th August 2018 and comments generated were incorporated. Undertaking of a regulatory impact assessment and assessment of financial implication is planned for the FY2019/20.

3.1.2 Establishment of Uganda's Mineral Potential

3.1.2.1 Geochemical survey of Katara Uranium Anomaly

Geological survey and Ground gamma-ray spectrometry were carried out on the Katara uranium anomaly. Uranium was found to be associated with an unconformity of Proterozoic Quartzitic sandstone with older pelitic metasediments.

Ground gamma-ray spectrometry over the anomaly reveals the uranium content in country rock to vary between < 1 to 15 ppm while anomalies between 50 to 4000 ppm eU were along a river within the swamp.

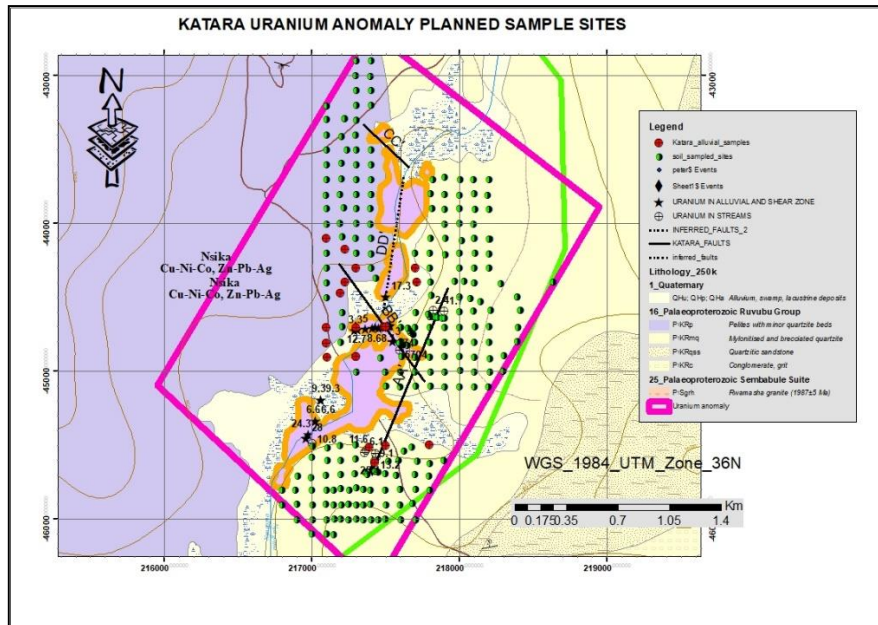


Figure 1: Katara Uranium anomaly survey map - Sampled points

Also, gamma ray spectrometry in streams and along profiles, across shear zones and alluvial sediments in the swamps and the springs revealed uranium concentration (eU) varying from 1.7 to 5704ppm. The highest uranium concentration (eU) of 5704 ppm was recorded on spring (at 217600mE, 9955144mN) which drains from contact between sheared quartzite and black shale. It was observed that shear zone with breccia cemented with limonite adjacent to black shale, shows high uranium concentrations, while the shear zone with breccia with hematite and another with quartz as cementing matrix show low uranium concentrations.

The anomaly covers 6km² in the swamp including a lateral thickness of 60m over the sheared quartzite adjacent to the swamp. However, the highest readings were recorded within a thickness of 25m of intensely sheared and brecciated quartzite cemented by limonite and in contact with black shale.

The uranium anomaly appears to be associated with the shear zone with breccia cemented by limonite in contact with black shale that could have provided the reducing environment for the deposition of uranium.

Recommendations:

- i) To establish the uranium resource in the peat, pitting should be done to determine the thickness of the peat and calculate the tonnage.
- ii) Mapping of the shear zone and its extent by pitting through the alluvial to the bed rock.
- iii) Radon measurements over the generated soil uranium anomaly and inferred faults to narrow the target area and locate pitting targets.
- iv) Detailed geological mapping and follow-up of the soil anomalies

3.1.2.2 Geochemical Survey of Muko iron anomaly to determine minerals associated with iron mineralization

One hundred and thirteen (113) stream sediment and thirty-eight 38 rock samples, were collected during the survey. The samples have been prepared and are being analysed with a portable XRF

Also, during the survey, several mineralisation indicators such as: sulphide bearing rocks, shear zones, faults and breccia floats were observed.

Massive sulphides were observed along Karungu stream which flows from Kyabagara at location 824943mE/9840255mN. The sulphides were observed in beddings of sheared graphitic schist and quartz veins. The sheared and hydrothermal altered quartz vein in contact with water has a smell of sulphur and has black minerals probably tantalite. A float of breccia of sandstone cemented by haematite was found down streams. Samples of sulphide bearing minerals were collected and will be analysed for gold and base metals.



Figure 2: MUK/RCK is graphitic schist with massive sulphide along bedding planes. MUK/RCK/17B is quartz veins with sulphides. 824943mE/9840255mN



Figure 3: A is brecciated and sheared quartzite west of kacerere trading Centre B is brecciated quartzite cemented by hematite, C is quartzite cut through by quartz vein before faulting and D is brecciated quartzite/quartz vein. (816986mE,9858430mN)

The gold potential of the muko iron anomaly is also highlighted by artisanal workings (Figure 4) observed in Nyamabare and along river Migyera where the artisans mine alluvial gold around Nyamuyaga in Rwanchererere in Butanda Parish in Butanda Sucounty.

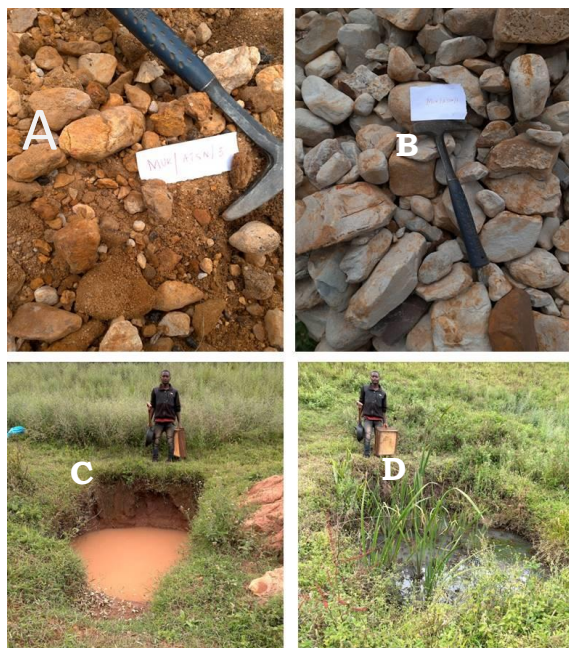


Figure 4: : A - yellowish gravel with ferruginised sandstone panned by artisans (822593, 9844060), B - yellowish gravel with ferruginised sandstone with sub rounded to rounded boulders heaped by artisans (at 822680mE, 9843602mN) C and D - new and old open pits left by a

3.1.2.3 Refurbishment of Kabale regional Mines office

Due to the high mineral potential of the region there has been a number of developments to revive the mining activities in South Western Uganda such as acquisition of land in Ntungamo District to construct a mineral beneficiation center, site investigation of land for iron ore refinery in Rubanda and upgrading of Kabale regional Mines office.

The regional office which takes care of Kigezi region mining operations has been refurbished by Painting, buying curtains, , tiling and procuring of office furniture for both the senior inspector of mines and the secretary (Figure 5).

Service of the Regional office to clients

The office offers among others the following services:

- i. Dissemination of Information on minerals and licenses to clients
- ii. Guiding clients on how to acquire mineral rights

- iii. Advising clients on best mining practices for health, safety and environment safeguard while mining



Figure 5: Newly Refurbished Kigezi Region Geological Survey and Mines office in Kabale

Challenges the office faces

- i. Limited information on minerals such as maps and technical reports
- ii. The office lacks a workstation in the office in the reception for the visitors
- iii. The secretary has no computer which limits her services as a secretary
- iv. It was noted that the regional office also lacks toilet and the office is not connected to piped water by National water and sewage cooperation.

Recommendations to counter the challenges

- i. The regional office should liaise with the Head Office in Entebbe for its information needs to serve clients over there better.
- ii. A workstation for clients should be provided as soon as possible to facilitate among others e-licensing which is beginning soon during 2019/20FY
- iii. Two (2) computers one for the secretary and another for the workstation should be provided to facilitate service delivery to the clients especially as the licence prudence goes e-licensing

- iv. The office should exploit toilet services of the Kabale District Local Government as it may not be possible to construct a stand-alone toilet for DGSM on Kabale District LG land.

3.1.2.4 Preliminary investigation for the proposed site for iron ore smelting plant in Rubanda

A team of 8 (Eight) officers from DGSM together with the Rubanda District visited the area to assess the geotectonic suitability of Kabirizi site for iron ore smelting in Rubanda District.

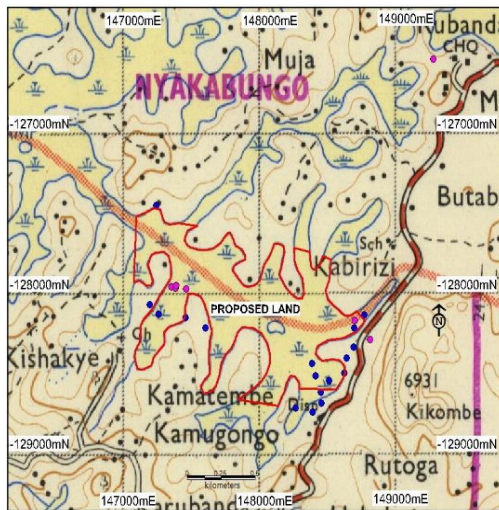


Figure 6: Location of the proposed site for iron ore smelting plant, adapted from the previous assessment report of 5th October 2018.

Location

The land is located along Kabale – Kisoro Highway in Kabirizi (**Error! Reference source not found.**) and belongs to Rubanda District Local Government - although the District does not have land title deeds for it. Preliminary surveys indicate the land to be about two hundred thirty-three (233) acres.

Geological mapping

The area is generally underlain by granite which is overlain by alluvial and volcanic ash in the west and eastern parts respectively (Figure 7)

Pitting.

The proposed site is generally flat covered by alluvial and volcanic tuff towards the road. Pitting was done to understand the nature of the subsurface. Five (5) pits were dug in areas covered by volcanic tuff and logged. The logs show that the area is covered by massive volcanic ash to a depth of about 1.2m, while in some areas it's covered by dark-gray soil grading into weathered volcanic ash with isolated brown volcanic ash to a depth of 0.8m. It was noted that the water table in the pitted areas vary from 1.22 to 1.98m. Drilling should be done to determine the depth of hard bed rock in the areas covered by volcanic ash/tuff and alluvial.

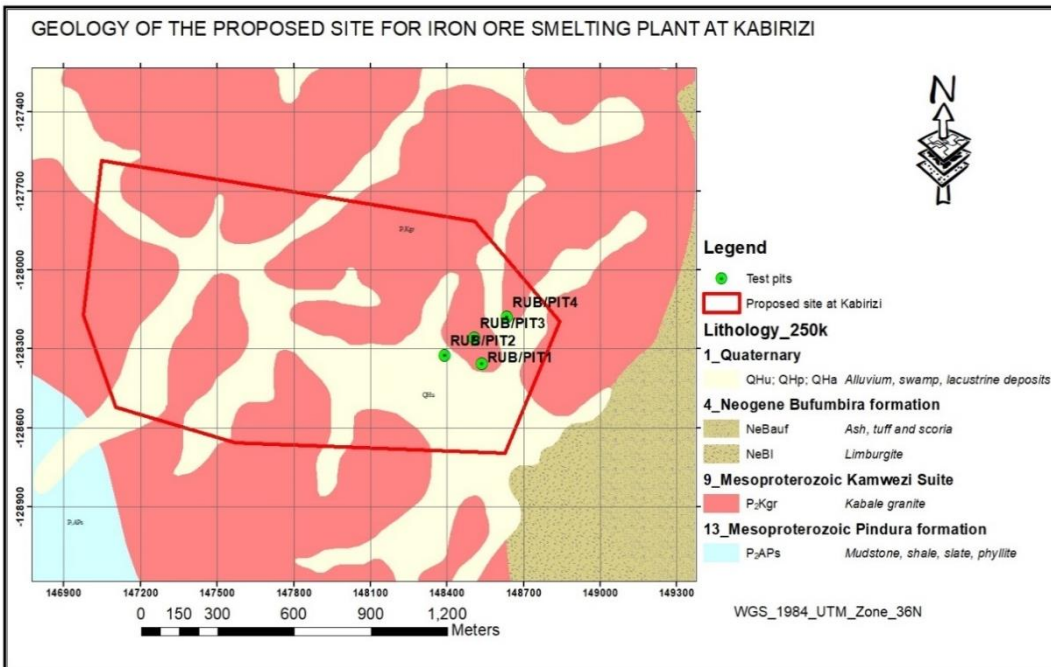


Figure 7: Geology of the proposed site for iron ore smelting at Kabirizi

Other factors that affect location of the plant

Other than the availability of land and proximity of the iron ore factors such as the source of the reducing agents (coal), source of power, market and other raw material such as limestone are very crucial and worth considering before making a choice of a location for iron ore smelting plant.

Conclusion

- i. Preliminary investigation for the proposed site for iron ore smelting plant in Rubanda shows the area to be suitable provided other factors such as

source of the reducing agents (coal), source of power, market and other raw material such as limestone are catered for.

