



MINISTRY OF ENERGY AND MINERAL DEVELOPMENT



DEPARTMENT OF GEOLOGICAL SURVEYS

P.O. Box 9, ENTEBBE



URANIUM EXPLORATION



GEOHARDS ASSESSMENT

PERFORMANCE REPORT FOR FY 2023/24

JULY, 2024

TABLE OF CONTENTS

Table of Contents	i
List of Figures	ii
LIST OF TABLES.....	iv
Acronyms.....	vi
Executive Summary	6
1 Introduction	10
2 Institutional framework	10
3 Performance of the	10
3.1 Policy Formulation Regulation	10
3.2 Institutional Capacity Building	11
3.3 Mineral Exploration, Development, Production and Value-Addition Promotion for Socioeconomic Development Of Uganda	21
3.4 Health and Safety	59
3.5 Cross cutting activities	71
4 Challenges and recommendations.....	74
4.1 challenges	74
4.2 Recommendations	74
5 Appendices	75
5.1 Minerals and rocks for construction overlaid on general geology map of Uganda	75

5.2 Table of earthquake events in uganda and neighbourhoods for
fy2023/24 76

LIST OF FIGURES

Figure 1: Radiometric anomalies interpreted by IAEA Experts in 2016..... 22

Figure 2: Geochemical anomalies on TMI_IGRF REMOVED. 24

Figure 3: Radiation Surveys in Boma using RADEYE PRD4 25

Figure 4: Sampling in Trenches 1, 2 & 3 and radiation distribution along the
trenches..... 28

Figure 5: Variation of Uranium concentration around Kasana Hill..... 30

Figure 6: Pits and trenches excavated in Lwensakala. 31

Figure 7: Location of pits and trenches in lwensankala..... 32

Figure 8 Trench 3 excavation in Lwensakala 33

Figure 9: Cross-section of trench 3B 33

Figure 10: Variation of radiation along the bottom of pit 3A..... 34

Figure 11: The 10 iron ore prospects evaluated by the EU funding. 36

Figure 12: Location of Buikwe District..... 40

Figure 13: Topographic map of Buikwe..... 40

Figure 14: U2/Th ratio of area of interest 42

Figure 15: Analytical signal map of the area of interest..... 43

Figure 16: Mineral potential areas in Buikwe 44

Figure 17: Old pit near Ssenyi Landing site. 45

Figure 18: Basalt in Nanso B village at location 527792mE, 42059mN 46

Figure 29: Seismicity of Uganda and surrounding areas. Map showing earthquake events that occurred in or close to Uganda for FY2023/24. The red stars denote the epicentres of the recorded earthquakes, light green diamonds represent the location of the seismic stations and the dark green triangle is the location of IRIS Global Seismographic Station (MBAR).....60

Figure 19: GSD Field team with the CAO and the DCAO of Bulambuli District61

Figure 20: GSD field team on Kerate rack (L). The boy on the right (with RED Short) is standing on a hanging rock. Note the relative width of the widening crack.62

Figure 21: Geo-hazard assessment and geotechnical investigations of cracks in Nakitwe village, Kibanda Parish in Bulambuli District.62

Figure 22: The team assessing the extent of cracks at Elgon Sub County ..63

Figure 23: Subsidence causing house wall crack in Nachere Village, Bumboi Parish in Bududa District.63

Figure 24: Crack and subsidence at Shibanga Village, Manafwa District. ..64

Figure 25: Locations of study areas in Wakiso District.....67

Figure 26: Geological map of the study area in Wakiso District.....68

Figure 27: Steep walls of Dyango quarry Nakawuka.69

Figure 28: Abandoned open pits filled with water in Bukaiba quarry.70

LIST OF TABLES

Table 1: Collar data for the trenches in Boma.....	25
Table 2: Summary of geological observations and number of samples collected	26
Table 3: Summary of the evaluation of the iron ore prospects	37
Table 4: Sites assessed.....	39
Table 5: Geological observations in Buikwe	47
Table 6: Summary of gamma-ray spectrometer survey.....	48
Table 7: Summary of assessment of Quarry Sites in Wakiso District.....	70

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ACRONYMS

AG	Acting
ASM	Artisanal and Small-scale Miners
EARS	East African Rift System
EU	European Union
GSD	Geological Survey
IAEA	International Atomic Energy Agency
ICGLR	International Conference on the Great Lakes Region
Ltd	Limited
MEMD	Ministry of Energy and Mineral Development
MD	Mines
UK	United Kingdom

EXECUTIVE SUMMARY

The Department of Geological Survey is mandated to *establish and promote the Development of Mineral Resources for Social and Economic Development*. Key priority areas that the department therefore implements include:

- (i) Providing a conducive Legal and Regulatory framework to boost investment in the Mineral Sector, spur industrial development, job creation and poverty reduction;*
- (ii) Institutional and human resource capacity development to harness optimal benefits from the mineral resources;*
- (iii) Mineral Exploration, Development and Value-Addition Promotion for Socioeconomic Development of Uganda;*
- (iv) Promoting Health, Safety and Environment in the mining industry and the people of Uganda, and*
- (v) Promoting Regional and International cooperation for research and development in the mining industry.*

PROGRESS ON POLICY LEGAL AND REGULATORY FRAMEWORK

This included drafting and review of the Memorandum and Articles of Association for the Uganda National Mining Company, which has since been incorporated as legal entity. Review of the Draft Geoscientists Registration Bill

and Draft Building Substances Bill, and Regulations for the provision of Geoscientific Services were also undertaken.

PROGRESS ON CAPACITY DEVELOPMENT

Infrastructure Capacity development: Capacity in uranium exploration was boosted by acquisition of a range of tools including: Radeye, Dosimeters (10/10; gamma-ray spectrometers (2/2); Radonmeter (2) and Portable X-Ray. Also various equipment were received and serviced in the the Laboratory Division.

Human Resources Capacity: Two Officers completed their MSc degrees in Natural resources management from Nkumba University, Uganda, and one Officer continue to pursue a PhD in Australia. Also, a number of short-term trainings locally and internationally were undertaken.

PROGRESS ON MINERAL EXPLORATION, DEVELOPMENT, AND VALUE-ADDITION PROMOTION FOR SOCIOECONOMIC DEVELOPMENT OF UGANDA

Mineral exploration: this was mainly in Uranium exploration in Sembabule and Iron ore evaluation in Kigezi Sub region. Intensified exploration confirmed presence of three Uranium bearing minerals in Sembabule, while preliminary results of iron ore evaluation under the EU funded project in Kigezi indicated 35.9 Million tonnes. Acquisition of Airborne geophysical data in Karamoja was also completed. Ground geochemical survey follow up of resultant mineral targets also progressed well.

Mineral Sector Development Promotion: The department continued with sector development promotion through geoscientific dissemination physically at GSD Offices, website and GMIS portal. The sector was also promoted at various local and international conferences including Uganda Construction and Infrastructure Forum and Exhibition, East African Trade and Investment Forum, Environment and Natural Resources Committee of Parliament during their induction to the Energy, 12th Annual Mineral Wealth Conference, Energy and Minerals Week, Africa Mining Indaba in Cape Town. Sixth Joint Technical Committee meeting and the 2nd Uganda – Tanzania Business Forum and Exhibition, among others.

PROGRESS ON PROMOTING HEALTH AND SAFETY IN THE MINERALS AND MINING INDUSTRY

Geohazards investigations in Elgon Sub Region: Investigations undertaken included the widening cracks in Manafwa, Bududa, Mbale, Sironko, Bulambuli and Kapchorwa Districts in November, 2023 and the

unstable and collapsing quarries in Wakiso District. Conclusions and recommendations from investigations highlighted the need for regulation of human activity by stakeholders in the affected areas.

Earthquake Monitoring and advisory services: Interpretation of data collected revealed 37 earthquakes events within the region, two of which were within Uganda. The entire population and contractors are therefore advised to adhere to construction designs and recommendations while constructing houses, roads, dams, railways to mitigate damages due to Earthquakes as the country is prone to Earthquakes.

PROGRESS ON PROMOTING REGIONAL AND INTERNATIONAL COOPERATION

ACP-EU Development Minerals Programme: Since 2016 in collaboration with the Ministry of Energy and Mineral Development UNDP continues to implement the African, Caribbean and Pacific (ACP) Development Minerals Programme in Uganda financed by the European Union and the United Nations Development Programme (UNDP). During the FY2023/24, the programme mobilised mining communities, skilled and financed them.

DRIAR Research Project

GSD together with other institutions led by the Virginia Polytechnic Institute and State University (Virginia Tech) USA continued with their collaborative geoscientific research study entitled Dry Rifting in the Albertine-Rhino Graben (DRIAR) of Uganda to develop a better understanding of the fundamental processes associated with magma-poor (dry) rifting. Using the various seismic station sites (20) installed, data collection was completed during the FY. Data analysis and interpretation continues.

Organization of African Geological Surveys (OAGS): Through GSD, Uganda remains an active member of the OAGS whose mandate is to foster and sustain geoscience programmes and excellence on the African continent in the quest for socio-economic development and poverty alleviation, with special emphasis on mineral resources assessment, sustainable land use and development, natural hazard mitigation and environmental protection. Mr. Gabriel Data, Asst. Commissioner/ Geology is currently the Vice President for Eastern Region.

Uganda benefitted in AMREC/ PARC training, a mineral classification system for use in attracting meaningful investment and sustainable management of Africa's Mineral Resources.

Other crossing cutting issues: The Department participated in organization and celebration of MEMD Women's day as well as Gender issues such as MEMD Women in leadership gender training at Protea Hotel, Entebbe.

Geodata sales: Airborne geophysical data acquired under SMMRP Project worth UGX.12, 713,169 was sold to M/s Steel and Tube Plant Limited, M/s West Nile Nickel Resources pvt. Ltd. and M/s Gecko Minerals Uganda. Individual Assessments were made and funds were directly paid to URA.

1 INTRODUCTION

The Ministry of Energy and Mineral Development is mandated to establish, promote the development, strategically manage and safeguard the rational and sustainable exploitation and utilization of energy and mineral resources for socio-economic development. The Geological Survey (GSD) contributes to the establishment and promotion of the development of mineral resources. In line with the NDPIII programmatic approach, GSD falls under the **Mineral Development Programme: 01 Mineral Exploration, Development and Value Addition**. GSD, particularly, undertakes geological surveys and mineral exploration to collect geoscientific data that is used in: 1) establishing the mineral potential of the country, 2) promoting the development of mineral resources and value addition, 3) monitoring of earthquakes and other geological hazards, 4) research and Development, and 5) utilization in other sectors of the economy.

2 INSTITUTIONAL FRAMEWORK

The Geological Survey consists of Four Divisions i.e. Geology, Mineral Laboratory, Geophysics and Seismology, and Geodata. These Divisions are further divided into Sections in order to effectively execute the mandate.