- ii. Well-designed water draining system to keep the area dry for ease in construction is required since the water table on average is at about 2m below the surface

3.1.2.5 Assessment of infrastructure for drilling of iron ore targets

Upon identifying and selection of iron ore targets for drilling in Rutenga, Muko and Kabale areas, roads to the targets and water for drilling was also assessed. Note that selection of targets for drilling was based on ore reserve tonnages (Appendix 8.4-6) arrived at using geological and geophysical investigations and therefore there is need for drilling to verify the reported tonnages

Drilling targets in Rutenga iron ore anomaly

The drilling targets in Rutenga iron ore anomaly include Bucundura, Katagata, Kitojo, Kasambya, Nyarugorogoro, Rwengongo and Rushebeya-Nyakarambi. Most of these iron ore lenses in Rutenga zone can be accessed by use of village motorable roads that come off the main Mparo-Kisiizi road. **Error! Reference source not found.** below shows the shortest distance from the target to the nearest road and water source. For some of the targets, the water sources are nearer while others the distances are up to and over 1 Km where the water can be carried by a truck (**Error! Reference source not found.**).

Table 1: The distances to the nearest road and water source from the iron ore target.

Site Name	Distance	
	Road	Water
Bucundura	250m	1km
Katagata	100m	200m
Kitojo	300m	500m
Kashambya	120m	100m
Nyarugorogoro	500m	1.6km
Rwengongo	200m	100m

Drilling targets in Kabale-Katuna iron ore anomaly

The drilling targets in Kabale-Katuna iron ore anomaly include Katuna, Kicumbi, Karukara, Kamuterere Buhara, Makanga, Nyamiringa, Muruhita and Mwiguriro iron ore lenses.

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Some of the iron ore lenses in Kabale iron ore anomaly (Appendix 5) can be accessed by good murrum roads for short distances off either Katuna or Kisoro tarmac road. The **Error! Reference source not found.** below shows the shortest distance from the target to the nearest road and water sources. The water can be carried to the sites by either tracks or pumping (**Error! Reference source not found.**).

Table 2: The distances to the nearest road and water source

Site Name	Distance	
	Road	Water
Karukara	500m	1km
Muruhita	300m	1km
Butanda	430m	460m
Makanga	100m	1.14km
Kicumbi	974m	1.87km
Katuna	300m	956m
Nyakyonga	1km	1.268km

Drilling targets in Muko iron ore anomaly

Iron lenses in Muko iron ore anomaly include Kijuguta, Rubuguri, Higabiro, Rushekye, Kayonza, Rubaya, Kyanyamuzinda, Rugando (Kanungu), Kashenyi, Kamena. The Kyanyamuzinda, Rugando (Kanungu), Kashenyi and Kamena lenses, there has been drilling and proven reserves established as shown in Appendix 6. The accessibility for most of the locations is not a problem as most of the areas are easily accessed by use of good murrum roads and motorable tracks judging from the distance of closest approach to the target (**Error! Reference source not found.**). However, most of the prospects are located on top of the ridges and water must either be pumped uphill for over 1km or carried by a track.

Table 3: The distances to the nearest road and water source from the target location of the iron ore.

Site Name	Distance	
	Road	Water
Rugando	100m	1km
Rubuguri	350m	1.36km
Rushekye	260m	1.5km
Kayonza	350m	1km

3.1.2.6 A Resistivity/Induced Polarization survey of Kamena and Bukimbiri Iron ore targets.

Resistivity/Induced Polarization survey (Figure 8) over Kamena and Bukimbiri Iron ore targets outlined the lateral and vertical/depth extent of the iron ore lenses.

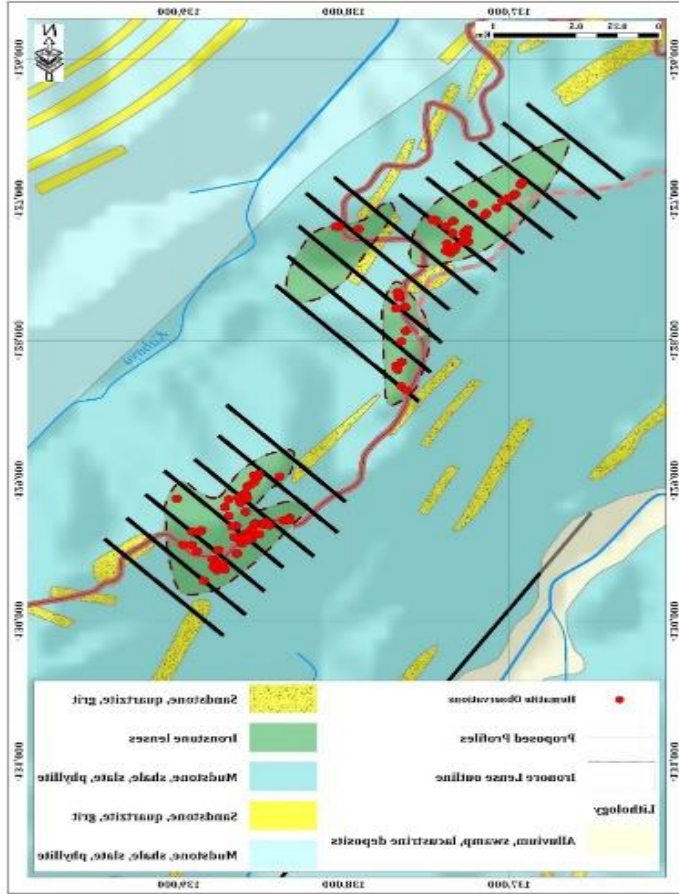


Figure 8: Geology map of the survey area. Black lines indicate the IP survey profiles while the red dots indicate hematite observations.

3.1.2.7 Ground geophysics follow-up of Boma and Lwensakala uranium anomalies in Sembabule district.

Eighteen (18) survey profiles (NE-SW) totaling to 46.85-line kilometers at Boma were made while fifteen (15) NE-SW survey profiles at Lwensakala (26.6) line kilometers were surveyed (Figure 9 A & B).

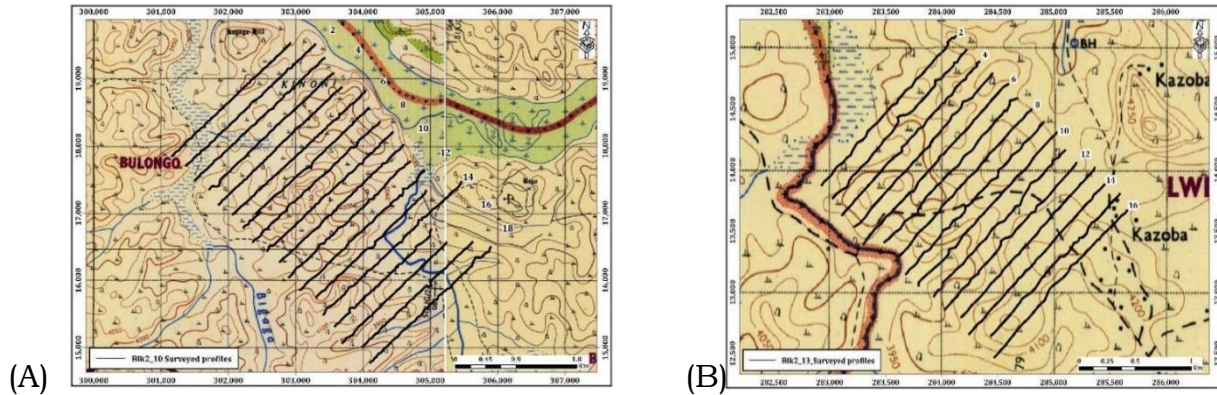


Figure 9: Location map of Boma (A) and Lwensakala (B) uranium prospects.

Results indicate the highest concentrations of Uranium for Boma target being along profile 5 at the UTM coordinates 36N 03033164E, 0018428N, 1184m height (Datum WGS1984). The highest concentrations of Uranium at Lwensakala target were recorded at the UTM coordinates 36N 0284147 0013853, 1220m height (Datum WGS1984).

3.1.2.8 Mineral Sector Development promotion

DGSM continued to promote the mineral sector as well as building capacity to promote the sector even better.

i. Integrated Information Management Systems (GMIS)



Figure 10: GMIS Prototype for geodata sharing and promotion of the mineral sector (<http://94.100.75.105/uganda/>)

DGSM together with Beak Consultancy continued with designing the integrated Information Management Systems to facilitate geoinformation

capture and sharing. Training in GIS and database were conducted and now the GMIS prototype is up for testing (Figure 10).

GMIS project was to be completed, installed and users trained by April 30th, 2019. However, the delay in payment by MEMD to the Consultant led to delay in the launch of the GMIS system. Beak Consultants halted work on the system but have resumed now. Hence another date for the launch shall be communicated in Quarter 1 of FY 2019/2020.

- ii. **DGSM webpage** - DGSM continued to build and update the webpage of DGSM under the domain name www.dgsm.go.ug. The contract for use of its domain name was renewed in June 2019. Acquisition of Content Management System and SSL Certificate is ongoing.
- iii. **Communication strategy** – The Procurement process for a consultant to design a communication strategy for DGSM is ongoing. The process commenced on 10th June 2019 and was anticipated to end mid July 2019.
- iv. **Geodata/ Information identification and acquisition** - The Directorate receive 95 (Ninety-five) geoscientific publications which were acquired to build Institutional capacity for the mineral sector. 5(five) unpublished technical reports were also received.
- v. **Geodata/information** was **disseminated** to one hundred (100) visitors and 26 (Twenty-six) staff members who were doing research on mineral resources of Uganda
- vi. One hundred fifty-eight (158) copies of Mining Act, 2003, 138 copies of Mining Regulations, 2004, 41 copies of mineral policy, 11 copy of Mineral resources and 5 copies of small-scale mining handbook were disseminated on complimentary basis.
- vii. **Exhibition:** DGSM participated in the Ministry of Finance, Planning and Economic Development National Budget Month 2018/19 Exhibition Week at Kololo Independence grounds from 5th- 7th June 2019

3.1.2.9 Licensing

To facilitate the licensing process GSD,

- i) prepared and printed two hundred fifty-two (252) title prints for Mineral Rights.
- ii) reviewed mineral rights performance reports and applications to aid in renewal and grant of mineral rights.

3.1.2.10 Laboratory services

The Directorate's laboratories continued to offer geological materials sample preparation, chemical analysis, ore test work, and technical advisory services and training as part of geological data collection and inspection, monitoring and regulation of mineral exploration, mining and mineral trade activities in the Mining and Mineral Sub-sector by the Directorate.

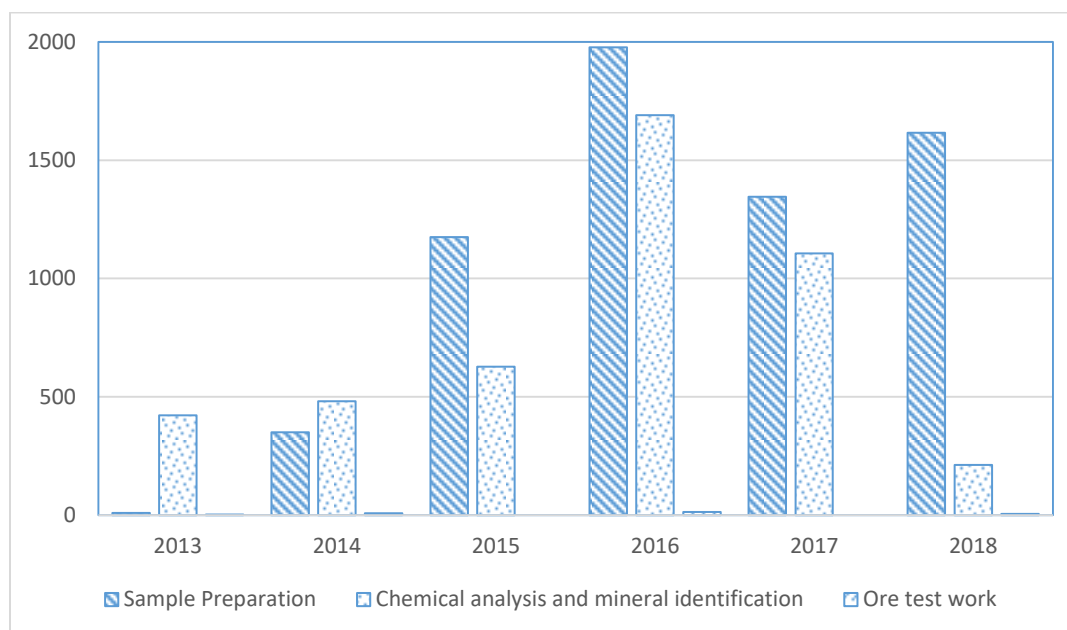
Sample preparation

The laboratories undertook sample preparation for chemical analysis of a total of one thousand six hundred fifteen (1615) geological samples from identified mineral target follow-up exploration activities in Kigezi Region and geochemical survey activities by the Geology Division under the Mineral Wealth and Mining Infrastructure Development (MWAMID) Project and also mineral exploration activities in West Nile Region.

Analyses

Analysed forty two (42) gold samples for gold content and a total of two hundred twelve (212) other geological samples such as rocks, carbonatite, coltan, wolfram, tin, amblygonite, beryl for wolfram, titanium, tin, niobium, tantalite, aluminium, iron, manganese, phosphorus, calcium, chromium, vanadium, copper, zinc, silicon sulphur, magnesium, selenium, potassium, zirconium, and vanadium content of which one hundred two (102) were police exhibit samples for verification and determination of mineralogy and elemental content. The analytical techniques used were gravimetric, X-ray fluorescence (XRF) spectrophotometry, titration, and mineralogy examination techniques. The purpose of these analyses was for mineral prospecting and exploration, trade purposes and for purposes of computation of royalty, and to facilitate police investigations.

The laboratories have received new sample preparation, chemical analysis and mineral identification equipment, and also equipment that had broken down repaired, but have not yet been deployed as they wait for a rewiring of the laboratory buildings so as to have good quality power supply. This is evident in Figure 11 where there is not seen an increase in number of samples analysed in the last two years. However, the approval of modifications to the wiring of office and laboratory blocks at DGSM in Entebbe was obtained and submissions made for initiation of procurement for the rewiring and installation of standard electrical installations.



3.1.2.11 Monitoring and Inspections

Regional Mineral potential - Fifteen (15) Regional Mineral potential and licensing status maps for Tooro, Bunyoro, Lango, Acholi, Teso, Bugisu, Sebei, Bukedi, Busoga, Buganda, Kigezi, Ankole and Rwenzori were prepared to facilitate the review of mineral rights in the in the country.

Monitoring of the performance of Exploration - GSD carried out inspection and monitoring of the performance of Exploration Licenses to ensure compliance with the Mining Act 2003, mining Regulations 2004. Thirty (30) Exploration Licenses in Kabale, Rubanda and Kisoro, Districts were inspected (Appendix 6.1)

3.1.2.12 Audit for metallurgical accounting and appraisal for mineral value addition

Laboratories Division technical staff and the Mines Officer in Charge of Eastern Region undertook a follow-up mining operation audit for metallurgical accounting and appraisal for mineral value addition of Tiira Gold Mine in Busia District and Namakera Vermiculite Mine in Manafwa District, on 5th and 6th July 2018.

3.1.3 Earthquake monitoring and Advisory Services

3.1.3.1 Earthquake Events

DGSM continued to operate and maintain the National Seismic Network of five (5) stations at Entebbe (ENTD/TEBE), Hoima (HOID), Nakauka (NAKD), Kilembe (KILD) and Mbarara-Kyahi (MBAR). Data analysis revealed six (6) earthquake events in the region, with three (3) events (red stars – Figure 11) located within Uganda region. Epicentre parameters of the events were recorded, and locations determined as in table 4:

Table 4: Earthquake events recorded on atleast three seismic stations and therefore well located during the period July 2018 to April 2019.

Date (DD.MM.YY)	UTC event time (hh:mm:ss)	Magnitude (Richter)	Latitude (deg)	Longitude (deg)	Depth (km)	Geographical Region
05.01.2019	18:13:46	4.8	3.0863	31.4085	17.1	Uganda
02.02.2019	07:29:47	4.3	-8.6246	32.7038	10	Tanzania
07.02.2019	08:52:38	3.7	-3.3005	37.3751	10	Tanzania
12.02.2019	17:38:47	3.9	-0.0322	29.7311	10	Uganda/D.R.Congo boarder
24.03.2019	16:21:15	4.7	-3.0654	38.162	10	Kenya
21.03.2019	09:15:40	5.5	-7.8777	32.0851	22	Tanzania
03.04.2019	19:40:51	4.5	1.7615 S	31.199 E	10	Lake Albert Region, Uganda

period July 2018 to April 2019.

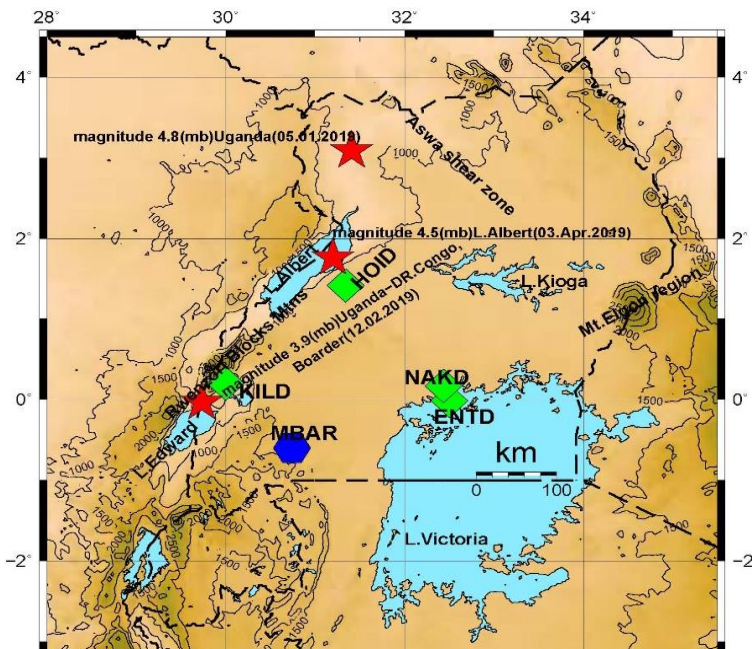


Figure 11: The RED stars denote epicentre locations of the earthquake events; GREEN diamond represents broadband seismic stations while the BLUE hexagon represents the global seismic station (MBAR) located at Mbarara.

band Seismic Experiment

The nine 9 temporary stations in the North East and Northern Uganda (Figure 9) were demobilized, and shipped back to IRIS PASCCAL, USA. However, a copy of the raw data that was acquired during the survey was retained at DGSM and will soon be made open and available for research use to whoever is interested.

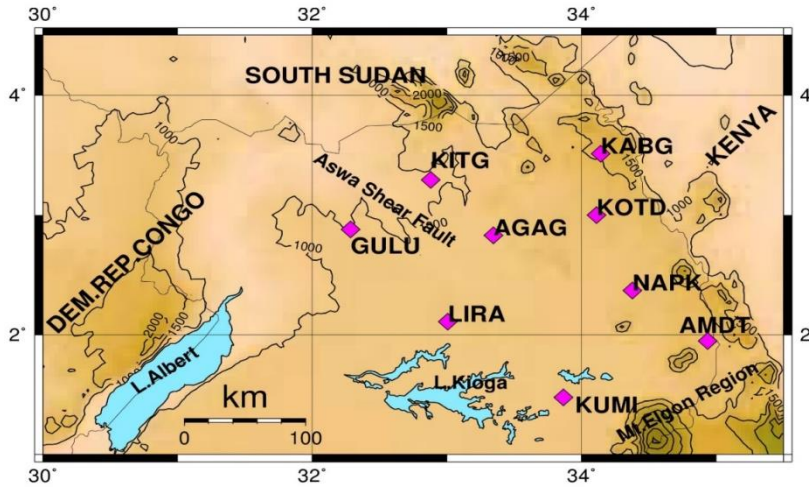


Figure 12: A map showing distribution of a temporary seismic stations for North-East Uganda Broadband Seismic Experiment.

3.1.3.3 Geodetic Global Positioning System (GPS)

Three (3) geodetic GNSS/GPS stations covering the Central and Eastern regions of Uganda (Nabumali-Mbale, Buyende, and Nakasongola) were installed to supplement the 7 sites that were already (2017) installed within the Central and Western Kenya. The research program is purposely for Kinematic study of the East African Rift System (EARS) for investigating the rifting pattern and rate at which the EARS is moving apart.



Figure 13. Google Earth Map showing location of GNSS/GPS station sites (UGN1, UGN2, & UGN3) installed in Uganda.

3.1.4 Institutional capacity Development

3.1.4.1 Infrastructure Development

The following infrastructural developments were undertaken at DGSM:

- i) Contract for design, implementation, maintenance and support services of a Laboratory Information Management System (LIMS) for the DGSM Laboratories was signed.
- ii) Five (5) laboratory fume hoods and four (4) scrubbers were serviced and maintained under an ongoing three (3) year contract.
- iii) Engineering designs, bills of quantities and procurement documents for the proposed Ntungamo Mineral Beneficiation Centre were prepared by a technical team from the Ministry of Works and Transport and necessary approvals obtained. Documentation has been submitted to the Procurement and Disposal Unit for initiation of procurement.
- iv) Submissions were made for initiation of procurement of a contractor to construct the Tooro Regional Offices and Mineral Beneficiation Centre for the DGSM in Fort Portal Municipality.
- v) Modified electrical wiring and installations drawings for the rewiring DGSM office and laboratory blocks at the Geological Survey and Mines Directorate in Entebbe were finalized, including bills of quantities and procurement documents and submissions made for initiation of procurement and for approval by Entebbe Municipal Council.

3.1.4.2 Human Resource Development

Long-term training

During the period of reporting, the following long-term training activities were undertaken:

- i) Mr. Henry Onyege, Chemist completed a Master of Science in Analytical Chemistry at the Kingston University in the United Kingdom. He returned in January 2019 resumed his duties as a Chemist.
- ii) Mr. Isaac Moses Ajule, Laboratory Technician continues to pursue a Master of Science in Analytical Chemistry at Kingston University in London, United Kingdom.
- iii) Ms. Erios Naiga, Documentation Officer continues with a three (3) years MSc. Degree in Informatics at Gyeongsang National University in South Korea. She is expected to complete the course on August 31st, 2020.

Short term training

- i) Mr. Henry Ngada – Ag. Assistant Commissioner (geodata) attended two certificate courses in project planning and Management, and Project Monitoring and Evaluation in September and October 2018 at the Uganda Management Institute (UMI) Kampala.
- ii) Mr. Joseph Nyago (Ag. Senior Seismologist) participated in a one-week Field Testing of OSI Geophysical Techniques (Equipment) for Shallow Applications between 10th and 14th September 2018 at the Austrian Defense Base in Tritolwerk, Vienna. The exercise was by invitation of CTBTO On-Site Inspection (OSI) Division in Vienna, Austria.
- iii) The geophysics team was trained on use of Geotools software for processing Magnetotellurics and Transient Domain Electromagnetic data for five days 21 September to 2 October 2018. The training was delivered via web conferencing by CGG staff. The training coincided with EAGER visit to mentor the team under EAGER assignment U43.
- iv) Mr. Fred Tugume (Assistant Commissioner, Geophysics and Seismology), Isaiah Tumwikirize (Principal Geophysicist) and Joseph Nyago (Ag. Seismologist) participated in the Eastern and Southern Africa Regional Seismological Working Group (ESARSWG) Conference in Dar es Salaam, Tanzania from 8th to 10th October 2018, to commemorate 25 years of existence of ESARSWG.
- v) Mr. Birungi Nelson undertook a training in Leapfrog Geothermal software from 3-9th March 2019 in Naivasha, Kenya.
- vi) Mr. Joseph Nyago (Ag. Seismologist) attended Technical Training Programme for waveform station operators of Joint International Monitoring Stations (IMS) and International Deployment of Accelerometers (IDA) stations from 15th – 19th October 2018 Vienna, Austria.

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- vii) Three (3) students from Kyambogo University and one (1) from Makerere University underwent industrial training in the laboratories. The students whose years of study vary from 1 to 3 are pursuing qualifications of Bachelor of Science in Chemical Engineering, Bachelor of Technology in Chemistry, and Bachelor of Science in Laboratory Technology.
- viii) Mr. Chris Lubangakene, Ag. Assistant Commissioner Laboratories participated in a retreat organised by the Ministry to review performance for Financial Year 2017/18 and plan for budget implementation, from 30th July 2018 to 3rd August 2018, at Kyangabi Crater Resort, in Rubirizi District.
- ix) GSD staff participated in the DCIUNIN information sharing Workshop from 18th to 20th November 2018 at DGSM Boardroom.
- x) GSD attended a presentation on Geohazards assessment of the Mt Elgon region (project proposal) on 16th October 2018
- xi) GSD attended a presentation by presidential advisor on mining for prosperity 26th October 2018.
- xii) GSD Participated in training in GIS and database training was to be conducted from 5th- 9th November 2018.
- xiii) Ms. Brenda Ssubi is undergoing training in information management at the Documentation Centre.

3.2 Mines Department

3.2.1 Policy, Legal and Regulatory Framework

Cabinet approved the Principles for the Mining and Minerals Bill 2019. Consequently, technical review of the Bill was carried out and modifications incorporated in the draft during the one-week workshop from 5th to 11th May 2019, at the Imperial Golf View Hotel, Entebbe. Consultative review meetings with other stakeholders in the various parts of the country are expected to take place during the first quarter of FY2019/2020.

3.2.2 The Mining Regulation

Review of the Mining Regulations 2018 was also concluded during a one-week residential work at the Victoria Mall - Best western Hotel, Entebbe from December 9th to 15th, 2019. Once passed, the regulations shall provide for online mineral licensing. The Mining Regulations 2018 shall also enable the implementation of ICGLR Regional Certification Mechanism, a regional initiative against illegal exploitation of Natural resources. The prevention of illegal exploitation and illicit trade in designated minerals regulations, 2018 is being developed.

3.2.3 E-government based mineral licensing system

Programming and upgrading of the mining cadastre to include an e-government based mineral licensing system is in advanced stages. Users including licence holders continue with registering to obtain user accounts that will enable them to submit/receive applications, make payments, submitting reports and production returns, as well as undertaking renewals online. Launching of E-licensing is planned for the beginning of FY 2019/20

3.2.4 Licensing and regulation of exploration and exploitation of mineral resources

3.2.4.1 Licencing Status

There was a general improvement in the licensing process as testified in the tables 5 & 6. This is attributed to ongoing reorganization of the licencing administration. The newly established Mining Cadastre and Registry System is an intervention to increase accessibility to information, boost productivity, eliminate bureaucracy, reduce on the time taken to process mineral rights applications, minimize noncompliance and significantly enhancing government revenue collection.

Table 5: Licencing Status as of 30th June 2019

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Type of License	Status as at 30/06/2018	Granted	Renewed	Expired	transferred	Revoked	Current as at 30/06/2019
Prospecting License	113	159	N/A	113	0	0	159
Exploration License	220	130	29	31	21	0	319
Retention License	4	0	0	1	0	0	3
Location License	49	61	12	10	4	0	100
Mining Lease	41	6	0	0	4	3	44
Mineral Dealers*	91	82	N/A	32	0	0	50
Total	518	438	41	187	29	3	675

Table 6: Licencing Status as of 30th June 2018

Type of License	Status as at 01/07/2017	Granted	Renewed	Expired	Revoked	Current as at 30/06/2018
Prospecting License	150	181	N/A	192	0	139
Exploration License	374	86	15	136	0	325
Retention License	4	1	0	0	0	5
Location License	70	17	6	22	0	71
Mining Lease	39	2	0	0	2	39
Mineral Dealers*	79	115	N/A	102	0	92
Total	695	402	21	260	2	671

Comparative examination of mineral rights (EL, RL, LL & ML new and renewals) granted in FY2017/18 (242) vis-à-vis FY2018/19 (320) shows a 32.2% improvement. Also, production licences (LL & ML) increased by 30.9% from the one hundred ten (110) in 2017/18 to one hundred forty-four (144) in 2018/19. The increase in mineral rights projects a future increase in revenue collection from both annual mineral rent and monthly production returns. More funding for increased vigilance in monitoring and supervision of exploration and mining operations is recommended to realize this projection.