3 PERFORMANCE OF THE

3.1 POLICY FORMULATION REGULATION

- i) Participated in drafting of the Memorandum and Articles of Association of the Uganda National Mining Company. The company has since been incorporated as legal entity.
- ii) Participated in the review of the Draft Geoscientists Registration Bill on 29th February, 2024 in the Mineral Development Programme Main boardroom in Entebbe;
- iii) Participated in the review of the Draft Building Substances Bill in the Mineral Development Programme Main boardroom in Entebbe and at Protea Hotel, Entebbe;
- iv) Participated in Regional Consultative meetings on ASM Regulations;
- v) Regulations for the provision of Geoscientific Services;
- vi) GSD participated in the National Consultation Workshop on the Atomic Energy Bill on 12th June, 2024 at Skyz Hotel, Kampala;
- vii) Participated regional consultation workshops on the Draft Artisanal Mining Regulations in Busia, Kabale, Mbarara and Kassanda Districts during the month of June, 2024;

- viii) Two members of staff from 15th to 17th May, 2024 accompanied the Environment and Natural Resource Committee of Parliament to rural electrification projects and selected mineral exploration projects and mining and mineral processing operations in Western and Central Uganda. The Committee visited the Mutaka Mine in Mitooma District, Kitagata Hot spring in Sheema District, and Ruti Tin Smelter in Mbarara;
- ix) Participated in a meeting with a technical staff from State House on issues of the gold levy, export ban on mineral ores and concentrates, and the summary report on Uganda Mineral Sector Action Plan by M/S. Tahuti Global Inc; Canada;
- x) Participated in launch of the International Conference on the Great Lakes Region (ICGLR) Chain of Custody (CoC) certificate for Uganda at the Commonwealth Resort, Munyonyo, Kampala on 29th November, 2023;
- xi) Participated in the sensitization workshop on Uganda's mining and minerals legal framework, from the 29th August to 1st September, 2023 at Fairway Hotel, Kampala; and
- xii) Hosted a meeting with the Publicity Secretary of the Institute of Surveyors Uganda (ISU) on 8th August, 2023 at the Geological Survey in Entebbe. The publicity secretary was on a sensitization mission to encourage staff to get registered with the Surveyors Registration Board as affiliate members, but members preferred registration as geoscientists under the Geoscientists Registration law whose Bill is already underway.

3.2 INSTITUTIONAL CAPACITY BUILDING

3.2.1 Infrastructure

- i) Received the following uranium exploration equipment under the UGA 2004- Supporting the Uranium Exploration and Evaluation Project: Radeye, Dosimeters (10/10; gamma-ray spectrometers (2/2); Radonmeter (2) and Portable X-Ray. The equipment is already being used for uranium exploration in Sembabule and Buhweju Districts;
- ii) Undertook bond work index test on one (1) iron ore sample;
- iii) Carried out general service and maintenance on laboratory equipment; notably the following: Elementrac Carbon Sulfur Analyzer, Dionex Aquion Ion Chromatography, Spectro Arcos ICP-OES (troubleshooting with expert from South Africa), Optika transmitting and reflecting microscope, Optika transmitting microscope, Optika gemology microscope, Mettler Toledo

- analytical balance/ hydrostatic balance, Rigaku MiniFlex 600 X-Ray Diffractometer (XRD) and its chiller, rotary lapping machine, crushers among others;
- iv) Upgraded the power supply cables to the isolation units of the smelting and cupellation furnaces in the fire assay unit from 6 mm to 10 mm;
 - v) Repaired the ultra-pure water purification unit and the Esco oven;
 - vi) Calibrated the Optika transmitted and reflected light polarising microscope and it is now possible to measure grain size using it;
 - vii) Carried out troubleshooting and rectified an issue with the cupellation furnace;
 - viii) Carried out general equipment maintenance as well as cleaning of the laboratory;
 - ix) Power stabilizer and uninterrupted power supply (UPS) systems for the Beckman Coulter LS 13320 XR Laser Particle Sizer and the Mettler Toledo Excellence XPR5003S Precision Balance were installed;
 - x) Finalized fourteen (14) standard operating procedure (SOPs), sixteen (16) forms and two (2) policies required for ISO/IEC 17025 accreditation of the Geological Survey and Mineral Laboratory in Entebbe;
 - xi) Witnessed the newly constructed Regional Office and Mineral Beneficiation and Training Center in Fort Portal was handed over to the Ministry by M/s. BMK Limited on 4th June, 2024 upon completion of construction works;
 - xii) Received a test material from the International Association of Geoanalysts (IAG) in March 2024 which it analysed using gravity, x-ray fluorescence (XRF) spectrometry, and Inductively Coupled Plasma Optical Emission Spectrophotometer (ICP-OES) and submitted the results on 26th June, 2024. This is part of the laboratory's participation in proficiency testing which is a requirement of the ISO/IEC 17025 general requirements for testing and calibration laboratories;
 - xiii) Attended a meeting with a Russian delegation led by Ambassador Vladlen Semivolos, Ambassador of the Russian Federation to the Republic of Uganda and Professor Yu V. Zvorykina on 9th April, 2024 at MEMD Headquarters in Amber House. The need for cooperation in a number of areas was noted, among which included:
 - Laboratory and scientific research
 - Geoscientific research and mineral processing technology transfer
 - Russians investing in Uganda's mining industry
 - Atomic, solar, wind and hydrogen for energy
 - Establishment of Uganda – Russia Business Council.

It was agreed cooperation with the Ministry would be through the Russian Center for Ecology which is concerned with mineral resources, plants, climate, among others.

- xiv) The Laboratory submitted documentation required by ISO/IEC 17025 general requirements for testing and calibration laboratories to Kenya Accreditation Service (KENAS) as well as an application for accreditation on 7th March, 2024 which KENAS reviewed and submitted the document review report on 22nd May, 2024. The Laboratory is to have its initial assessment from 15th to 19th July, 2024.
- xv) Attended a high-level consultation meeting on the Analytical Fingerprint (AFP) extended 2023 – 2024 project phase on 26th February, 2024 in Bujumbura, Burundi. However, the AFP laboratory at the African Minerals and Geosciences Center (AMGC) in Dar es salaam, Tanzania which is a critical part of the AFP was not yet functional, as well as a sample preparation laboratory in Uganda was yet to be established as planned; whereas there was no agreement to a no-cost extension of the project which is to end in 2024.
- xvi) The Ministry and the International Association of Geoanalysts (IAG) entered into a Memorandum of Understanding for Cooperation in Proficiency Testing on 7th December, 2023 for a period of five (5) years (renewable).
- xvii) One staff participated in a pilot processing test work of graphite from Orom Graphite Project which is under a mining lease held by Consolidated African Resources Limited at Yantai Jinyuan Mining Machinery Company Limited in Yanji City, China, from 31st July to 7th August, 2023 He also visited other companies in the graphite value chain such as those producing graphene and expanded graphite to understand the value chain.
- xviii) Undertook stocktaking for end of Financial Year 2022/23 and updated inventory of equipment, accessories and chemicals and reagents and other supplies.
- xix) GSD received 14 publications, 4 unpublished reports, extracted 75 articles from newspapers to support R & D
- xx) GSD subscription to Elsevier's international Journal of applied earth sciences for R&D by geoscientists.
- xxi) The following procurements were initiated and were still underway by close of the FY202/3/24:
 - LPO generated for supply of reagents, chemicals, small equipment and consumables and supply is awaited;
 - LPO generated for heating elements for furnaces and awaits supply/ payment; and

- Supply and installation of spare parts and accessories of fume hoods to enable their proper functioning is awaiting spares from abroad.

3.2.1.1 Long Term Training

- i) Ms. Stellah Pule (Staff Cartographer) and Mr. Henry Mulindwa (Geologist) completed their M.Sc. In Natural Resources Management degrees from Nkumba University; and
- ii) Mr. Julius Kwezi, Chemist continues to pursue a Master of Science in Analytical Chemistry from Kings University, London.

3.2.2 Human Resource Development

3.2.2.1 Long term

- i) Ms. Catherine Nyakecho continues with her PhD studies in Western Australia
- ii) Ms. Stellah Pule (Staff Cartographer) and Mr. Henry Mulindwa (Geologist) completed and graduated with their M.Sc. In Natural Resources Management of Nkumba University.
- iii) Mr. Julius Kwezi, Chemist continues to pursue a Master of Science in Analytical Chemistry from Kings University, London, UK.
- iv)

3.2.2.2 Short term training, conferences and workshops

International and National short-term training, conferences and workshops participated in by various staff members during the year included:

- i) Mr. Richard Nelson Birungi (Senior Geophysicist) participated in the OSI Directed Field Exercises organized by the Onsite Inspection Division of the Preparatory Commission for the CTBTO. The activities were conducted from 17th to 28th September 2023 in Vienna, Austria.
- ii) Mr. Joseph Nyago (Geophysicist) participated in a One-Week Technical Training Program for Station Operators of Auxiliary Seismic Waveform Stations jointly operated by CTBTO International Monitoring System (IMS) and International Research Institutions in Seismology, International Deployment of Accelerometers (IRIS – IDA) held from 4th to 8th December 2023 in Seibersdorf, Austria.
- iii) Mr. Lawrance Kabenge (Senior Seismologist) participated in Seismology, seismic data analysis, Hazard assessment and risk mitigation in German Research Centre for Geosciences, Germany from June 21 to July 19, 2023.
- iv) Mr. Lawrance Kabenge (Senior Seismologist) participated in the Eastern and Southern Africa Region Seismology Working Group (ESARSWG)

Seismological Bulletin Compilation Workshop from 19th to 25th November 2023 in Nairobi, Kenya.

- v) Ms. Geraldine Paula Babirye, Geophysicist participated in Nemmers Workshop on Volcano and Rift Seismicity in the northern branches of the EARS between 20th and 24th May, 2024 under the auspices of DRIAR Program hosted at Northwestern University, Evanston, Illinois, USA.
- vi) Mr. Nelson Birungi, Senior Geophysicist attended a 2-weeks CTBTO training on On-Site Inspection (OSI) Directed Exercises from 14th to 28th April, 2024, aimed at deployment of geophysical techniques in the context of an On-Site Nuclear Inspection.
- vii) Mr. Nelson Birungi, Senior Geophysicist attended a workshop at Speke Resort in Munyonyo from 14th to 22nd May, 2024. The Integrated Uranium Production Cycle Review Mission (IUPCR) mission workshop assessed Uganda's preparedness to produce uranium as well as scrutinizing the legal regime, safety benchmarks, infrastructure and environmental protection.
- viii) GSD staff were trained in Geo-database Management using Geobank software during the EU funded Iron ore evaluation project in Kigezi Sub region.
- ix) GSD staff were also trained in iron ore exploration and assessment techniques during the EU funded Iron ore evaluation project in Kigezi Sub region.
- x) Technical staff attended a presentation by Rwenzori Rare Metals Limited of its Makutu Rare Earths Project as well as a feasibility study report for an application for a mining license on 3rd August, 2023 at the Geological Survey Main Boardroom;
- xi) James Natukunda (Principal Geologist/ Mapping) attended a conference on Iron ore in Perth, Australia in September, 2023;
- xii) Participated in validation meeting on Ratification of UN Convention against Transnational Organized Crimes on 26th October, 2023;
- xiii) Conducted training on 10th November, 2023 for technical staff (15) on the application of AMREC by Mr. Ocitti Bob Felix (Resource Person) who was involved and instrumental in developing the AMREC System. This is in line with the objective of domesticating a Mineral Classification System for Uganda's Mineral Resources Management. The African Union Commission (AUC) through the African Mineral Development Centre (AMDC) developed the African Mineral and Energy Classification and Management System

(AMREC) to ensure proper resource estimation and classification in a harmonized way across Africa;