3.2.4.2 Monitoring and Inspections

The Department of Mines (DM) through its Inspections and monitoring division continued to inspect, monitor and regulate the mining, processing and

exploration activities all over the country focusing on compliance with applicable laws ,mine plan, checking whether the directions given during the last inspection visits were followed or not as well as checking whether the royalty is paid as per the production made. Flagship Projects: Sukulu Phosphate and steel project and Tibet-Hima were also monitored.

Sukulu Phosphate and steel project

Construction of the dressing plant and the first phase of the fertiliser plant was completed and, was commissioned by H.E the President of the Republic of Uganda on October 23th, 2018, (Figure 14). Construction of the first phase of the steel plant, slag cement factory, glass factory and a baking-free brick factory is still ongoing.



Figure 14: H.E the President of Uganda launching the Fertiliser Plant at Sukulu Phosphate and Steel Project



Figure 15: Bio-organic fertilizer from the Sukulu Phosphate and Steel Project

Tibet Hima Mining Company limited (THMCOL) – Kilembe Mines Concessionaire:

Tibet Mining Company limited underperformed their debt and work obligations.

The Minister of Finance, Planning and Economic Development issued the Company a Termination Notice terminating THMCOL's Concession Agreement.

ToR's for the selection of a new operator for Kilembe Mines were done and Twenty-one (21) parties have shown interest in taking over Kilembe Mines under a restrictive bidding process.

other inspections carried out during the FY2018/19 in the various parts of the country observed that:

Observations

- i. there is a lot Illegal mining (Figure16-19), buying and transportation of minerals without appropriate mineral licences and permits which leads to lack records on production from the operators and hence loss of revenue to both local and central government

- ii.* Many of the licenced holders are not available in their licence areas, implying that they are briefcase investors and no work is going.
- iii.* There is still ignorance in the local community regarding their role in exploration and mining operations. On the 7th of December 2018, it was reported from Ochuloi quarry that UNDP officials were bitten by the locals when they had gone to record a documentary on development minerals. Cameras were all destroyed, and the report is at Katine police post.
- iv.* The quarry at Kamusalaba by CCCC Construction Company was left with an open pit that turns into a pool of water during rainy season is health and safety hazard.

Interventions

- i.* Carrying out the registration process of ASM faster and having leadership to on mining operations in their groups will held in record keeping and uncover production by the ASM.
- ii.* Increased monitoring of mining and mineral trade operations involving the local leadership in known mining areas should be enforced. This will reduce on the illegal mineral trade as well as reveal non-compliant licence holders.
- iii.* Revoking noncompliant licences to encourage others licence holders to work.
- iv.* Continuous sensitization of the local community of their role in exploration and mining operations to provide a conducive environment to mineral developers and geotourists.
- v.* Mine closure plans for mining companies should be scrutinized to ensure they provide for environment restoration. Ensuring heavier penalties to companies which failure to abide by their mine closure plans – fail to restore environment.



Figure 16: Illegal Gold mining in Nakabaat in TN 2985 (Heyday International Mining Group Company formally Jan Mangal ML1129).



Figure 17: Inspecting DAO marble site in Rata. No activity at the site

AMURIA DISTRICT



Figure 18: Lake created by excavation of granite by Multiplex Ltd in Dokolo municipality.



Figure 19: Quarry in Amuria was opened in Abuket village, Abwanget parish, Willa Subcounty Amuria district - UTM zone 36N 0566373mE, 0228733mN where big quarrying is taking place was also inspected

3.2.4.3 Mineral Production Statistics

Mines department continued to closely monitor mining operations in the country. FY2018/2019 registered a 6.9% increment in production compared to the previous FY2017/0218 (Table 5). This is attributed to increased exploitation of pozzolana and syenitic aggregates for the manufacture of cement in the newly established Simba Cement and Kampala Cement factories. Increased monitoring of illegal mining activities along the porous DR Congo and Rwanda borders has also reduced on the rate of smuggling of minerals out of the country which explains the increased quantities of Wolfram declared as returns by miners in western Uganda.

Vigilant monitoring to curb down illegal mining and smuggling of minerals is recommended for better performance.

Table 7: Mineral production Statistics

Mineral	Average Price per Tonne in 10 ³ UGX.	Quantity in Tonnes		Value in 10 ³ UGX	
		FY2017/18	FY2018/19	FY 2017/18	FY 2018/19
Limestone	120	1,028,010.81	1,019,344.21	123,361,297	122,321,305
Pozollana	21	910,235.67	1,219,081.02	19,114,949	25,600,701
Gold	117,291	0.0000	0.03	361	3,150
Vermiculite	579	7,186.10	10,285.34	4,160,752	5,955,212
Wolfram	34,575	109.50	246.77	3,785,928	8,531,934
Syenitic Aggregate	1.5	84,213.83	194,308.65	126,321	291,463
Kaolin	100	30,550.03	25,339.46	3,055,003	2,533,946
Iron Ore	271.29264	6,589.00	0.00	1,787,547	0
Granite	922.7625	-	-	0	0
Lead	5000	-	-	0	0
Coltan (30% Purity)	28,413	10.35	0.23	294,075	6,450
Tin (75% Purity)	34,034	98.04	18.25	3,336,680	620,974
Beryl (1% Beryllium)	8,715	-	-	0	0
Diatomite	1,021	0	205.00	0	209,305
Grand Total				155,383,767.1	166,074,440

NB: UGX 117,291

3.2.4.4 Non-Tax-Revenue (NTR)

The Department registered a 4.02% NTR collection shortfall in FY2018/19 (UGX. 16,031,523,348) -Table 8, compared to FY2017/18 (UGX. 16,702,115,814). This is attributed to the drop in Loyalties as result of the Presidential ban of raw mineral exports. Loyalties are a percentage of the value of minerals produced and or exported. Ban of mineral export did not only cut

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down production/mining but more so affected mineral exports and revenue collection as royalties. Royalties dropped from UGX. 13,727,098,474 in FY2018/19 to UGX. 11,027,116,650 in FY 2018/19. Also, mineral certification requirement – an initiative to fight illegal exploitation of natural resources in the great lakes region was another hindrance.

Table 8: Non-Tax Revenue (NTR) collected in 2018/19

NTR Source	FY 2018/2019		
	Q1 & Q2	Q3 & Q4	Q1-Q4
ROYALTIES PAID BY HOLDERS OF MINERAL RIGHTS OR MINERAL DEALERS-	5,777,613,630	5,249,503,020	11,027,116,650
ANNUAL MINERAL RENTS (OTHER THAN FOR PROSPECTING LICENSE)-	1,558,590,000	1,863,447,114	3,422,037,114
MINERAL DEALERS LICENSE-	142,000,000	365,000,000	507,000,000
PREPARATION OF EXPLORATION LICENSE-	138,000,000	76,000,000	214,000,000
PROSPECTING FEES	56,000,000	45,500,000	101,500,000
PREPARATION OF A LOCATION LICENSE-	48,000,000	30,400,000	78,400,000
REGISTRATION OF EXPLORATION LICENSE-	12,000,000	83,000,000	95,000,000
PUBLICATIONS -MAPS	3,227,341	2,087,543	5,314,884
SURRENDER OF EXPLORATION LICENSE-	3,000,000	3,000,000	6,000,000
TRANSFER OF MINERAL RIGHT OR OF SHARE OF THE RIGHT IN RESPECT OF-		78,000,000	78,000,000
ANNUAL FEES FOR GOLDSMITHS LICENCE-		38,000,000	38,000,000
ANNUAL MINERAL RENT FOR RETENTION LICENSE-		25,000,000	25,000,000
PREPARATION OF A MINING LEASE-	15,000,000	25,000,000	40,000,000
RENEWAL OF A MINING LEASE-		5,000,000	5,000,000
RENEWAL FOR EXPLORATION LICENSE-	24,000,000	16,000,000	40,000,000
RENEWAL OF LOCATION LICENSE-	11,000,000	3,000,000	14,000,000
LATE LODGEMENT FEES AND LATE LODGEMENT PERIOD-	8,975,000	63,675,000	72,650,000
BLASTING CERTIFICATE FEES	500,000	2,500,000	3,000,000
TRANSFER OF EXPLORATION LICENSE-	60,000,000	150,000,000	210,000,000
PREPARATION OF A RETENTION LICENSE-		10,000,000	10,000,000
SEARCH IN A REGISTER OF MINING INSTRUMENTS-	1,600,000	1,200,000	2,800,000
COPY OF OR EXTRACT FROM ANY REGISTERED DOCUMENT FOR EVERY PAGE-		200,000	200,000
AIRBORNE GEOPHYSICAL	26,264,700	-	26,264,700
PREPARATION OF A RETENTION LICENSE-	10,000,000	-	10,000,000
COPY ISSUED FOR LOST OR DESTROYED CERTIFICATES INCLUDING COPY OF ANY MAP ATTACHED TO THE ORIGINAL INSTRUMENT-	240,000	-	240,000
TOTAL	7,896,010,671	8,135,512,677	16,031,523,348

3.2.4.5 Mineral exports statistics

Mineral exports dropped by 60.24% from UGX. 690,131,321 in FY2017/18 to FY2018/19. This was due to a Presidential ban on raw mineral exports during the FY2018/19. This deterred our clients from carrying on their mineral businesses and hence the performance.

Table 9: Comparative examining of Mineral exports for FY2018/19 and those of FY2017/18

Commodity	Quantity in Tonnes		Royalties on Exports (UGX)	
	FY2017/18	FY2018/19	FY2017/18	FY2018/19
Tourmaline	-	0.20044	-	439,399
Tantalite	13.15	0.15	41,692,080	349,080
Gold	0.0100481	0.0094137	412,547,670	61,131,852
Wolfram	212	202	200,386,779	181,789,264
Ruby	0	0.00061	-	238,764
Amblygonite	0	96	-	15,211,790
Iron ore	9	0	33,750,000	-
Beryl (1% Beryllium)	72	78	1,754,792	14,907,709
Gemstones		0.003685	-	272,503
Kyanite	0	0.0003	-	33,974
Total			690,131,321	274,374,335

3.2.4.6 Mineral imports statistics

There were no imports of minerals recorded at the Department of Mines

3.2.4.7 Mineral Traceability and Certification

The Department continued technical collaboration with Partnership Africa Canada (IMPACT) in the implementation of the Regional Initiative on Fight

against the Illegal Exploitation of Natural Resources (RINR). RINR is one of the Protocols of the Pact on Security, Stability and Development in the Great Lakes Region under the International Conference of the Great Lakes Region (ICGLR). The following have so been achieved:

- i.* A mine site inspection manual for Uganda was developed and finalized.
- ii.* A mine site inspection template for Uganda was developed and finalized.
- iii.* Training of government inspectors (Mines, Customs, Police, Labour, and Environment) to use the Mine Site Inspection Template.
- iv.* Two mock mine site inspections were undertaken at Kikagati Tin Mine in Isingiro District and Nyamuliiro Wolfram Mine in Rubanda District to test the mine site inspection manual and mine site inspection template.
- v.* A draft mineral export procedure for Uganda was developed and finalized and awaits validation in a stakeholder meeting.
- vi.* The guidelines for evaluation process for chain of custody services providers that express interest was developed and await finalization before validation in a stakeholder meeting.
- vii.* The National (Uganda) Road Map to the implementation of the 6th Protocol of the ICGLR Regional Initiative on the fight Against the Illegal Exploitation of Natural Resources was prepared.
- viii.* Establishment of the “Uganda-ICGLR Certification Unit”, based at DGSM in Entebbe is underway to document production and trade of 3TG (Tin, Tungsten, Tantalum and Gold) minerals in Uganda and the Great Lakes Region.
- ix.* BGR has Expressed Interest to provide technical assistance and capacity building to Uganda on to the ICGLR-RCM implementation in Uganda. DGSM and BGR are in the process of signing a MOU on the proposed support.

3.2.4.8 Sensitization and registration of ASMs

Formalisation of Artisanal and Small-Scale Miners (ASM) is ongoing. DGSM is carrying out this activity in partnership with civil society organizations such as Ecological Christian Organization, Safer World, Uganda Human Rights. The following outputs have been registered so far:

- i.* Mapping of ASM commenced in Mubende, Namayingo, Buhwezu, Busia, Moroto, Nakapiripirit, Amudat Kabong, Abim, Ntungamo, Isingiro, Kabale, Kisoro, Kasese, Rubanda and Bugiri Districts,
- ii.* Registration and formation of Associations is ongoing, and over 40 (forty) associations have been formed so far.
- iii.* Sensitization of the communities about the advantages of formation of associations is going on.
- iv.* The mining regulations are being revised to include curbing illegal mining and trade.

- v. Construction of training and beneficiation centres for transfer of skills to ASMs is ongoing.
- vi. The DGSM commissioned a regional office for Karamoja sub region based in Moroto, Procurement to obtain a contractor to construct a Beneficiation centre in Ntungamo has been initiated.
- vii. Designs for the Beneficiation centre in fort portal have been finalized and await approval by ministry of works and Transport
- viii. A Minerals Protection Police Unit assisting the Mines Department to enforce compliance to the Mining Legislation is in place.
- ix. DGSM mediated between the ASMs and AUC Mining (U) Limited – an exploration and mining company mineral right holder to sharing a concession in Kassanda District as guided by H.E. the President of the Republic of Uganda.
- x. The consultant to carry out the biometric registration of Artisanal miners was procured. A contract was awarded, and the project launched.

3.2.5 Institutional Capacity Building

3.2.5.1 Human Resource Development

Long term training

Mr. John Kennedy Okewling is pursuing master's degree in mining engineering at the University of Exeter, United Kingdom. He is Expected to return at the end of 2019.

Short term training, workshops and conferences

- i. The Department attended the opening ceremony of Uganda-China (Guangdong) free zone of international industrial cooperation on August 9th, 2018, in Tororo Uganda.
- ii. The staff of Mines Department participated in the Administrative workshop, aimed at improving performance at DGSM on 5th July 2018.
- iii. The staff of Mines Department participated in the National Launch of the registration for the online mineral licensing system at DGSM on 12th July 2018.
- iv. The staff of Mines Department participated in the internal stakeholder's consultation workshop for the minerals laboratory services policy for DGSM on 16th and 17th July 2018.
- v. The staff of Mines Department participated in the review of the mining regulations.
- vi. The staff of Mines Department participated in a workshop to understand the progress of the Design, construction and installation of Uganda

- National Infrasound Network Project (DCUNIN), 19th -20th November 2018, at DGSM boardroom.
- vii. The staff of Mines Department attended a meeting to discuss the proposal for the Geohazard Assessment of Mt. Elgon Region Project.
 - viii. Nassuna Grace drafted the Job descriptions and Person Specifications for the Mines department, two meetings were held in October 2019 at Amber house to review the drafts for DGSM.
 - ix. Nassuna Grace together with Martin Nganda updated the TOR for the National Mineral flow database in October and November 2018.
 - x. Agnes Alaba, Grace Nassuna, Vincent Kedi and Morris Tabaaro attended a meeting with BGR to discuss possibilities of having a working MOU with DGSM on RCM, 8th November 2018, at DGSM.
 - xi. Nassuna Grace drafted the client charter for the Mines department, a preparatory meeting to agree on the road map for handling the assignment took place on November 1st, 2018, and another one on December 6th, 2019 at Amber house to review and develop a client charter for MEMD.
 - xii. The staff of Mines Department participated in the commissioning ceremony of Sukulu Phosphate comprehensive industrial development project, 23rd October 2018, in Sukulu, Tororo.
 - xiii. Nassuna Grace participated in the validation of the 5th Annual report on the state of equal opportunities in Uganda FY 2017/2018 on 18th October 2018, at Imperial Royale, Kampala.
 - xiv. Nassuna Grace together with Nassaka Sylvia, Lugaizi Isah, Pule Stellah, Nakirijja Jackie participated in a workshop for completion and validation of development minerals mapping exercise for Uganda, 29-30 November 2018, Victoria Mall Entebbe.

3.3 Geothermal Resources Department

3.3.1 Policy, Legal and Regulatory Framework

The formulation of the geothermal policy started in 2016 with support from Climate Technology Centre Network (CTCN) of the United Nations Framework Convention on Climate Change (UNFCCC) who produced the first draft. Since then the draft has undergone several improvements to come up with the current draft after a review workshop held at Essella Country Hotel in Kiira Municipality, Wakiso District on 24th to 26th April 2019. A draft Cabinet Memo has also been prepared. The Regulatory Impact Assessment (RIA) is being finalized before submission to the Permanent Secretary, Ministry of Energy and Mineral Development for onward transmission to cabinet for approval.

3.3.2 Establishment of Uganda's Mineral Potential

3.3.2.1 Government of Uganda - EAGER cooperation project.

In June 2016, the Government of Uganda signed a MoU with Adam Smith International (ASI) on behalf of East Africa Geothermal Energy Facility (EAGER) financed by the United Kingdom Department for International Development (DFID) on technical cooperation in geothermal exploration and development. Under the MoU, the two parties carried out detailed exploration at Panyimur and Buranga geothermal prospects and developed subsurface models of the two prospects (Figure 20).

The models have been a basis for locating sites for Temperature Gradient Drilling at the two prospects. Other achievements under the MoU are as follows: (i) Mentoring of the DGSM staff in data collection and interpretation, (ii) Conceptual modelling, (iii) Ranking of Uganda geothermal areas and selecting new areas for future studies, (iv) Development of business and financial models to guide geothermal exploration and development, (v) Development of a Geothermal database and website, (vi) Direct use application pre-feasibility studies of Kibiro and Panyimur.

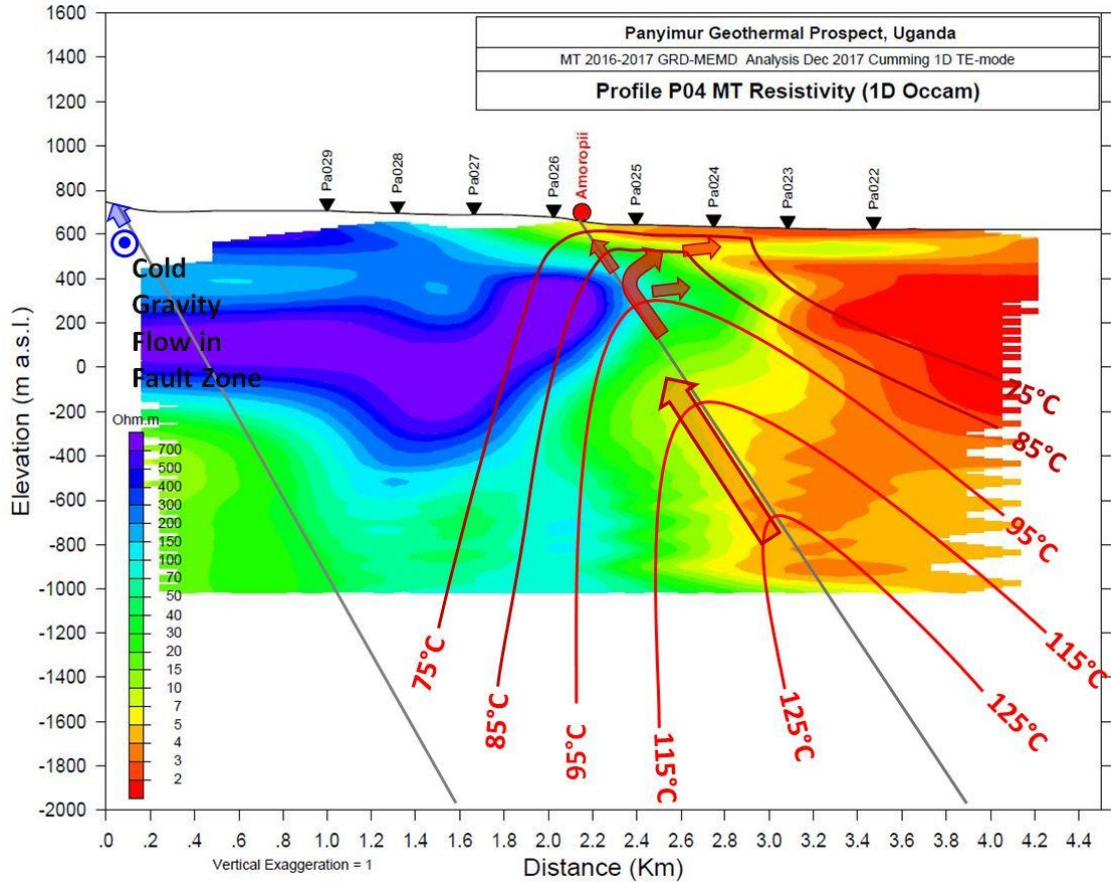


Figure 20: Panyimur. Conceptual model along Profile P04 through Amoropii hot springs.

3.3.2.2 Drilling Temperature Gradient Wells (TGW):

Ministry of Energy and Mineral Development (MEMD) procured a Consultant to design, assist in procuring a Drilling Contractor and supervise TGW drilling at Kibiro and Panyimur geothermal prospects. The agreement between the Consultant and Government of Uganda was signed on 13th May 2019. The procurement of a contractor to drill the sixteen (16) TGW has been initiated and will take a maximum of six months. The drilling is planned for January to February 2020.

3.3.2.3 Sampling of geothermal fluids and flow rate measurements:

Sampling of geothermal fluids for volatile components was done at Kabuga in Kasese District, Buranga in Bundibugyo District, Kibiro in Hoima District and Panyimur in Pakwach District. Measurement of water flow rates was done at Kibiro. The Flow rate measurements are done every six months as a Baseline before the upcoming drilling programme. During drilling and subsequent

extraction of the geothermal fluids, the changes in the flow rate, if any, will be compared with the original background values. This is part of the Environmental Impact Assessment of the project.

3.3.2.4 Geophysical Exploration

In April 2019, the Geothermal Project Team designed and conducted a combined MT and ground magnetic survey at Rubaare geothermal area, Ntungamo District. A total 15 MT soundings were conducted. This was complimented by ground magnetic surveys involving 14 magnetic survey profiles. Data processing, analysis and interpretation is on-going.

3.3.2.5 Shallow Temperature surveys

The GRD conducted 1-meter depth shallow temperature measurements at Katwe Geothermal prospect (Figure 21). Data was processed, analysed and interpreted. A shallow anomaly was detected but needs additional measurements to delineate its boundaries. Similar surveys were conducted at Rubaare and Panyimur areas to map shallow thermal anomalies that could give indication of a thermal gradient in the area.



Figure 21: Shallow temperature surveys at Katwe.

3.3.2.6 Geothermal Risk Mitigation Fund (GRMF)

The final requirements were submitted to the African Union Commission (AUC) in Addis Ababa, Ethiopia. We are now waiting for the final decision on the AUC support to the Temperature Gradient Drilling programme at Kibiro and

Panyimur. Once this support is approved, a Grant Contract agreement will be signed with the Government of Uganda.

3.3.2.7 Katwe MT Survey

During August to September 2018, MT Field surveys were conducted at Katwe geothermal prospect involving 43 MT soundings. Data was processed, interpreted and analysed by the staff and EAGER Experts (Figure 22).

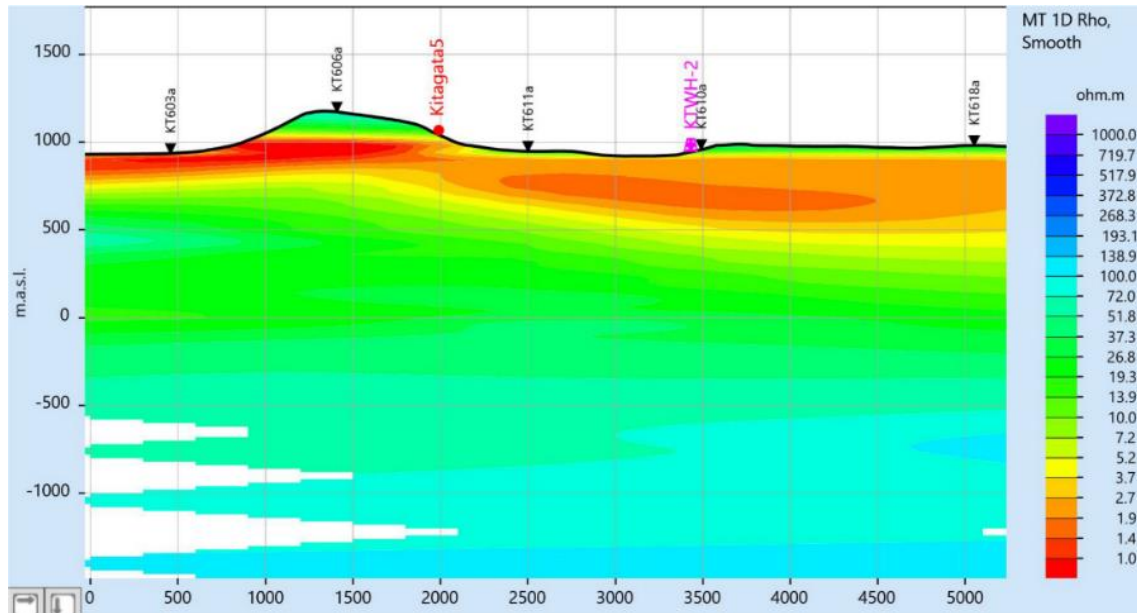


Figure 22: 2D MT cross-section through Lake Kitagata.

The results indicate a shallow cap rock (about 500m thick) overlying a possible geothermal reservoir with limited space between 500m and 900m below the surface. The basement in this area lies at approximately 900m below the surface. The above findings suggest a low temperature geothermal system with temperatures about 100°C and a limited resource below the surface in the region of Lake Kitagata. More surveys are needed to delineate and test this model.

3.3.2.8 Micro-seismic surveys

From 1st to 4th October 2018, the micro-seismic network equipment, which was deployed at Kibiro and surroundings, was demobilised after two (2) years of data collection. The data awaits processing and interpretation to aid in up-

dating and refining a geothermal conceptual model of Kibiro prospect. Preliminary interpretation indicate that the region is tectonically active and further investigations needed.

3.3.2.9 Direct use application

Pre-Feasibility studies were conducted on direct use of geothermal heat other than power generation by GRD and EAGER. The study was carried out at Kibiro and Panyimur geothermal prospects. The preliminary results show that the two areas have potential for direct uses in fish drying, salt extraction, aquaculture, drying of agricultural produce and tourism.

3.3.3 Licensing and inspection

Three (3) companies are holding licenses at Buranga, Ihimbo and Panyigoro in Bundibugyo, Rukungiri and Pakwach districts respectively.

3.3.3.1 Gids Consult (U) Limited

The company is holding a Retention License (RL) over Buranga geothermal prospect. The operator has carried out additional MT/TDEM geophysical surveys. The data will be used to update the current subsurface conceptual model of the area that will be a basis for locating TGW and exploration wells.

3.3.3.2 Moto Geothermal Projekt

The holder conducted geochemical surveys (water sampling, isotopic sampling, rock sampling, gas sampling). The samples have been analysed at a laboratory in Germany and data processing and interpretation is on-going. The company is planning to continue with a feasibility study.