- xiv) Participated in the Alignment Seminar on Integrating Occupational Health Service in to Primary Health Care in Africa from 21st to 22nd November, 2023 in Kigali, Rwanda sponsored by African Union Development Agency-NEPAD (AUDA-NEPAD. Occupational Health and Safety management in Mining Sub-Sector of Uganda was presented and discussed during the Seminar.
- xv) Staff attended training on the Human Capital Management System (HCM) on 24th January, 2024 in the main DGSM Boardroom at Entebbe;
- xvi) Four staff together with 21 participants from 14 African Countries underwent training in geoscientific mapping under the PANAFGEO2 project from 27th February in Entebbe and SW Uganda;
- xvii) Attended workshop on Spent Nuclear Fuel and Waste Management at Hotel Afrikana on 27th February, 2024
- xviii) Attended workshop on Stakeholder Awareness and Sensitization on Regulation of Radioactive Waste Management Strategy at Sheraton- For Point, Kololo on 28th February, 2024.
- xix) Principal Officers, Assistant Commissioners and Commissioners attended Leadership Training Workshop facilitated by Chandler Institute of Governance at Petroleum House in Entebbe between March 6th and 14th, 2024.
- xx) Held meetings in preparation for the upcoming Expert Mission to Uganda by experts from the IAEA under the Technical Cooperation Project UGA2004: Supporting the Uranium Exploration and Evaluation.
- xxi) Participated in Integrated Uranium Production Cycle Review (IUPCR) meeting during Expert Mission to Uganda by the IAEA Experts under the Technical Cooperation Project UGA2004: Supporting the Uranium Exploration and Evaluation from 14th and 22nd May, 2024

- xxii) Participated in the Joint Ministerial Commission between the Republic of Uganda and the Republic of Kenya from 12th to 14th May, 2024. The Draft MoU on the Cooperation in the Development of Mining Sector and Related Infrastructure was approved by the AG in Uganda but could not be finalized because the Kenyan counterparts in Mining did not participate
- xxiii) Participated in capacity building sessions during Expert Mission to Uganda by experts from the IAEA under the Technical Cooperation Project UGA2004: Supporting the Uranium Exploration and Evaluation from 15th and 21st April, 2024. Review of exploration was done at Entebbe and training in field exploration techniques in Boma, Lwesakala and Katara;
- xxiv) Participated in the East Africa Regional AMREC/PARC (African Mineral and Energy Resources Classification and Management System/ Pan African Reporting Code) Implementation and Public Sensitization Workshop in Kampala from 3rd to 5th April, 2024. The workshop was organized and sponsored by the African Minerals Development Centre (AMDC);
- xxv) On 11th April, 2024, GSD Staff participated in a field visit organised by Planet Gold Uganda Project to the Kitumbi-Kayonza gold mining site in Kassanda District to witness first-hand the innovative and sustainable practices being implemented in the artisanal and small-scale gold mining (ASGM). The project whose aim is to reduce the use of mercury in ASGM mining by providing technical support and awareness of alternative technologies for gold processing. It is supported by the Global Environment Facility (GEF) and led by the United Nations Environment Programme (UNEP) and is being executed by Impact in partnership with the National Environment Management Authority in collaboration with the Ministry.
- xxvi) Supported final year students from Makerere University, of Civil and Environmental Engineering to carry out their research projects titled: i) evaluation of the application of banana peel ash as a road sub-base stabilizer in Uganda, and ii) evaluation of the mechanical properties &

moisture susceptibility of hot mix asphalt concrete mixtures containing maize cob ash and rice husk ash fillers.

- xxvii) Ms. Grace Lajwe, Principal Chemist attended a workshop on Integrated Uranium Production Cycle Review Mission organized by the Nuclear Energy , from 14th to 22nd May, 2024 at Speke Resort Munyonyo, Kampala, Uganda.
- xxviii) The Honourable Phionah Nyamutoro, Minister of State for Minerals visited and was inducted to the Geological Survey and the other two s of the Mineral Development Programme on 9th April, 2024 and 17th April, 2024.
- xxix) Attended the handover ceremony of the portfolio of Minister of State for Minerals from Hon. Peter Teko Lokeris to the incoming Hon. Phionah Nyamutoro on 28th March, 2024, at MEMD Headquarters in Amber House.
- xxx) Ms. Grace Lajwe, Principal Chemist, Mr. Henry Onyege, Senior Chemist and Ms. Alice Biira, Chemist attended a training on Uranium exploration organized by the International Atomic Energy Agency (IAEA) from 16th to 17th April, 2024 in the Mineral Development Programme Main Boardroom in Entebbe.
- xxxi) Laboratory technical staff and other staff of the Mineral Development Programme attended training on all risk general insurance coverage for the Laboratory by M/s. Sanlam General Insurance (U) Limited on 27th March, 2024.
- xxxii) Staff were interviewed by enumerators from Uganda Bureau of Statistics (UBOS) on 22nd and 25th March, 2024 as part of the National Human Resource Survey.
- xxxiii) Mr. Chris Lubangakene gave a talk on careers in the mining industry to students of Namilyango College on 22nd March, 2024 during the school's Career Day.
- xxxiv) Laboratory technical staff visited the M/s. Rwenzori Rare Metals Limited demonstration plant in Makuutu, Bugweri District on 19th March, 2024 to among others understand the beneficiation process as well as laboratory

analytical techniques required to support the Makuutu Rare Earths Project and operations later on and similar laboratory test requirements. The pilot test work as well as upscaling works was found to be progressing well.

- xxxv) GSD senior staff participated in an Organisational Excellence training Programme between 6th and 14th March, 2024, at the Petroleum House in Entebbe. The training was conducted by facilitators from the Chandler Institute of Governance, Singapore.
- xxxvi) Laboratory technical staff attended a presentation of a research undertaken by Mr. Lugoko Paul, Geologist as part of studies towards Master of Science (MSc) from University of Leeds, United Kingdom on 22nd February, 2024.
- xxxvii) Staff attended training on the Human Capital Management System (HCM) on 24th January, 2024 in the Mineral Development Programme Main Boardroom in Entebbe.
- xxxviii) Carried out internal audit in accordance to ISO/IEC 171025:2017 general requirements for testing and calibration laboratories on 11th and 12th January, 2024.
- xxxix) Ms. Grace Lajwe, Principal Chemist and Mr. Oliam Jofrey, Laboratory Technician attended a specialized training on Elementrac Carbon Sulphur Analyzer from the 13th to 17th November, 2023 in Johannesburg, South Africa.
- xl) Ms. Naomi Nangoku, Senior Mineral Dresser Ms. Stella Nankinga, Geologist and Mr. Isaac Moses Ajule, Chemist attended a training on African Mineral and Energy Resources Classification and Management System (AMREC) on 10th November, 2023 in the Mineral Development Programme Main Boardroom in Entebbe;
- xli) Attended a meeting to finalize prioritizing of the Mineral Development Programme indicators for the final year of implementation of NDP III on 13th December, 2023 in the Mineral Development Programme Main Boardroom in Entebbe.

- xlii) Attended a meeting with National Planning Authority (NPA) on 17th November, 2023 in the Mineral Development Programme Main Boardroom in Entebbe and discussed indicators of Mineral Development Programme for FY 2024/2025.
- xliii) Attended a meeting on the Mineral Development Programme Priorities for FY 2024/2025 on 04th October, 2023 in the Mineral Development Programme Main Boardroom in Entebbe.
- xliv) Continued to train internship students from Makerere, Kyambogo, and Nkumba University and the Institute of Survey and Land Management. Additionally, a master's student from Taita Taveta University in Voi, Kenya continued to be supported in carrying out his research on optimization of rare earth ore dressing process using response surface methodology.

3.2.2.3 New staff

GSD received new staff during the year and these included:

- i) Ms. Maria Assumpta Namaweje, chemist;
- ii) Ms. Alice Bira, chemist ;
- iii) Mr. Kafeero Emmy, laboratory technician; and
- iv) Mr. Omondi Emmanuel, laboratory technician.

3.2.2.4 Transfers

- i) Mr. Isa Lugayizi Senior Geologist/Mapping was transferred on promotion to Mines as Principal Geoscientist
- ii) Ms. Sarah Wegosasa – Cartographer was transferred on promotion to Mines as Gescientist/GIS

3.2.2.5 Abscondement

Ms. Erios Naiga/Documentation left the country for studies leading to an award of a PhD degree in Australia without official clearance.

3.2.2.6 Retirement

Ms. Dorothy Namuli, Librarian retired from the service under the mandatory scheme after attaining 60 years of age.

Consequently, GSD's appeal, is that during FY 2024/25, the above vacant positions are filled to bridge the gap so as to deliver service as mandated.

3.2.2.7 Retirement

Mr. Baguma, Driver, retired during the FY after attaining the mandatory retirement age of sixty (60) years.

3.2.2.8 Geoscientific data/information sharing and technical cooperation

GSD continued acquisition of geoscientific data/information through geoscientific surveys, laboratory analyses as well as collaborating with other organizations. Various geoscientific data was disseminated or exchanged with other stakeholders. The online platforms at www.dgsm.go.ug and Geological and Mineral Information System (GMIS) were also updated and kept running for online users. Mineral exploration, promotion, production and value addition

3.3 MINERAL EXPLORATION, DEVELOPMENT, PRODUCTION AND VALUE-ADDITION PROMOTION FOR SOCIOECONOMIC DEVELOPMENT OF UGANDA

3.3.1 Mineral Exploration

3.3.1.1 Uranium Exploration in Uganda

The government in its National Development Plan Three (NDPIII) targets an electricity generation capacity of 14,670 MW by 2025. To achieve this target, the Government of the Republic of Uganda recognized nuclear energy as a source of electricity that will help the country to meet the projected target. In 2008, under the Sustainable Management of Mineral Resources Project (SMMRP), the Government of Uganda acquired airborne geophysical survey data (magnetics, radio-metrics) over 80% of the country and Electromagnetics (EM) over selected mineral rich areas. The radiometric survey data became useful in assessing the uranium potential of the country. The Geological Survey, started following up the uranium anomalies generated and partnered

with the IAEA to provide technical assistance to enhance its capacity in uranium exploration.



Figure 1: Radiometric anomalies interpreted by IAEA Experts in 2016

Within the framework of the IAEA Technical Cooperation Project UGA/2/002 - “Strengthening the National Capacity for Uranium Exploration and Evaluation” and UGA2004- Supporting the Uranium Exploration and Evaluation, the IAEA provided professional training, expert services and equipment to the Geological Survey to strengthen its capacity for uranium exploration and evaluation. In 2016, the IAEA experts re-interpreted the radiometric data and identified 53 uranium targets and 34 of these were followed by ground geophysical survey.

The government prioritized four uranium anomalies namely: **Boma, Lwensakala, Kyambogo in Sembabule and Katara in Buhweju** for followed up by geological mapping, geochemical and ground geophysical surveys to confirm and evaluate their economic potential. During the period of reporting a more detailed uranium exploration was done in **Boma and Lwesankala** in Sembabule District

3.3.1.2 Uranium Exploration in Boma, Sembabule District

Geological mapping

Boma prospect geology is characterized by dominance of magmatic (granites) and metamorphic rocks (iron-rich banded gneiss) in the area. Foliated and altered granites attest to the presence of shear zones having drained hydrothermal fluids. Two shear zones have been interpreted. The shear zone north has been interpreted by correlating the observations of boulders of foliated and altered fine-grained granites and considering the approximate N110 strike of the foliation measured in the “old pit” outcrop. The shear zone South has been inferred parallel to the shear zone North interpreted from a satellite shear zone of the regional Katonga fault located north of the Boma prospect as can be delineated on the regional-scale magnetic map (Uganda Expert Mission Report, 2023).