3.3.3.3 Bantu Geothermal

The holder has carried out geological, geochemical and geophysical surveys and plans to drill exploration wells.

Monitoring and inspection of geothermal activities was done at Buranga, Kibiro, Panyimur and Ihimbo. It is important to note that the private sector is not performing to expectations since the number of licenses has dropped from 14 in 2011 to three (3) in October 2018 and no new licences have been granted. This is due to high geological risk in upstream geothermal exploration which

can only be mitigated or reduced by Government participation in upstream geothermal exploration.

3.3.4 Health safety and social awareness for miners

3.3.4.1 Environmental and Social Impact Assessment Studies at Kibiro and Panyimur

The GRD carried out an Environmental Baseline Survey at Kibiro to document the current state of the physical, social and economic environment. The baseline survey was a requirement for the successful AUC - GRMF application for Kibiro and Panyimur prospects. The procurement of consultants to undertake Environmental and Social Impact Assessment (ESIA) for drilling is at bidding stage.

3.3.4.2 Portable Gas Monitor

One portable gas monitor was procured to be used in monitoring and detecting hazardous gas levels in the environment. The newly acquired portable gas monitor was calibrated and tested. It is in good working condition. The equipment will be used to monitor the levels of geothermal non-condensable gases in the field.

3.3.5 Institutional Capacity Development

3.3.5.1 Infrastructure Development

Direct use of geothermal energy: A project proposal titled “Technical Assistance for Direct Use Assessment of Panyimur and Buranga geothermal areas, Uganda” was approved by the Climate Technology Centre Network (CTCN) and will benefit from the CTCN assistance for a pre-feasibility study for geothermal direct use at the two prospects. The CTCN based in Nairobi, Kenya will communicate the next steps in project implementation.

Geothermal Market Assessment for E. Africa: The GRD participated in the on-line geothermal market assessment for East Africa conducted by International Renewable Energy Agency (IRENA). The results of the study will be used to formulate a project to the benefit of the participating countries.

Geothermal Risk Mitigation Facility (GRMF): Uganda qualified for AUC-GRMF funding to a tune of USD 648,800 to finance Temperature Gradient Drilling of four (4) wells each at Kibiro and Panyimur geothermal prospects. The above funding is 80% of the total project with the remaining 20% to be

contributed by the Government of Uganda. The drilling is expected to take place in 2020.

3.3.6 Human Resource Development

3.3.6.1 Long term training

Mr. Eria Kaahwa – Geologist is pursuing a three (3) years M.Sc. degrees in Earth Resources Engineering at Kyushu University in Japan.

Ms. Jacinta Achieng – Chemist is pursuing a three (3) years M.Sc. degrees in Earth Resources Engineering at Kyushu University in Japan. The training which started in August 2018 is Sponsored by The Japanese Government.

3.3.6.2 Sort term training, conferences and workshops

Hot springs and Spa Development Workshop: On 9th April 2019, the GRD presented a paper on status of geothermal exploration in Uganda during a Hot springs and Spa Development workshop held at the Golf Course Hotel, Kampala. The workshop was attended by Spa Experts from Hungary who are interested in developing Kitagata hot springs in Sheema District, Southwestern Uganda. The experts presented a paper on geothermal tourism opportunities in general giving a number of opportunities for geothermal direct uses in tourism. These include: Geotourism/ecotourism, Nature based tourism, Adventure tourism, Volcano tourism, Leisure and recreation, Medical tourism, Hot spring tourism, Health and wellness Spa tourism. The workshop noted that Uganda has potential for spa development in many geothermal areas and this potential needs to be translated into outputs.

Seventh African Rift Geothermal Conference (ARGeo-C7): From 29th October to 5th November 2018, seven (7) staff of the Ministry led by Her Excellency Uganda High Commissioner to Rwanda, Amb. Olive Wonekha, participated in the Seventh African Rift Geothermal Conference (ARGeo-C7) in Kigali, Rwanda (Figure 23). The conference was organized by the Government of the Republic of Rwanda in partnership with UN Environment and other development Partners. Staff presented papers and participated in pre-conference short courses (Low Temperature Geothermal Systems and Direct Use Application; Geothermal Development and Financing of Geothermal Projects, and Reservoir Modelling and Well Testing).



Figure 23: Some of the Ugandan participants, from left: Mr. Isa Lugaizi, Amb. Olive Wonekha, Mr. Peter Mawejje, and Mr. James Francis Natukunda.

The major outcome of the Conference was “The Kigali Conference Statement” that focused on “Mainstreaming Direct Use application in Geothermal Power development”. This was a call on participating countries to promote use of geothermal energy for Direct Uses in Industry, Agriculture and Tourism.

EAGER Annual Stakeholder Meeting: On 31st October 2018, five (5) staff attended the Annual (and final) Stakeholder Meeting for the East Africa Geothermal Energy Facility (EAGER) programme as a side event at the ARGeo_C7 Conference in Kigali, Rwanda. The participating countries underscored the high level of technical support provided by EAGER. They requested for further support from EAGER or other sources from the Development Partners to continue the good work done by EAGER.

African Geothermal Centre of Excellence (AGCE): Uganda participated in the formation of the African Geothermal Centre of Excellence (AGCE) to be hosted by the Government of Kenya. The policy and legal instruments for its operationalisation are being drafted by the Government of Kenya before the final approval by the African Union (AU) conference of the Heads of States. The centre will be used for sharing experiences among African Rift Countries, capacity building (training), sharing of equipment and expertise among others.

Geothermal Association of Uganda (GAU): On 18th February 2019, the Constitution of the Geothermal Association of Uganda was adopted and now the Association is operational. The GAU is a Branch of the African Regional

Branch (ARB) which in turn is a Branch of the International Geothermal Association (IGA). A number staff have been nominated to take up positions on the ARB Board of Directors for the year 2019/2020.

Geotools™ geophysical Data processing software: Six (6) staff attended a four (4) days Geotools™ software training workshop at DGSM. Geotools™ is Magneto-telluric (MT) and Time Domain Electromagnetic (TDEM) interpretation software. It is a modern interactive platform for analysis of MT & TDEM data. It has 1D, 2D - inversion and modelling capabilities as well as 3D model slicing. The instructor at the training was Ms. Alice from Milan, Italy. The software is still being developed and has been used to model MT, TDEM, Gravity and Magnetics data, and Seismic data in petroleum exploration. The Geotools software has already been used by GRD staff to characterize the geothermal resource at the Katwe geothermal prospect and assessed the resource and specific Temperature Gradient Wells (TGW) targets at the Panyimur geothermal prospect. It is recommended that the GRD acquires the software to improve its data processing.

ARGeo Steering Committee Meeting: Uganda attended the seventh African Rift Geothermal Facility (ARGeo) Steering Committee Meeting in Kigali, Rwanda as a side event at the ARGeo_C7 Conference. The meeting commended the work done by UN-Environment and requested for further support in the field of Direct Uses of geothermal energy.

Science, Technology and Innovation Exhibition: From 10th to 14th December 2018, the GRD participated in the Parliamentary Science, Technology and Innovation (PSTI) exhibition week at the Parliament of Uganda. As a public outreach activity, the public was informed of the social, economic and environmental benefits of geothermal energy.

Leapfrog Geothermal Training: Following the training of two (2) geologists on an integrated 3D modelling and visualisation software workshop using “leapfrog geothermal software” in Kenya, Ms. Clare Baxter (a Technical Sales Adviser) from the United Kingdom visited Directorate of Geological Surveys and Mines (DGSM) on 20th June 2019. She conducted a hands-on training session to the staff and marketed the product. The software can be used both in minerals and geothermal and has not been used in oil and gas. For example, in geothermal it can be used for temperature data modelling, pressure measurements, drilling parameters, geology and geophysics. It is recommended that the Geothermal Resources Department (GRD) acquires the software to assist in development of 3D models of geothermal systems.

Sustainable Development Goals (SDG) - Short Course III on Exploration and Development of Geothermal Resources: One (1) staff participated in a

‘Sustainable Development Goals (SDG) Short Course III’ on Exploration and Development of Geothermal Resources in Naivasha, Kenya from 7th to 27th November 2018. The twenty-one (21) day course was organized by Kenya Electricity Generation Company (KenGen) and the United Nations University – Geothermal Training programme (UNU-GTP) in Iceland. Another staff participated as a guest lecturer and presented a paper ‘Geothermal Exploration in Uganda – Status Report’.

Ten (10) interns from Makerere, Kyambogo and Nkumba Universities benefited from the internship programme organized by the GRD which involved office work and field mapping of geothermal surface features at Katwe and Buranga geothermal prospects.

4 PERFORMANCE OF PROJECTS

4.1 Minerals Laboratories Equipping and Systems Development (MLESD) - Program 1505

Implementation of the three (3) year Minerals Laboratories Equipping and Systems Development Project which commenced in Financial Year 2017/18 continued and during the FY 2018/2019 the following milestones were registered by the project:

- i) Supply of five (5) high capacity and low detection limit analytical equipment for analysis of samples from mineral exploration was concluded. The equipments include the following:
 - a) Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) for geochemical and environment sample analysis to detection limits of parts per billion (ppb) of at least seventy-five (75) elements in the Periodic Table and of higher sample throughput with a 250 sample Auto-sampler.
 - b) Cupellation furnace which is the last of a series of fire assay (quantitative chemical analysis technique for precious metals: Au, Ag, Pt and Pd: in ores and metallurgical products with the aid of heat and dry reagents) equipment procured over the last four (4) years.

- c) Planetary ball mill which is to be used for the milling of mineral samples (sample preparation) of small quantities, especially for trace element analyses, to avoid contamination.
 - d) 3370-litre large sample drying oven which is to be used in drying large batches of samples from geochemical surveys at ago and thereby quicken sample preparation and analysis.
 - e) 220 litre bench top oven for drying small sample quantities and laboratory apparatus.
- ii) Procurement for minimal electrical installation works to improve earthing and lightning protection and right power supply cable at laboratory points in which newly acquired ICP-OES, planetary ball mill and bench-top oven are to be installed was initiated and recommendation for contract award approved.
 - iii) Modified distribution points and wiring of office and laboratory blocks at DGSM following an assessment of electrical installations were submitted to Entebbe Municipal Council for approval. Approvals of modifications for electrical distribution and related plans of office and laboratory blocks at DGSM by Entebbe Municipality were secured and submission to enable submission to the Ministry's Contracts Committee for approval of procurement of an electrical and mechanical works contractor to rewire and install standard electrical installations the buildings were prepared.
 - iv) Procurement of an individual consultant for the Design, Implementation, Maintenance and Support Services for a Laboratory Information Management System (LIMS) for the DGSM Laboratories was successfully concluded and the consultant has been able to design the system and carry out a demonstration to DGSM technical staff. The consultant is to now proceed to install the system.
 - v) Procurement was concluded for shipment of the GBC Savant Atomic Absorption Spectrometer (AAS) to the manufacturer (M/s GBC Scientific

- Equipment Pty Limited) centre in Malaysia to have it repaired as recommended by the authorized distributor in East Africa and the equipment was successfully shipped to Malaysia.
- vi) Technical proposals for Individual Consultant for the Design of a Dust Extraction System for the Sample Crushing Unit and Secure Venting System for the Chemical Store at GSMD Laboratories in Entebbe were evaluated and retendering recommended.
- vii) Procurement for periodic maintenance, service and calibration services of laboratory equipment for a period of three (3) years was initiated and a pre-bid meeting conducted.
- viii) Standard Operating Procedure (SOPs) for analytical techniques were developed. Procurement for American Society for Testing and Materials (ASTM) Standards for selected analytical techniques for the DGSM Laboratories was also initiated and is underway.
- ix) Engineering drawings for the remodelling of laboratory building at GSMD in Entebbe to house the Fire Assay Unit, including bills of quantities and procurement documents, were finalized and submitted by Ministry of Works and Transport. Procurement was subsequently initiated and successfully concluded and a four (4) month contract is underway and is progressing well with structural remodelling and re-roofing completed; pending is fittings and fixtures and equipment installation.
- x) Benchmarking trip by a team comprising of DGSM technical officers and part of a four (4) man team from Ministry of Works and Transport assigned to support the design of a modern laboratory building to house all DGSM laboratories was undertaken of mineral research facilities of the University of Cape Town and MINTEK in South Africa, and their research collaborations to inform the design. Terms of Reference (ToRs) for procurement of a consultant to design the building at DGSM in Entebbe were thereafter prepared.

- xi) Procurement was initiated and successfully concluded for supply and installation of petrology, mineralogy, gemmology, sample reception, and reagents cold storage equipment for the DGSM laboratories. Contract implementation is underway and so far three (3) equipment (hydrostatic balance, weighing balance and laboratory refrigerator) of the eight (8) have been delivered.
- xii) Continuous training of laboratory technical staff on method validation and conformity testing was undertaken. This was undertaken in preparation for developing and adoption of methods for application in the laboratories and subsequent audits for ISO/IEC 17025:2017 Accreditation of the mineral laboratories.
- xiii) Continuous training of staff on hazardous substances and health, safety and environment in laboratories was undertaken.

4.2 Uganda Geothermal Resources Development Project (Program 1199)

4.2.1 Policy, Legal and Regulatory Framework

Information and awareness

Information and awareness campaigns were undertaken in ten (10) geothermal hosting Districts, to enhance public knowledge about geothermal benefits and utilisation. This was to mitigate environmental misconceptions, local population concerns, public perception, and lack of knowledge of the benefits of geothermal development and utilization.

4.2.1.1 Energy Policy of Uganda 2019

On 7th April 2019, one staff attended a zero draft Energy Policy review workshop at Golf Course Hotel, Kampala.

4.2.1.2 Geothermal Association of Uganda

On 18th February 2019, the constitution of the Geothermal Association of Uganda was adopted and now the Association is operational.

4.2.2 Establishing Uganda's Geothermal Energy Resources Potential

4.2.2.1 Katwe MT Survey.

During August to September 2018, MT Field survey was conducted in Katwe involving 43 soundings. Data was processed, interpreted and analyzed by EAGER Consultants.

4.2.2.2 Shallow Temperature Survey.

Staff conducted a shallow temperature measurement at Katwe Geothermal Area. Data was processed, analyzed and interpreted. Shallow anomaly was detected, and a report was submitted.

4.2.2.3 Soil gas survey

Soil gas survey at Katwe was discontinued due to prolonged heavy rains. Soil gas surveying involves the collection and analysis of gas samples from unsaturated **dry zones**. Work is planned to resume in dry season.

4.2.2.4 Detailed Geological Mapping

Field team conducted detailed geological mapping in Katwe which included mapping of geothermal manifestations and structural analysis of faults. Results and interpretations were discussed, and a report compiled.

4.2.2.5 Geothermal Resource Conceptual model workshop

From 3rd to 5th October 2018 a geothermal conceptual modelling workshop was conducted by EAGER consultants at Best Western Hotel, Entebbe. Contents of workshop included; Components of a geothermal conceptual model; Basic steps to construct a geothermal conceptual model; Types of data and types of expertise needed; Using models in well targeting and capacity assessment;

Targeting conceptual models versus targeting data; Decision making issues when using conceptual models; and strengths and weaknesses of a conceptual model approach. A training report was submitted.

4.2.2.6 Micro-seismic survey

From 1st to 4th October 2018, service visit was conducted on micro-seismic network which was deployed at Kibiro. Seismic equipment was demobilized since the project is existing PIP and no funds will be available for paying for security, data bundles and per Diem. However, adequate data has been collected which awaits processing and interpretation to aid in up-dating and refining a geothermal conceptual model of Kibiro geothermal area. Preliminary interpretation indicate that the region is tectonically active as indicated by recorded seismic activity.

4.2.2.7 George Fault Mapping

Preliminary geological mapping around Dura was undertaken and report was submitted. Geological mapping documented surface indicators of geothermal activity which included thermal spring (Dwenkorebe), gaseous emissions and travertine. George Fault (Main rift normal bounding fault) is the presumed structural control of geothermal activity. It is presumed to be a deep circulation extensional (non-magmatic) system and typifies other fault-controlled geothermal systems that are driven by deep circulation of ground waters.

4.2.2.8 Geothermal Data Management

In November 2018, A report “U54-D03 Concluding Report for continuation of mentoring the implementation of a geothermal data management system by EAGER consultants was submitted.

4.2.2.9 Direct use application

Pre-Feasibility studies were conducted on direct use of geothermal heat other than power generation by EAGER experts. A concluding report on prefeasibility studies at Kibiro and Panyimur, U33-D06 was submitted in November 2018.

4.2.2.10 TEM Survey

Panyimur TEM data which was acquired using GEONICS equipment was processed using newly acquired Geotools software. Initial models were tested,

supplemented, and refined by further processing. The process will continue until a hopefully reliable model is achieved. Kibiro TEM data and Katwe TEM data was also processed using geotools.

4.2.2.11 Direct use applications

Staff supported by Experts from EAGER conducted a pre-feasibility study on how to use geothermal resources besides power generations (Direct use model). This was conducted in Kibiro and Panyimur and recommended direct use applications like geothermal spa, salt extraction, aquaculture, agricultural drying, and heating of oil pipeline using geothermal fluids and fish hatcheries. A report was submitted.

4.2.2.12 Mineral recovery

Strategic minerals such as lithium, zinc and manganese ore are known to be found in some geothermal brines. These elements are critical to industries like electronic, automobile and aviation. Brines were tested for these minerals and results are yet to be received.

4.2.2.13 EAGER Data

All raw and processed data acquired by EAGER during the lifespan of the project was submitted to the Directorate which included data from Kibiro, Panyimur, Katwe and Buranga.

4.2.2.14 Field mapping

Field mapping was undertaken at Rubaare geothermal site. The area has active surface geothermal features which included hot springs, gas discharges and seeps. Geological mapping documented relict features which included hot springs deposits (travertine deposits, evidence of past hot springs activity) and the springs have significant flow. The surface features are aligned implying structural permeability. There are no documented young volcanic rocks in the vicinity implying that this is a non-magmatic deep circulation system. In many respects, it typifies other fault-controlled geothermal systems that are driven by deep circulation of

groundwater. Fluid movement is presumed to be controlled by a fault dipping towards the swamp. Gas concentration mapping and shallow temperature surveys were recommended as further work.

4.2.2.15 Shallow Temperature surveys

This was conducted at Rubaare as a low-cost exploration method before deploying the cost intensive MT method. Data is being processed, analysed and interpreted to map and delineate the presumed shallow thermal anomaly due to geothermal heat. A geologic concept is being developed for this fault-hosted geothermal system. It is an extensional (non-magmatic system) as opposed to magmatic driven geothermal system. From 2nd to 13th January 2019, shallow temperature surveys were also conducted at Ihimbo and a thermal anomaly has been indicated. A total forty-one (41) temperature probes were conducted and further work of data gap closure was recommended according to submitted report.

4.2.2.16 MT Surveys

From 9th to 22nd January 2019, MT surveys were conducted at Ihimbo to fill gaps of earlier MT survey. Data is being processed, analysed and interpreted to develop conceptual models of this fault-hosted geothermal system. Data will also be processed using new geophysical data processing software EMpower being procured. From 23rd January 2019 to 4th February 2019, MT data gap closure was also conducted in Buranga and data will be processed using “Geotools” and advanced EMpower geophysical data processing software. The new software will strengthen the interpretations so far made.

4.2.2.17 Thermal Gradient Holes Siting

Pinpointing of geographical locations of TGH was conducted using Global Navigation Satellite System (GNSS) at Kibiro (8 holes) and Panyimur (15 holes). Landowners to be affected by the project were identified as well. A report was compiled and submitted.

Thermal Gradient Wells Drilling: A contract for a Drilling Supervisor Contractor was signed and the Drilling Supervisor assumed office. The drilling supervisor has prepared an Inception Report, ToR for Drilling Service Contractor (DSC). The Consultant has also conducted a TGH drilling infrastructure assessment in Kibiro and Panyimur. He recommended a truck-mounted drilling rig for the drilling job.

4.2.2.18 Geophysical Exploration

In April 2019, Project Team designed and conducted a combined MT and ground magnetic survey in Rubare area. A total 15 MT soundings were conducted. This was complimented by ground magnetic surveys involving 14 magnetic survey profiles as per field report. Data processing, analysis and interpretation is on-going.

4.2.2.19 Geothermal maps

SRTM DTM maps were prepared for Mineral, Rubabo, Birara and Rubaare. Others included heritage and Embuga. These DEM maps enable identifying active controlling structures for geothermal activities in these areas. Very high resolution DTM images were recommended like **LiDAR** and **ERDAS**. These offer resolution of less than 30cm accuracy digital elevation data. These can be analysed to characterise active tectonic environment and identify recent structures which are common conduits of upwelling geothermal fluids.

4.2.2.20 Geophysical Investigation Surveys

Data gap closure geophysical investigation surveys (MT surveys and ground magnetic surveys) were conducted in Panyimur area. Field report was produced. Data processing, analysis and interpretation is going on. This will result into processing report and after interpretation reports. High end computer with data storage, data back-up and archive capability for high volume data were recommended for data processing, analysis and interpretation.

4.2.2.21 Soil gas surveys

Soil gas and gas-flux measurements were conducted in Buranga area as data gap closure following earlier measurements. High flux areas indicated during gas concentration mapping were interpreted to represent concealed active fault zones (enhanced permeability) that act as conduits for hydrothermal fluids.

4.2.2.22 Monitoring and Supervision

Field personnel were supervised in Panyimur, Rubaare and Buranga. The monitoring was to help to assess if desired progress is being achieved. By monitoring progress against goals, we were able to assess what is working and what is not, and from there we determined changes to be made to a project. There are measurable results in the project.

4.2.2.23 Preliminary Surveys

Preliminary geological mapping was conducted at Embuga (Kenjojo), Nyakalenjijo (Kasese), Kiruruma (Kanungu), Minera, Rubabo, Birara (Rukungiri). These areas experienced lateral stretching and thinning of the crust, a process which is still active in some areas. High heat flow characterised these areas which are tectonically active. They are not associated with volcanoes. These resources occur where groundwater circulates deeply along major fault zones (control structure) that bound rift valley. Groundwater simply is heated as it circulates downwards within the zone of fractured and highly permeable rocks. Working hypothesis were developed for these systems. **Handheld GPS Mobile Mapper 50** was recommended for future digital mapping.

4.2.2.24 Thermal and Mineral Springs Map of Uganda

This map was re-digitised and updated with new information. Inventory of new geothermal sites was conducted (Embuga, Kenjojo).

4.2.3 Geothermal Energy Sector Promotion

- i.* On 29th May 2019, staff gave a talk about geothermal energy and its utilization benefits to thirteen (13) Journalists at **African Centre of Media Excellence (ACME)** offices in Soya, Bunga.
- ii.* **Science, Technology and Innovation Exhibition:** From 10th to 14th December 2018 Two (2) staff participated in the Parliamentary Science, Technology and Innovation (STI) exhibition week at Parliament Parking space. As a public outreach activity, the public was informed the social, economic and environmental benefits of geothermal energy utilization.

On 9th April 2019, one staff attended a **Spa Development Workshop** and presented a paper on status of geothermal exploration in Uganda during a hot springs and spa development workshop at Golf Course Hotel, Kampala. The workshop was attended by Spa Experts from Hungary who are interested in developing Kitagata hot springs for health and wellness tourism. **Geothermal Exhibition:** Staff attended a National Budget Exhibition week at Kololo ceremonial ground.

- iii.* **Geothermal Market Assessment for E. Africa.** Staff members participated in the on-line geothermal market assessment for East Africa conducted by conducted by International Renewable Energy Agency (**IRENA**).

4.2.4 Institutional Capacity Development

4.2.4.1 Infrastructure Development

- i.* **Field Base camp land acquisition.** This was identified in Panyimur and Hoima. Validation of land is going on.
- ii.* One desktop computer was procured for PC/Geothermal.
- iii.* **MS-Project 2016.** Procurement of Project management software was initiated. MS-Project 2016 will be used to measure and track the progress of the project.
- iv.* Five (5) **handheld field computers** were procured to aid in GIS digital geological mapping, soil gas and gas flux measurements and portable XRF measurements.
- v.* **Kuster Tool.** Procurement of well logging tool (PTS; Pressure, Temperature Spinner) was initiated. One bidder responded with very high price upon bid evaluation. Retendering was initiated.
- vi.* **Orsat gas analyser.** Procurement was initiated and was deferred by Contracts Committee due to non-transparent and inclusive specifications. Specifications were reviewed and resubmitted.
- vii.* **MT Units up-grade.** A contract to upgrade the MTU 5A to MTU-5C units is ready for signing. upgrade will be conducted by the Provider M/S Phoenix Geophysics Ltd of Toronto, Ontario Canada. URA has cleared re-export of MTU units to Canada. Courier services have been procured.
- viii.* **EMpower geophysical data processing software.** Solicitor General cleared this procurement as well as NITA-U and a contract is ready for signing. EMpower is a software program that processes, displays, and exports TDEM data acquired with Phoenix V8 and RXU receivers.
- ix.* **MT Batteries.** The batteries supplied by the provider did not meet user specification and were returned.

4.2.4.2 Human Recourse Development

- i.* Two (2) staff continue pursuing their three (3) years M.Sc. degrees in Earth Resources Engineering at Kyushu University in Japan.
- ii.* One (1) staff participated in the **Sustainable Development Goals (SDG) Short Course III on Exploration and Development of Geothermal Resources** in Kenya, at Lake Bogoria and Lake Naivasha from 7th - 27th November 2018. The course was organized by KenGen of Kenya and UNU-GTP of Iceland.
- iii.* Another staff participated as a guest lecturer and presented a paper Geothermal Exploration in Uganda – Status Report.
- iv.* **Mining Conference** On 3rd to 4th October 2018 Staff attended a 7th Annual Mineral Wealth conference at Serena Hotel Kampala organized by Uganda Chamber of Mines and Petroleum.

- v. **Seven** (7) staff were trained in Geotools software by EAGER consultants. From 10th to 13th June 2019, eight (8) staff attended a geotools training workshop by CGG ELECTROMAGNETICS (ITALY) SRL at DGSM. Geotoolstm is a modern interactive platform for the analysis of Magnetotelluric (MT) and time-domain electromagnetic (TDEM) data. 1D and 2D inversion and modelling capabilities are included. A training report was submitted as a deliverable.
- vi. GRD Staff were trained and mentored in geothermal conceptual modelling and geothermal resource capacity assessment by EAGER hired experts. Staff were trained and mentored in GIS data compilation, data base management by EAGER hired experts from 30th July to 3rd August 2018.
- vii. **EAGER Reports:** A report U43-D02 titled Geophysics mentoring final report and a report on U43-U49 “Training and Mentoring to input and manage data using Geotools software” were submitted. During October 2018, the following reports were submitted by EAGER Consultants in October 2018; “Geotools implementation: data standardisation and cleaning” U49 – D01; “Geotools concluding report U49-D02 and a report “Concluding report on conceptual modelling workshop”. During November 2018, another report “final report –support to GRD for financial models for geothermal prospects, U31-D02 was submitted. A report concluding report for continuation of mentoring the implementation of a geothermal data management system was submitted by EAGER Consultants in November 2018.
- viii. **EAGER Workshop:** From 5th to 14th November 2018, staff attended an EAGER organized workshop at Entebbe. During the workshop other sites for future studies were selected; financial models reviewed and the updated manual, geothermal database management system mentoring, direct use application pre-feasibility studies of Panyimur and Kibiro, data standards and implementation of geothermal website portal undertaken.
- ix. **EAGER annual stakeholder meeting.** On 31st October 2018, two (2) staff attended the annual (and final) stakeholder meeting for the EAGER programme will take place at ARGeo in Kigali. The meeting was at the Radisson Blue conference centre.
- x. **Structural analysis of faults and mapping.** Senior staff were mentored by EAGER structural geology and geologic mapping expert. In turn, junior staff were trained and mentored in detailed mapping and structural analysis of faults in Katwe and Buranga area by senior staff. A training report was compiled and submitted. It was recommended that staff be trained in slip-dilation tendency analysis, pattern of faulting, stress field determination and fault kinematics to improve their capability in structural analysis.
- xi. seven (7) staff participated in the Seventh African Rift Geothermal Conference (ARGeo-C7) in Kigali Rwanda. Staff presented papers and participated in a pre-conference short courses (Low Temperature

Geothermal Systems and Direct Use application; geothermal development and financing of geothermal projects as well as Reservoir Modeling and Well Testing). Also, ARGeo-C7 conference proceedings full technical papers were received.