Following the recommendations of the IAEA Expert Mission of 2023, the technical staff of GSD conducted regional structural analysis around Boma and the surrounding areas like the Katonga thrust fault and generated a base map that was used in the fieldwork. The team then carried out detailed geological mapping around the Boma uranium prospect. A total of 20 sites were investigated sites were made in the outcrop limited Boma area and five rock samples were collected for petrographic studies.

Geochemical surveys

Geochemical surveys were conducted over Boma uranium prospect to define anomalous zones. Geochemical samples were collected from soils, anthills, rocks, and pits. The results of previous exploration show uranium concentrations of up to 586 ppm with strikingly, high values of Copper (140-336ppm in soil samples and 318- 714 ppm in rocks samples), tin (180-359 ppm in rocks samples), wolfram (105-140 ppm in rocks), nickel (233 ppm in

soil samples and 403-1681 in rock) and zinc (79-117 ppm, in soil and 79-169 ppm in rocks samples).

As a follow, up in April, 2023 pitting campaign was undertaken on the anomalous zones. Five (5) pits of up to 3 meters deep were dug and 37 samples collected. The data indicate uranium concentration generally increases with depth from about 500 to 639 ppm at depth of 0.46-1.46 m.

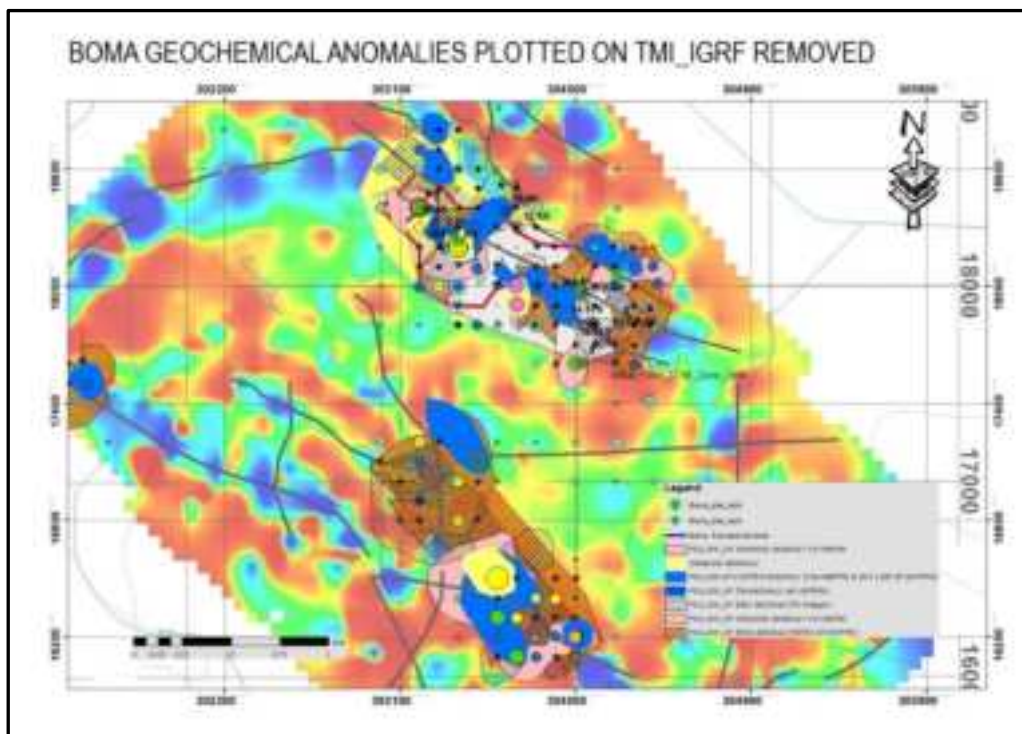


Figure 2: Geochemical anomalies on TMI_IGRF REMOVED.

The geochemical anomalies coincide with low magnetic structure that is interpreted to be a shear zone (**Error! Reference source not found.**). The geochemical and geophysical survey data defined anomalous zone about 230m wide.

The Expert Mission in June, 2023 by IAEA experts to Uganda recommended trenching in Boma and Lwensankala uranium prospects.

Radiation surveys (RADEYE PRD4)

During 19th April to 4th May 2024 trenching was done across anomalies in Boma prospect. Radeye survey using RADEYE PRD4 was first done to redefine the anomalous zone (low magnetic signals) across which trenching was undertaken.

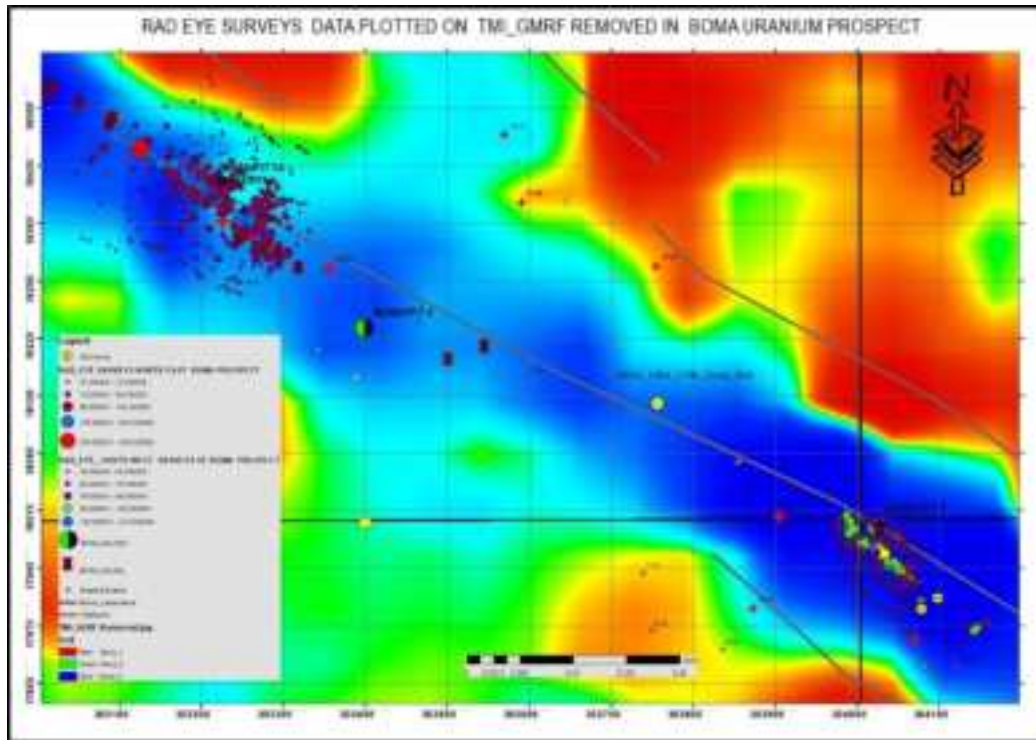


Figure 3: Radiation Surveys in Boma using RADEYE PRD4

The survey was conducted in the northern part of the ring structure at a spacing of 20m and 834 measurements were recorded. Radeye data and geochemical data were plotted on total magnetic intensity map and the sites for trenching were identified (Figure 4).

Trenching

Six (6) trenches were dug across the soil anomalies in the northern and southern parts during April to May, 2024. The trench collar data is presented below:

Table 1: Collar data for the trenches in Boma

Trench	Start		End	
	E(m)	N(m)	E(m)	N(m)
TR1	303035	18491	303040	18509
TR2	303276	18316	303296	18332
TR3	304032	17987	304012	17968
TR4	304032	17953	304029	17951
TR5	303174	16979	303196	16997
TR6	303273	17027	303282	17026

A total of two hundred forty-three (243) samples were collected for analysis. Table 2 presents the geological observations and number of samples collected along the trenches.

Table 2: Summary of geological observations and number of samples collected

Trench	Geological Observation	Number of samples
TR1	Trench 2 cut through sheared granites with kaolinised zones. The trench has a 4m fine granite zone with four silicified ferruginised bands of about 0.3m each with a radiation of above 630cps.	58
TR2	Trench 2 cut through sheared granite with two silicified ferruginised zones. One zone is about 1m thick within pink brown fine grained granite while the second band is 0.2m thick within dark grey fine grained granite. The bands are areas of the highest radiation of up to 710cps.	66
TR3	Trench 3 cut through two sheared silicified ferruginised granite (with thickness of 60cm and 20cm) within sheared dark grey to yellow-brown fine grained granite. The sheared	60

	silicified feruginised bands have the highest radiation of about 640cps.	
TR4	Trench 4 cut through two sheared silicified feruginised granite (with thickness of 60cm and 20cm) within sheared dark grey to yellow-brown fine-grained granite.	10
TR5	TR5 is 27 m long with average depth of 0.8m and sampled at 1m interval. It was observed that (0-30cm) was black soil, (30-90cm) is marrum soil overlaid on top of a weathered granite. The trench never intercepted the mafic rock.	26
TR6	TR6 is 8 m long and sampled at 1m interval. The trench was located in low magnetic zone at junction of faults interpreted from geophysics. The trench intercepted granite with no indications of mineralization and low values of uranium	23

The measurement of radiation along the trenches show areas of high uranium concentrations (Figure 5).

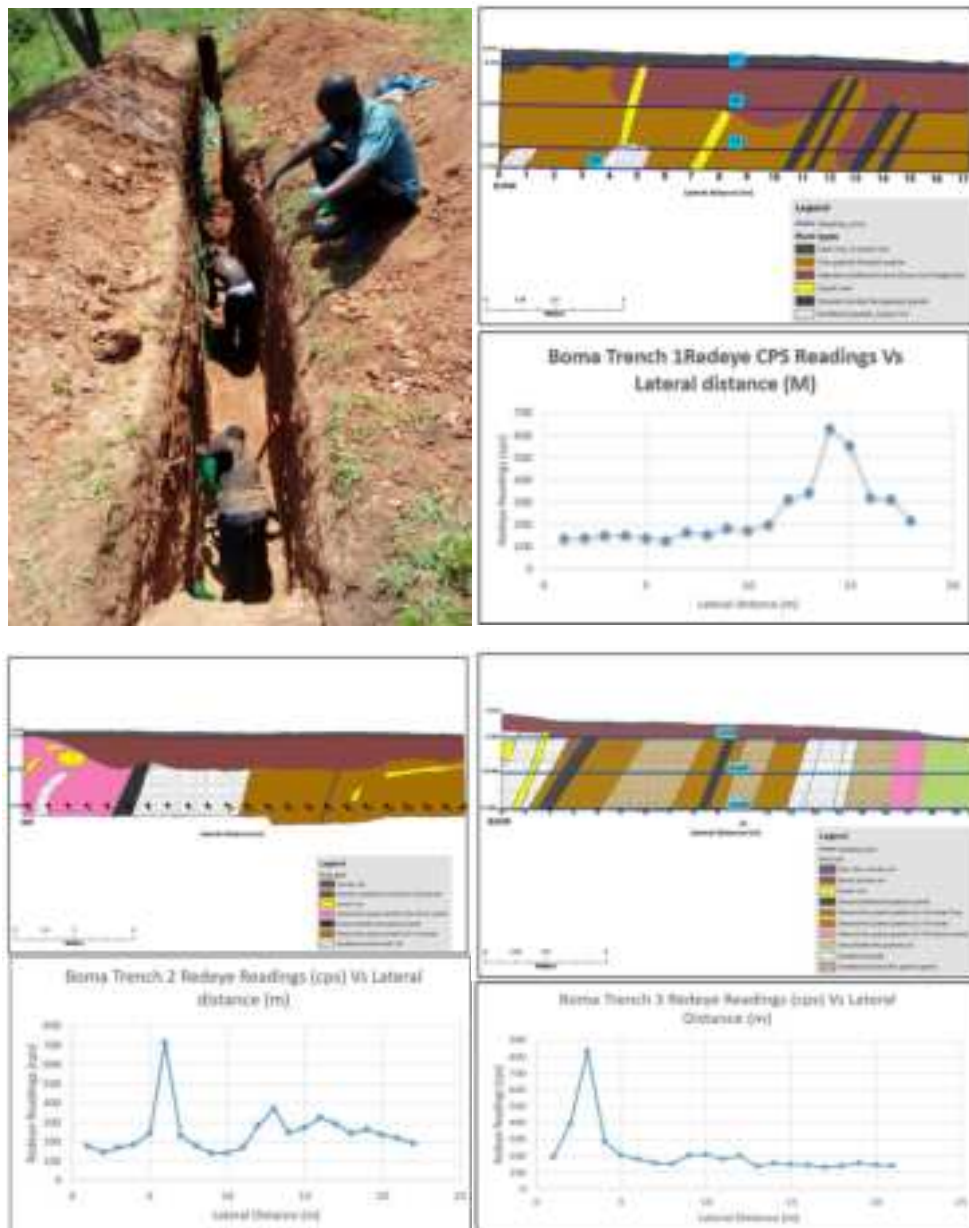


Figure 4: Sampling in Trenches 1, 2 & 3 and radiation distribution along the trenches