- xii.* **ARGeo steering committee meeting.** One staff attended ARGeo steering committee meeting in Kigali, Rwanda.
- xiii.* **African Geothermal Centre of Excellence.** From 16th to 19th July 2018, one staff attended a meeting on AGCE recovery costs and curriculum for AGCE member countries in Addis Ababa, Ethiopia. The Center will offer skills and knowledge needed in geothermal development in the Region.
- xiv.* **Graduate Internship.** As a way of providing industry experience to young professionals, several graduate interns underwent on-the-job training in geothermal investigation surveys. As an induction, four geologists were trained in identifying and mapping geothermal surface indicators of geothermal activity (surface discharge features).
- xv.* **Leapfrog Geothermal Training.** Two geologists attended an integrated 3D modelling and visualisation software workshop using “leapfrog geothermal software” in Kenya. Leapfrog geothermal creates comprehensive models of the field geology, including stratigraphy, structure, rock properties and reservoir parameters. A modelling workshop was held at DGSM boardroom using a 3D geological modelling software Leapfrog Geothermal. It was recommended to procure this software in future.
- xvi.* **Geothermal Geochemistry Workshop.** On 2nd May 2019, GRD staff were trained on sampling and evaluation of geothermal surface waters and gases, analysis of major and trace ion compositions as well as stable isotopes during a geothermal geochemistry workshop at DGSM boardroom
- xvii.* **Geothermal Drilling Training.** Consultancy services procurement has been cleared by Contracts Committee (CC) and a contract is yet to be signed for Geothermal Development Company of Kenya to offer hands-on training to three staff. On 15th May 2019, a contract negotiation between MEMD and GDC was held at MEMD Boardroom. Training needs analysis was conducted by GDC to identify training needs for staff.

4.2.4.3 Geoscience data dissemination

The project supported one (1) MSc student of Geological Engineering (Geothermal major) in Indonesia with preliminary data and information on geothermal in Uganda.

4.2.4.4 External Collaboration

Through external collaborations, Uganda qualified for the **Geothermal Risk Mitigation Facility** (GRMF) funds to undertake Thermal Gradient Drilling at Kibiro and Panyimur.

Also through external collaborations, a technical paper titled “Fluid Circulation at Structural Intersection through the Toro-Bunyoro Fault System(Bastein Walter et al,2019)” was received. The paper has been useful in complementing and constraining earlier field studies about the Kibiro geothermal system.

4.2.4.5 Health Safety Environmental

ESIA Panyimur: Fourteen (14) bidders which responded to EoI were evaluated.

ESIA Kibiro: Three (3) firms submitted bids to conduct Environmental and Social Impact Assessment at Kibiro. Technical and Financial Proposal were received and opened. The bids await evaluation. Listed companies included; AirWater Earth Ltd, JBN Consult and Planners and Gids Consult Ltd. Consultancy reference number is MEMD/CONS/17-18/00588/DGSM.

Portable Gas Monitor: One portable gas monitor was procured to be used in monitoring and detecting hazardous gas levels were staff is operating in hazardous environments. This is to protect the overall safety of workers in hazardous environments.

Micro-Seismic monitoring: Monitoring of micro-earthquake was continued in the quarter to map tectonically active faults presumed to be associated with geothermal activity around Kibiro. This data will be used in future as baseline determinations.

Radon monitoring: During soil gas survey, Radon contents are examined in areas investigated since Radon is responsible for most lung cancer in the world. Radon baseline data is collected.

Public Outreach and Communication: Geothermal outreach was conducted in Kibiro and Panyimur prior to siting locations of TGH.

Environmental Baseline Survey and Environmental Monitoring: Geologist (4) undertook Environmental baseline survey at Kibiro to document the current state of physical, social and economic environment and a baseline data report was produced as deliverable. Monitoring of changes geothermal features related to natural or human related causes was conducted.

Field Personnel Footwear: Fifty-one (51) pair of safety boots were procured for field personnel.

4.2.4.6 Licensing

Monitoring and Inspection: Monitoring and Inspection was conducted in Buranga, Ihimbo, Kibiro and Panyimu areas.

Gids Consult Limited: The licensee was inspected while undertaking data gap closure of MT soundings and soil gas surveys in Buranga.

Bantu Energy (U) Limited: The licensee conducted literature review of Panyimur area, conducted geophysical investigations (MT, ground magnetics and shallow temperature surveys).

Moto Geothermal Projekt: The licensee conducted geochemical surveys (water sampling, isotopic sampling, rock sampling, gas sampling) and structural analysis at Ihimbo. Samples are yet to be analysed to help in elucidating the recharge system, heat source (magmatic vs non-magmatic), reservoir rock types and sub-surface temperature. The private developer conducted on the job training of two Graduate Interns. A progress report was submitted.

4.3 African Resource Geoscience initiative (ARGI) – Uganda Pilot project.

4.3.1 Background

Resource development relies on geoscience data. In Africa, access to useful geodata is often slow, expensive and unreliable, which discourages potential investors and leads to a slow rate of development.

In order to respond to the problem of access to useful data for resource development, and further stimulate social and economic development in Africa, ARGI – Uganda Pilot project design, funding and implementation in Uganda was unanimously endorsed. This was during a two days stakeholders' workshop at Imperial Resort Hotel, Entebbe from March 23rd – 24th, 2017. Stakeholder participation included the African Union Commission, British Geological Survey, Geosoft, International Geosciences Services, Directorate of Geological Survey and Mines (DGSM) among others.

ARGI project is a follow up of the African Minerals Geoscience Initiative (AMGI) that was endorsed by the African Heads of State and Government in 2015. The AMGI was developed under the leadership of the Africa Union Commission as a pan-African initiative for spearheading the collection, consolidation,

interpretation and effective dissemination of national and regional geodata on an appropriate platform such as a data portal.

4.3.2 Project Area

Following a competitive process in which Uganda was selected for piloting the ARGi project, Jinja sheet NA-36-13 and Mbarara Sheet SA-36-1(1:250,000) were chosen because of the widely known Busia and Buhweju gold prospects.

4.3.3 Project Implementation

All the necessary project document preparation, project endorsements, cooperation agreement between Uganda and the development partners (Uganda Chamber of Mines and Petroleum, British Geological Survey and Geosoft consortium), legal and technical approvals, and signatures have been completed. The pilot project implementation is expected to commence in FY2019/2020.

4.4 ACP-EU Development Minerals Project

The African, Caribbean, Pacific (ACP) Group of States, the European Union (EU) and the United Nations Development Programme (UNDP) are implementing the Development Minerals Programme, a three-year, €13.1m capacity building programme to promote the sustainable development of the Development Minerals (industrial minerals; construction materials; dimension stones; and semi-precious stones) sector in 40 countries in Africa, the Caribbean and the Pacific. The Programme is implemented in partnership with the Ministry of Energy and Mineral Development in Uganda.

The program duration expired in October 2018, but because of the impact the project had had in the sector, DGSM in consultation with UNDP made a request to ACP secretariat in Brussels and EU for extension. The project was renewed in December 2018 for another three (3) years commencing in March 2019.

The achievements so far include:

- i. Baseline Assessment and Value Chain Analysis Reports finalized;
- ii. Trainings on environment, community, health and safety finalized;
- iii. Trainings on enterprise skills, value addition, investment promotion and market analyses finalized;
- iv. Training in GIS and resource modelling finalized;
- v. Sensitization of media and Members of Parliament

- vi. Support to the Development of the Gender Impact Assessment (GIA) Tool was done.
- vii. Support to the review of the Mining regulations 2018 and the Mining and Minerals Bill 2019

5 CHALLENGES AND RECOMMENDATIONS

5.1 Challenges

- iv) Understaffing due to several vacant positions in the Directorate which makes the few available Officers overloaded thereby DGSM not performing to its full potential
- v) Defects in the power infrastructure leads to inconsistent power supply thereby halting of many activities of the Directorate such as licence processing, mineral dressing, laboratory analyses, data processing and map production among others.
- vi) Delays in initiating of procurements and therefore resulting in the Directorate not having adequate time to absorb funds allocated to it in a financial year.
- vii) Poor facilitation of staff in undertaking daily duties. For example, staff having to use private transport means to undertake government business out of duty station in Kampala.

5.2 Recommendations

- iv) The vacant posts especially those filled on replacement basis should be filled as soon as possible lessen the gap.
- v) Increase in budgetary allocation to DGSM to allow for financial facilitation of the planned activities.
- vi) Timely promotion of staff and filling of all existing vacancies in the Directorate should be done for fair sharing of the activities and improving performance.

vii) The procurement process of the rewiring DGSM blocks should be quickened to get enough and consistent power supply for service delivery efficiency.

viii) Continuous sensitization of DGSM staff on procurement issues for timely preparation of procurement plans and documents for timely procurement initiations

6 APPENDICES

6.1 Table of Exploration Licences inspected

S/No.	Exploration Licence	District	Licence Holder	Mineral(s) explored
1.	EL892	Kabale	Sino Investment Company Limited	Iron ore and base metals
2.	EL893	Kabale	Sino Investment Company Limited	Iron ore and base metals
3.	EL0771	Kabale	Sino Investment Company Limited	Iron ore and base metals
4.	EL1662	Kisoro	Treadstone Limited	Iron ore and base metals
5.	EL1555	Kisoro	Buyaga Technical Services	Iron ore and base metals
6.	EL1740	Rubanda	Kamuntu	Iron ore
7.	EL1428	Rubanda	Kamuntu	Iron ore
8.	EL1565	Kabale	Kamuntu	Iron ore
9.	EL1563	Kabale and Kisoro	Kamuntu	Iron ore
10.	EL1600	Kabale	Kamuntu	Iron ore and base metals

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11.	EL1721	Kabale	Samata Mines and Minerals Uganda Limited	Wolfram and Tantalite
12.	EL1762	Kabale	WCH International Quarry Limited	Iron ore
13.	EL1640	Kisoro	Oli Gold Muruli Limited	Gold, Iron and base metals
14.	EL1622	Kabale	Oli Gold Muruli Limited	Gold, Iron and base metals
15.	EL1621	Kisoro	Oli Gold Muruli Limited	Gold, Iron and base metals
16.	EL1649	Kisoro	Oli Gold Muruli Limited	Gold, Iron and base metals
17.	EL1566	Kabale	Sanday Emanuel	Iron ore
18.	EL1564	Kabale	Sanday Emanuel	Iron ore
19.	EL1690	Kabale and Kisoro	Tian Tang Group Limited	Iron ore, gold and base metals
20.	EL1691	Kabale and Kisoro	Tian Tang Group Limited	Iron ore, gold and base metals
21.	EL1524	Kabale and Kisoro	Mata Mining Limited	Precious metals and base metals
22.	EL1708	Kisoro	Hummerston	Iron ore, gold and base metals
23.	EL1647	Kabale	Tembo Steel Uganda Limited	Iron ore
24.	EL1574	Kisoro	Strategic Acquisitions Limited	Wolfram and Tantalite
25.	EL1658	Kisoro	Hima Cement	Limestone
26.	EL1599	Kisoro	Raghv Investment	Limestone
27.	EL883	Kabale	Steel Rolling Mills	Iron ore
28.	EL1457	Kisoro	Ascort Mining Company	Coltan, Tin, Iron ore, copper, Nickel, Gold and Silver
29.	EL1536	Kabale	Oranto Petroleum	Iron ore

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			International Limited	
30.	EL1504	Kisoro	Kabale Diocese	Wolfram

6.2 Higher capacity and low detection limit analytical equipment for analysis of samples from mineral exploration at DGSM

S/N	Equipment	Purpose	Supply and installation status
1	Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES)	Geochemical and environment sample analysis to detection limits of parts per billion (ppb) of at least seventy-five (75) elements in the Periodic Table and of higher sample throughput with a 250 sample Autosampler.	Delivered and awaiting installation after rewiring of laboratory building which has experienced power supply problems.
2	Cupellation Furnace	This is the last of a series of fire assay (quantitative chemical analysis technique for precious metals (Au, Ag, Pt and Pd) in ores and metallurgical products with the aid of heat and dry reagents) equipment procured over the last three (3) years.	Shipment was previously underway on a LCL (less container load) shipment together with Items No. 4 and 5, but has been transferred to airfreight since the LCL shipment is taking longer than anticipated. The rest of LCL consignment is expected in early January 2019.
3	Planetary ball mill	Milling of mineral samples (sample preparation) of small quantities, especially for trace element analyses, to avoid contamination.	Delivered and awaiting installation.
4	Large sample	A 3370-litre oven to be	Shipment is underway

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S/N	Equipment	Purpose	Supply and installation status
	drying oven	used in drying large batches of samples from geochemical surveys at ago and thereby quicken sample preparation and analysis.	on a LCL shipment and delivery is expected in early January 2019.
5	Bench top oven	220 litre ovens for drying small sample quantities and laboratory apparatus.	Shipment was previously on a LCL shipment but has been transferred to airfreight since the LCL shipment is taking longer than anticipated.