In the southern part of the prospect, trenching was carried in the low magnetic signal with zinc-nickel anomaly delineated from the previous survey. The anomaly has nickel concentrations of 43-233ppm in soil and 403-1681ppm in rock samples and zinc concentrations of 79-117ppm in soil and 79-169ppm in rocks samples. Two (2) trenches (TR5 and TR6) were made with TR5 in the areas where a rock with concentration of 1680ppm of Ni was sampled while TR6 was sited at a junction of faults.

The radiation measured from the bottom of Trench 5 using RADEYE PRD4 was low with a maximum of about 95cps. However high values of to 1000ppm uranium were measured along joints in deformed granites near the trenches

XRD analysis of Boma samples

The analysis of Boma samples with XRD shows the presence of **Ulrichite Uranospathite, Metatorbernite and Phosphurranylite uranium minerals.**

3.3.1.3 Uranium Exploration in Lwesankala, Sembabule District

Geological mapping

Geological reconnaissance and spectrometric studies together with IAEA experts during April, 2023 indicated that lithology in this area is recrystallized quartz-rich banded grey gneiss with local pegmatites, quartz veins and brecciated pegmatite stockworks indicating past hydrothermal activity. The presence of granites not farther than 1 km, the strong recrystallization of the banded gneiss and the presence of pegmatite stockworks strongly suggest a magmatic, granite-related system in which the quartz-rich recrystallization of the banded gneiss is inferred to result from contact metamorphism with the granites (hornfels facies rock). Uranium concentration could result from late remobilization of uranium through fractures into altered (weathered) gneiss (Uganda Expert Mission Report, 2023).

Geochemical surveys

The Lwesankala anomaly is found at the contact point of the Rukungiri and Sembabule suites comprised of quartzofeldspathic gneiss and Rwamasha Granite. A reconnaissance soil survey was done in Kasana Village at a sample spacing of 200m. The area is underlain by mica schists of Nile Formation of Buganda Super Group. A reconnaissance survey in 2017 and 2019 delineated U-Pb-Cu anomaly in Kasana hill with U, Pb, Cu having maximum values 43, 102, 204 ppm in soil samples respectively and maximum concentrations of

495, 613 and 236.6 ppm in rock samples respectively. It was observed that the uranium concentrations are high on top of the hill and reduce towards valleys (Figure 6).

Error! Reference source not found. Figure 5: Variation of Uranium concentration around Kasana Hill

In April, 2023, pitting over Lwesankala uranium anomaly was carried. Nine (9) pits and two (2) trenches were dug where 185 samples were altogether collected. It was observed within trenches and pits that uranium mineralisation is controlled by shear zone. The reading of up to 800 ppm of uranium was measured in some pits using portable XRF with values increasing with depth (Figure 7).

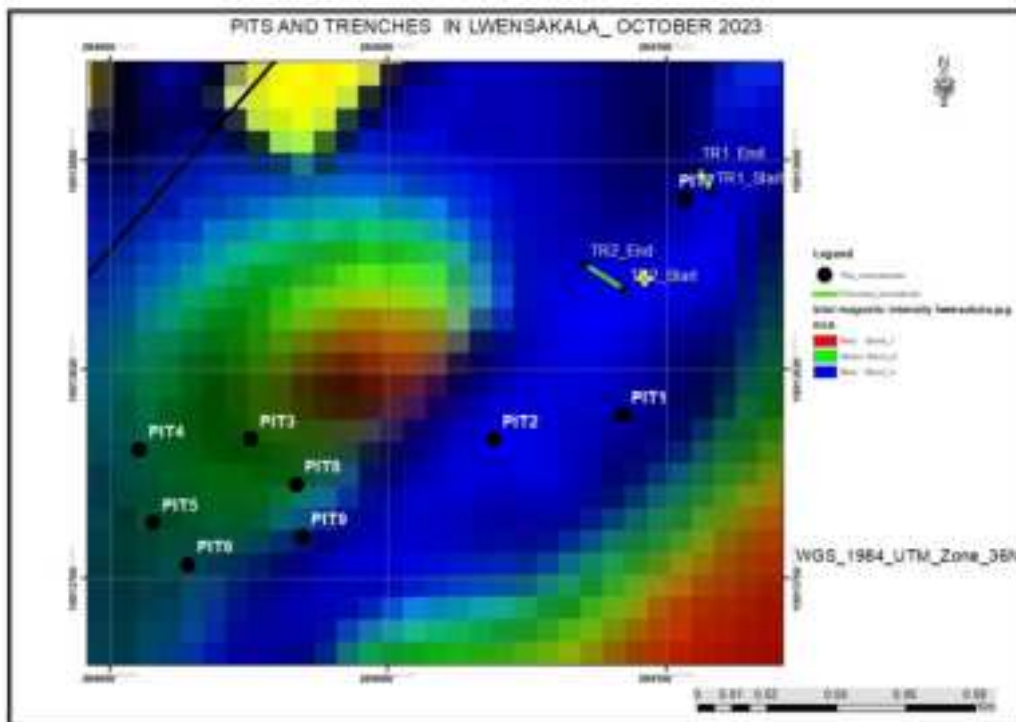


Figure 6: Pits and trenches excavated in Lwesakala.

During the Expert Mission to Uganda, 2023 it was observed that the rocks have Fe content lower than 20% while content in Ti is up to 16%. This high content in Ti suggests the presence of sphene (or titanite $\text{CaTi}(\text{SiO}_4)(\text{O}, \text{OH}, \text{F})$), mineral found in magmatic/metamorphic rocks which with the action of

hydrothermal solutions dissociates into calcite, quartz and rutile (TiO₂). Rutile is a mineral that can adsorb uranyl species (Qing-Jiang et al., 2012). The team recommended trenching.

In April 2024, further trenching, 133m long and trending WNW-ESE was carried out in Lwesankala (Figure 8). The trench is not continuous and is in two parts separated by a fence (TR3A & TR3B). The trench was a continuation of the one excavated in the previous trenching campaign in 2023. The objective of trenching was to intercept more zones enriched in uranium. Three hundred and ninety-five (395) samples were collected for geochemical analysis.

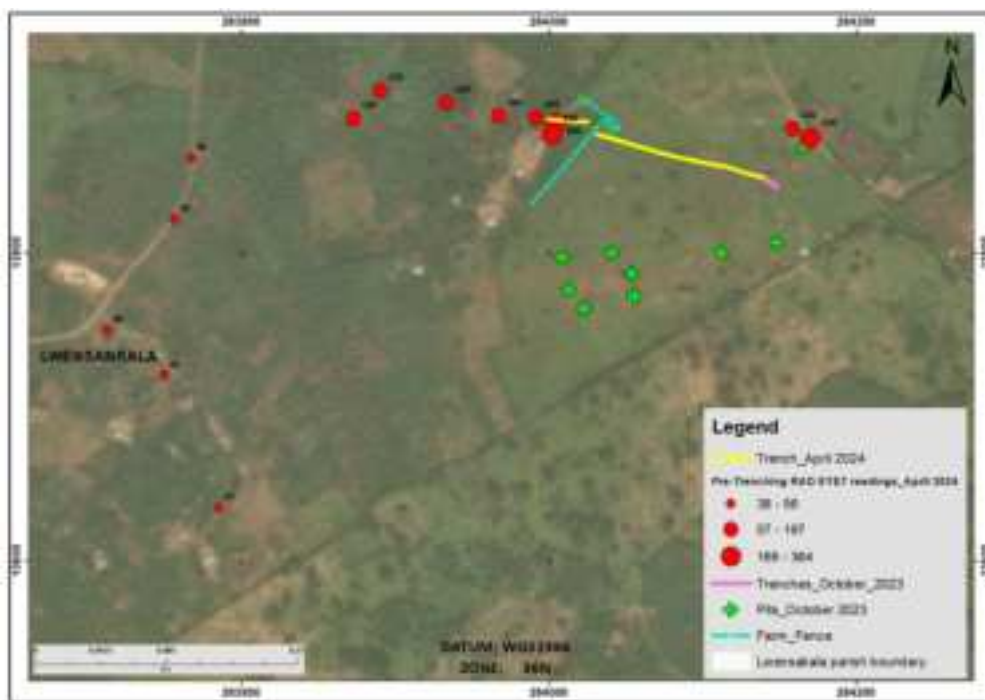


Figure 7: Location of pits and trenches in lwesankala.

The trenches intercepted a sheared granite with varying degree of metamorphism and weathering forming zones of intensely silicified ferruginized granite; yellowish (limonitic) saprolite; brown soil with reddish (haematitic) rock fragments from an intensely sheared and hydrothermally

altered zone; reddish brown saprolitic material with some whitish granitic material and kaolinised granite (Figure 8).

RADEYE PRD4 radiation measurements generally increase in WNW direction. It was also observed that the radiation levels increase with depth. Elevated radiation levels were observed to be generally associated with the sheared and silicified formations (Figure 9). **The sheared zones of highest reading of 808 Cps had pXRF field measurement of 494ppm uranium (Figure 10). TR3A continues to Trench TR3B across the fence. It has a high radiation of 800cps with altered limonitic yellow zone (Figure 10).**



Figure 8 Trench 3 excavation in Lwensakala

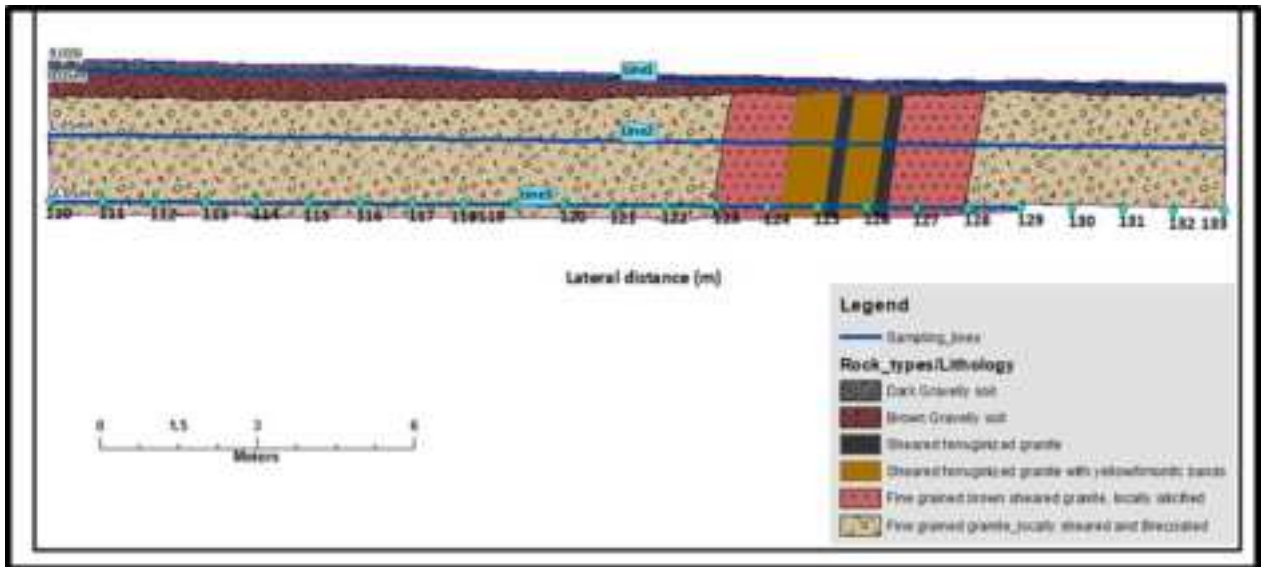


Figure 9: Cross-section of trench 3B

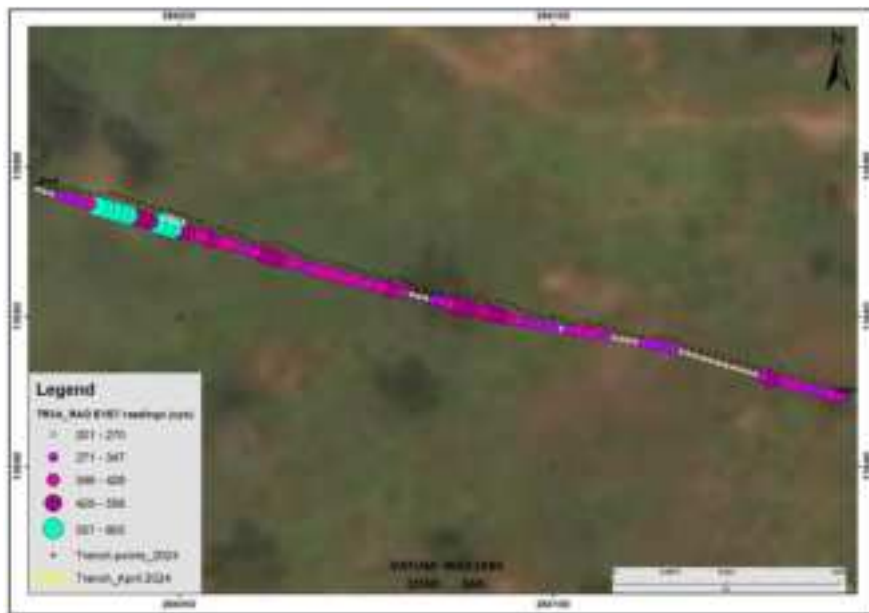


Figure 10: Variation of radiation along the bottom of pit 3A

3.3.1.4 Uranium exploration in Busanyi – Muwanga, Kiboga district

During the period (5th – 16th February 2024) the geophysics team undertook the pending geophysical fieldwork for gravity and magnetics over Uranium anomaly in Busanyi – Muwanga area located in Kiboga district. Geophysical data was acquired along 22 profiles (lines) as planned.

3.3.1.5 Uranium exploration in Katara area, Buhweju District

The geophysics team undertook field activities for Uranium exploration in Katara area, Buhweju District from 13th to 19th October 2023. The field investigations involved a combined ground magnetics and gravity surveys over the area on 28 planned profiles.

3.3.1.6 Geophysical targets mapping

The division staff continues to identify potential targets for exploration from the archives of Fugro airborne geophysical datasets.

3.3.1.7 Mugabuzi, Kiruhura Ore prospecting

The geophysics team undertook desktop preparations and field planning for the upcoming geophysical field campaign for a combined ground magnetics and gravity survey over the Iron Ore prospect at Mugabuzi, Kiruhura district.

3.3.1.8 Supervision of iron ore evaluation in Kigezi Region

Background

The Government of Uganda through the Ministry of Energy and Mineral Development received a grant of € 794,750 from the European Union (EU) to support the project, “*Institutional support to the Department of Geological Survey and Mines (DGSM), Geological Survey , Exploration Unit (FED/2022/436-873)*”, under the 11th EDF (European Development Fund). The main objectives of the project were:

- To support the sustainable development of iron ore mining in Uganda through building the capacity of the GSD to carry out its statutory mandate and support the implementation of the new Mining Policy, Mining and Minerals Act and Mining Regulations and also fast-track the formulation of a National Iron and Steel Development Policy
- To strengthen the exploration capacity of the DGSM's Geological Survey ; and
- To facilitate and undertake the evaluation of Uganda's iron ore deposits and attract investments.

The EU fund supported evaluation of the 10 iron prospects in Kigezi region (Figure 11) which was concluded on 22nd May 2024. The prospects included:

- Kihumuro, Katuna-1 (Rukaranga), Kijuguta found in Kabale District;
- Karukara and Nyamiringa found in Rubanda District;
- Kyanyamuzinda and Kamena found in Kisoro District
- Rwengongo and Katagata found in Rukiga District and
- Rugando found in Kanungu District.



Figure 11: The 10 iron ore prospects evaluated by the EU funding.

Implementation of project field activities

EU contracted a consortium of ADT Africa and Kalem Group to carry out the evaluation of selected iron ores in Kigezi. The activities included detailed geological mapping of the 10 iron prospects and drilling in the seven iron ore

prospects. The consortium submitted a report, which is currently under review by GSD Technical Staff.

Geological mapping

All the 10 iron prospects were geologically mapped. Prior to mapping, the GSD staff participated in the sensitisation of the district officials and the local council authorities about the geological mapping activities and the iron ore evaluation programme. The Kalem Group consultants carried out the field geological mapping supervised by the GSD technical staff. A total of 199 geological samples were collected for laboratory analyses.

Drilling

Drilling was undertaken in the seven iron prospects namely: Kihumuro, Katuna1, Kijuguta, Nyamiringa, Karukara, Kyanyamuzinda and Kamena. Diamond core drilling was done at Karukara prospect; the rest were drilled by Rotary Air Blast (RAB). Specifically, the geology team of the :

- Participated in the valuation of the access routes and drilling sites in the 7 iron ore prospects in which drilling was carried out together with the officials of the Chief Government Valuer's office;
- Carried out compensation of the Project Affected Persons;
- Supervised drilling by the ADT Africa and Kalem Group contractors;
- Samples collected from the mapping and drilling programs were submitted to DGSM Laboratory for analysis.

Sample analysis

The iron ore samples collected from the geological mapping (rocks) of the prospects and drill holes (cores and chips) were analysed with a portable X-ray Fluorescence (pXRF) to determine the iron grades in the samples.

Resource estimations

The results of geological mapping and drilling were used to compute the iron ore resources in the 7 iron ore prospects. Using the JORC, 2012 and the

Competent Person, the inferred and indicated iron ore resources were determined. The summary of the results is presented in Table 3 below;

Table 3: Summary of the evaluation of the iron ore prospects

Prospect	District	Iron ore Samples	Holes drilled	Total depth drilled (m)	Iron ore grade (%)	Iron ore resource (JORC Code 2012) (mt)	Average % Fe
Kihumuro	Kabale	45	10 RAB	363	24 to >68	14.2 (indicated)	48
Katuna-1 (Rukaranga)	Kabale	12	6 RAB	272	62 to >67	0.7 (inferred)	45
Kijuguta	Kabale	45	8 RAB	362	20 to >68	1 (Indicated)	60
Karukara	Rubanda	16	6 DD	199.5	55 to >68	2.4 (Indicated)	58
Nyamiringa	Rubanda	18	5 RAB	300	64 to >68	2.6 (Indicated)	30
Kyanyamuzinda	Kisoro	17	6 RAB	362	60 to >68	0.8 (inferred)	35
Kamena	Kisoro	12	5 RAB	240	65 to >68	14.2 (indicated)	62.5
Rwengongo	Rukiga	9	None	None	42 to 54	Not estimated	-
Katagata	Rukiga	11	None	None	34-59	Not estimated	-
Rugando	Kanungu	14	None	None	62 to >67	Not estimated	-
	Total	199	46	2098.5		35.9	48.4

RAB – Rotary Air Blast; **DD** – Diamond core Drilling.

In summary:

- 46 holes were drilled in 7 iron ore prospects.
- A total of 2,098.5 m/2.1Km was drilled in the 7 iron ore prospects.
- Basing on JORC Code, 2012 the total iron resources (indicated + inferred) in the 7 prospects are 35.9 million tonnes at an average 48.4 % Fe. (**JORC** – Joint Ore Reserve Committee – **JORC Code, 2012** is an Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves).

3.3.1.9 Assessment of Gold and Base metal potential in Buikwe District

Gold and uranium occurrences were reported by locals from Buikwe District. According to them, gold was detected at three different locations with depths of up to 50m and also indicated that the areas have potential for uranium. The following locations were provided for further investigations:

Table 4: Sites assessed

Locations	Eastings	Northings	Depth of detection of gold
L1	505775	15650	0-17.5
L2	505963	15734	0-20
L3	505184	16208	0-50

The Geological Survey then moved in to assess the gold and uranium potential in the locations mentioned. A team consisting of Assistant Commissioner Geology, Principal Geochemist, Senior Geophysicist and a Geochemist guided by the locals carried out the assessment during November, 2023.



Figure 12: Location of Buikwe District

The main objective of the work was to assess gold and uranium potential in selected localities in Buikwe District. Buikwe is located south of Jinja City on Topographical Map Sheet 72/3 (Bwema) (Figure 12 and 13).

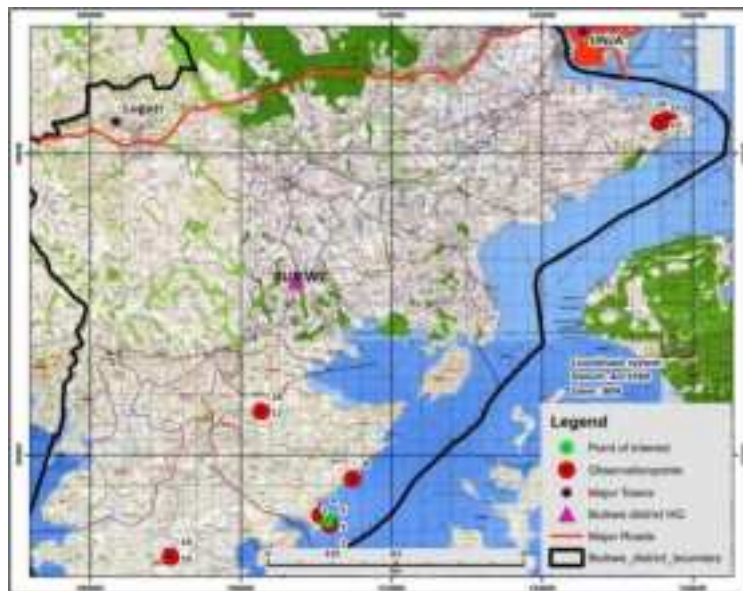


Figure 13: Topographic map of Buikwe

Compilation of available geological data

Different geoscientific datasets and reports covering the area of interest were retrieved, reviewed, processed and integrated to inform the investigations.

Jinja Sheet was first mapped by Davies in 1934 at 1:50 000 scale. Other work was done by the German Geological Mission in 1976 and produced a geological map at 1: 500 000 scale.

The onshore portion of the southern part of the country (south of 1°00' N) was flown with a magnetic and gamma-ray spectrometry system by Geosurvey in 1980, at 1 km line spacing. Another Magnetic survey were flown by Intera Kenting in 1983 as part of the “great Lakes” programme, covering Lake Victoria with triplets spaced 40 km apart, and the western part of Uganda, including Lakes Albert and Edwards, at 5 km line spacing.

Radiometrics: In order to reduce the contribution of thorium while enhancing uranium, a U^2/Th ratio map was prepared. It is observed that the sites assessed lie in low uranium signatures or at least at the contacts with zones having low uranium values (Figure 14).

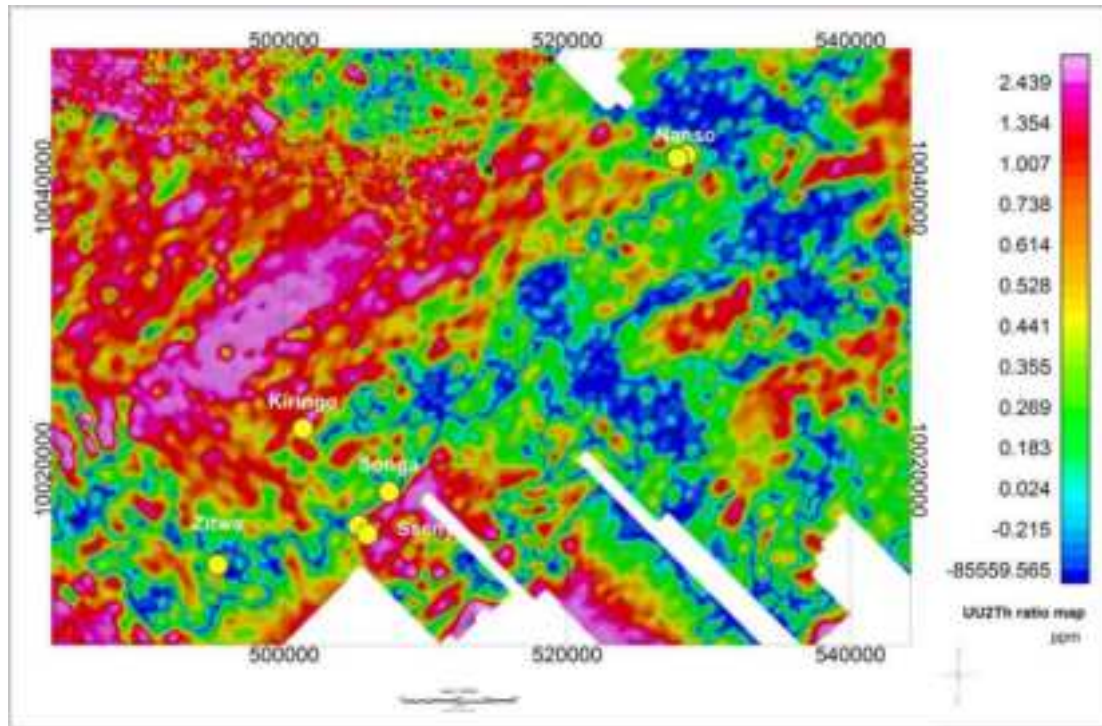


Figure 14: U2/Th ratio of area of interest

Magnetics: Analytical signal map of the area of interest was produced (Figure 15). Several structures with a dominant direction of NW-SE (possibly dykes) can be seen. The roundish pink structures/bodies in the map could indicate intrusive bodies like pipes. Linear structures could be representative of dykes, faults or shear zones. These structures could be host environments for minerals like gold and base metals.

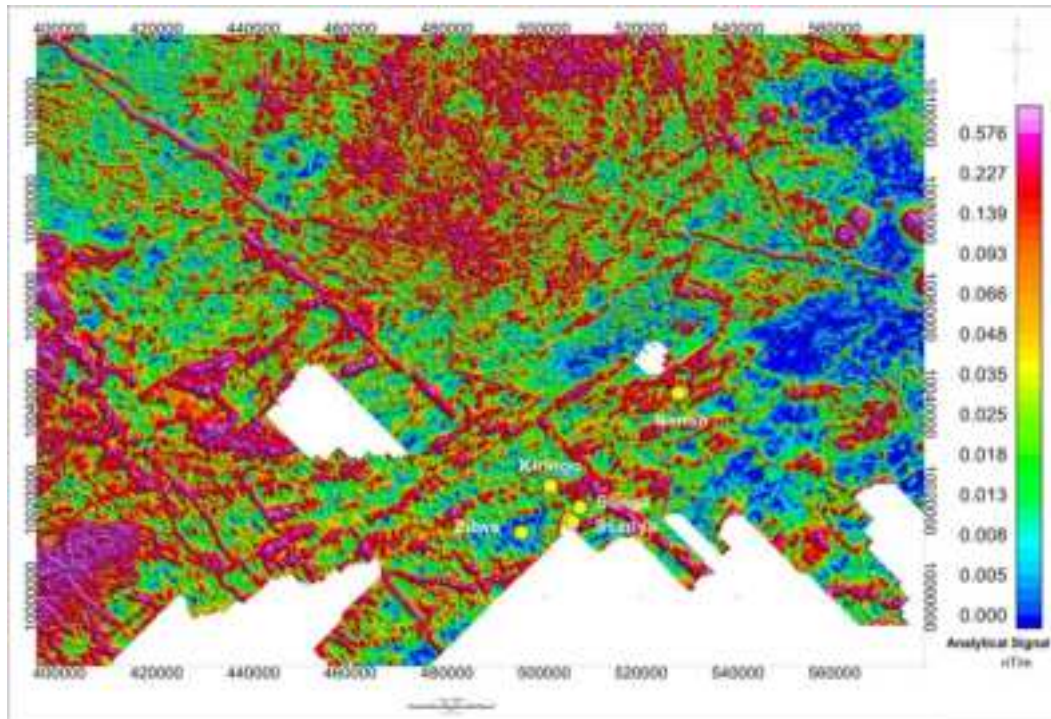


Figure 15: Analytical signal map of the area of interest

Geology and mineral potential

Under the Sustainable Management of Mineral Resource Project (2008 - 2012), The Geological Survey of Finland (GTK) together with the Geological Survey and Mines (DGSM) carried out geological mapping, geochemical surveys and mineral resources assessments with the aid of the airborne geophysical survey data acquired earlier between 2006 and 2008 under the same project. Jinja Sheet was mapped at 1: 100,000 scale. The area of interest is underlain by the Paleoproterozoic rocks (1,600 – 2500Ma) consisting of shales, slates, phyllites, orthoquartzites, conglomerates, mafic meta-volcanic rocks intruded by younger porphyritic granite. The mapping identified a number of prospective targets for follow up (Figure 16).

Economic minerals mapped in and around Buikwe include: iron ore (FeO), beryllium (Be), gold (Au) and glowstone (Gs) with localities described as:

- Glowstone (Gs) was identified around Bubwa, south of Zitwe;

- Beryllium (Be) around Naggoje (about 26Km north of Kiringo within shales, slates, phylites and Mayuge granite);
- Iron ore target (covering Nanso and surrounding areas); and
- Gold target which is about 9 km from Nanso.

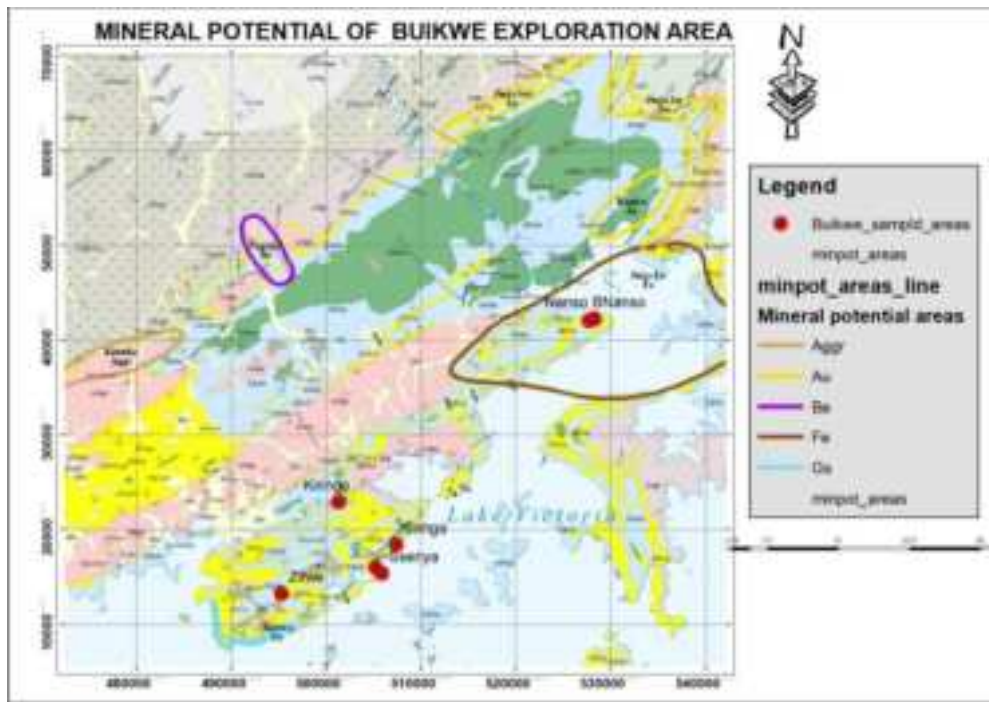


Figure 16: Mineral potential areas in Buikwe

Field assessment

The team carried out preliminary assessment of the areas of interest as guided by the company. The areas include Senya, Songa A, Nanso B, Zitwe and Kiringo all in Buikwe District. The survey involved:

- Field geological observations (rock types, mineralogy, textures, structures, alterations);
- Measurements of uranium concentrations using Gamma Ray Spectrometer (Table 6); and
- Measurements of concentrations of mainly base metals using portable XRF.

The purpose of the spectrometric survey was to assess the occurrence of Uranium in some of the visited locations. A Radiation solutions sodium Iodide spectrometer (RS-125) and a Scint-125 scintillometer were used to assay the various points that were visited as shown in table 4. The spectrometer gives the concentrations of Potassium-40, Uranium-238 and Thorium-232 while the scintillometer outputs only the total count regardless of the decaying radionuclide. Only the spectrometer results have been presented in this report.

Geological assessment in Senyi Village

In Senyi village, prospecting was done in two areas. The first observation point was in area believed to have gold as per results from metal detector. The area has an open pit of up to 5m deep (Figure 17) and according to the local people, it was dug in March, 2022. The rocks from the pit are ferruginized quartzites with vugs and sulphides. Four rock samples and three soil samples taken at depths of 1m, 2m and 4m were collected for analysis in the DGSM Laboratory.



Figure 17: Old pit near Ssenyi Landing site.

The rock samples were analyzed using portable XRF recording values of up to 309ppm Cu, 3.1% U and 2681 ppm Cr. The gamma-ray spectrometer recorded 0.7ppm uranium, 8.6ppmTh and 0.8% K.

The second observation point was made in area believed to have uranium (505993, 15496 Alt 1157). The area is underlain by quartzites with very low uranium concentration.

Geological assessment in Songe Village

Songe Village located about GPS coordinates 507392mE, 18440mN at Alt 1181m a.s.l is underlain by sandstones. A pit was dug to six (6) m but no gold was recovered. Gamma ray spectrometer recorded 0ppm U, 0.6ppm Th and 0% K. Two rock samples of white and reddish brown ferruginized sandstone were collected for analysis in the DGSM Laboratory (Table 5).

Geological assessment in Nanso Village

The survey was done in Nanso and Nanso B villages. Nanso has massive quartzites and brown silty soil with no signs of mineralization. A soil sample was taken from a location with GPS coordinates 528365mE, 42295mN and Alt 1288m a.s.l at a depth of 0.45m for analysis to study the values of elements in the soils. Nanso B is underlain by basalts with quartzite veins (Figure 18). Samples of basalt rock, quartz vein, and soil were taken for analysis (Table 5).



Figure 18: Basalt in Nanso B village at location 527792mE, 42059mN

Geological assessment in Zitwe Village

Zitwe located about GPS coordinates 495329, 22912 and Alt 1259m a.s.l is underlain by quartzitic sandstone, vuggy on the surface at times. Two samples, one of quartzitic sandstone and the other reddish-brown silty soil were taken for analysis. The rock samples were analyzed using portable XRF in the field. The readings are as follows: 45.28% Si, 1.03% Mg, 153ppm Fe and 10ppm Zr. The gamma-ray spectrometer recorded 22ppm U, 5.5% Th, 0.2% K.

Geological assessment in Kiringo Village

Kiringo located about 501333mE, 22912mN at Alt 1260m a.s.l is underlain by quartzite and sandstone cross-cut by quartz veins. The gamma-ray spectrometer recorded 2.0ppm U, 3ppm Th and 0.3% K.

Table 5: Geological observations in Buikwe

S/No	Sample number	Location	Eastings	Northings	Alt	sample description
1	SYN/RCK/1	Ssenyi	505887	15415	1160	Quartz vein with vugs and visible sulphides
2	SYN/RCK/2		505887	15415	1160	quartzite with vugs, cu 234ppm, Fe 48%, s 870ppm with portable XRF
3	SYN/RCK/3		505887	15415	1160	quartzite with vugs
4	SYN/RCK/4		505246	16036	1160	quartz vein in sandstone
5	SYN/01		505887	15415	1160	saprolitic whitish pyhllite with quartz probably from quartz vein at about 2m
6	SYN/02					brown soil with with quatizitic sand stone at about 4m
7	SYN/03					Brown silty clay soil 1m depth
8	Sng/RCK/01	Songe	507392	18440	1181	white sandstone
9	Sng/RCK/02					Reddish brown ferruginised sandstone
10	Nso/MisB/01	Nanso	528365	42295	1288	Brown silt soil at depth of 0.45m
11	NSOB/RCK/01	Nanso B				basalt rock sample
12	NSOB/RCK/02					quarz vein in Basalt rock
13	NSOB/RCK/03		527792	42059	1281	quarz vein in Basalt rock
14	NSOB/MisB/01		527770	42064	1277	Brown silt soil
15	ZTW/RCK/01	Zitwe	495329	13279	1265	Quartzitic sandstone

16	ZTW/MISB/01		495310	13268	1266	Brown silt soil
17	KGO/RCK/01	Kiringo	501333	22912	1259	quartz vein in sandstone
18	KGO/MISB/1		501324	22907	1260	redish brown silt soil

Table 6: Summary of gamma-ray spectrometer survey

	Locality	UTM-X (mE)	UTM-Y (mN)	Alt (m) a.s.l	K (%)	U (ppm)	Th (ppm)
1	Senyi (pit)	505888	15414	1148	0.8	0.7	8.6
2	Quartzites	505993	15496	1157	0.1	0.1	12.6
3	Zittwe Village	495329	13282	1280	0.2	2.2	5.5
4	Kiringo	501333	22912	1259	0.3	2.0	3.0
5	Nanso	527768	42059	1272	0.1	1.1	3.4
6	Songe Village	528365	42296	1272	0.0	0.0	0.6

Sample preparation and analysis

The twenty (20) samples were prepared in the mineral dressing laboratory at DGSM and submitted for analysis in the analytical laboratory. The soil samples were dried, demoulded and sieved to -125m microns. The rock samples were crushed and pulverized for analysis using ICP-OES for Ag, Au, As, Ba, Ca, Cd, Co, Cr, Cs, Cu, Fe, Hg, K, Mn, Mo, Ni, Pb, Rb, S, Sb, Se, Sn, Sr, Te, Th, Ti, U, V, W, Zn and Zr, REE and platinum group of metals. The samples are yet to be analyzed using the appropriate technique.

Conclusions and recommendations

- a) The geology of Buikwe is comprised of the Paleoproterozoic rocks of the Buganda Group composed of shales, slates, phyllites, orthoquartzites, conglomerates, mafic metavolcanic rocks and younger porphyritic granite;
- b) The presence of mafic metavolcanic rocks suggest possible heat sources that could mobilize fluids, leach metals from the surrounding rocks and deposit them to near surface in economic quantities;
- c) The occurrences of Beryllium (Be), iron ore (FeO) and gold (Au) in the vicinity, with similar geological setting, render the area prospective and warrants further follow up;

- d) The field measurements using portable XRF and gamma-ray spectrometer returned very low uranium values and does not detect gold. This is also evidenced by the low uranium signatures on the airborne geophysical surveys by Geosurveys in 1980;
- e) It is recommended that the samples that are already prepared be analyzed using AAS or ICP-OES analytical equipment. Then processing of the results to study element distributions, correlations and significance for mineralization can be done;
- f) It is therefore recommended that systematic mineral exploration programme be developed to establish the mineral potential in Buikwe. This will involve stream sediment and soil surveys at regional scale. This will be followed by soil survey along closer grid. Once anomalies are defined, pitting and trenching campaign will be conducted to investigate mineral occurrence in the sub-surface.

3.3.1.10 Geological mapping and geochemical surveys of Karamoja

The Geology Division staff participated in geological mapping and geochemical surveys of Karamoja under the Geological Survey of Karamoja Project (Reported under the Project).

3.3.1.11 Mineral laboratory services in support Mineral exploration

- i) Prepared for analysis a total of one thousand ninety-two (1092) samples; seven hundred fifty-one (751) of which were geochemical samples and three hundred forty-one (341) rocks under the Airborne Geophysical Survey and Geological Mapping of Karamoja Project which marked the end of sample preparation for Phase I and Phase II of geochemical survey under the project;
- ii) Performed chemical analysis on a total of six hundred ninety eight (698) samples comprising of rocks, drill core, geochemical samples, iron ore, tantalum ore, marble, gold nuggets, gold bars, peat, and police exhibits comprising of gold bars, gold, gold dust, metal objects, water samples, police exhibits, among others using gravity, x-ray fluorescence (XRF) spectrometry, ultra violet visible (UV-Vis) spectrometry and Inductively Coupled Plasma Optical Emission Spectrophotometer (ICP-OES) and high temperature infrared detection using carbon sulfur analyzer techniques;

- iii) Analysed a total of seventy-five (75) specimens comprising of rocks, soil, iron ore, mineral samples, police exhibit, and gemstones including garnet and amethyst using descriptive analysis and petrographic analysis using polarising and gemology microscopy techniques as well as specific gravity using a hydrostatic balance and semi-quantitative and qualitative X-Ray Diffraction (XRD) technique;
- iv) Performed particle size analysis on seven (7) crushed marble samples using the Beckman Coulter LS 13 320 XR Laser Diffraction Particle Size Analyzer.
- v) Undertook bond work index test on one (1) iron ore sample.

3.3.2 Promotion of Investment in Mineral Resources

- i) Online platforms (Website, GMIS & X) were also kept up and running for online visitors:
 - Updated the website theme builder and plugins to ease on navigation and data capturing.
 - Updated the website photo gallery with 40 photos from all s and 8 of them were uploaded on the smart builder dynamic photo home page.
 - Uploaded 4 MEMD weekly articles related to the mineral sector and 2 digital booklets on licensing.
 - Prepared 4 articles but one has been uploaded while others are still waiting for approval.
 - Conducted an in-house GMIS end user training on 14th February 2024 for sensitization of staff on how to interact with the system. Some key action points agreed upon included: renewal of maintenance contract, procurement of ArcGIS to run the system, Cost share the maintenance cost with Mines and GRD, continue guiding users on how to interact with the system and also acquire a new connection to the Mining Cadastre system to upgrade the licenses on GMIS.
 - 120 user manuals were prepared and distributed to staff for personal use and reference
 - New documents received were also uploaded onto the GMIS
 - The documentation centre continued to disseminate geoscientific reports via GMIS system to both staff and the general public.
 - X platform: 47tweets were shared on X.
NB: There is need to upload the approved new Mining and Minerals regulations 2024 for purposes of quick distribution.
- ii) Updated the mineral occurrence database with: Bentonite (Rukungiri Kikuube & Hoima), gold (Alerek-Abim & Kassanda), Nickel (Naigobya, Bugiri, Kafunzo, Kitgum, Arua) to inform mineral prospecting and sector promotion;
- iii) Prepared a mineral occurrence base maps for Jinja areas to aid in mineral prospecting by the geochemistry team;

- iv) Physically attended to at least 84 Visitors including the newly appointed Minister of state for minerals, Hon. Phionah Nyamutooro.
- v) Prepared a mineral sector promotion material titled “Investing in Karamoja Resources”
- vi) Prepared construction minerals and rocks for sector promotion at the Uganda Construction and Infrastructure Forum and Exhibition (UCIFE) 2023 at Kololo Independence grounds from December 14th -17th, 2023.
- vii) Prepared a Generalised geological base map based on “Geological ERAs” for uniformity in information presentation. The map is being used as base map for mineral occurrence map production (see appendix)
- viii) Undertook photo shoot of geological and mineral features in southwestern Uganda(Kabale and Kisoro) to acquire high resolution photos on minerals and rocks in their natural setting for sector promotion in October 2023.
- ix) Prepared a presentation of bankable projects which were presented by the Honorable Minister of Energy and Mineral Development on 16th January, 2024 at the East African Trade and Investment Forum, a side-line event of the 19th Non-Aligned Movement Summit, at the Serena Conference Center in Kampala, Uganda;
- x) Presented a paper on Mineral Value Addition (MVA) in the Ugandan Context to the Environment and Natural Resources Committee of Parliament during their induction to the Energy, Minerals and Oil & Gas sectors on 18th August, 2023 at the Commonwealth Resort Munyonyo, Kampala.
- xi) Geology Division staff participated in meeting with the International Atomic Energy Agency (IAEA) on 19th October, 2023 regarding UG-2004 Technical Cooperation Program to plan for Integrated Uranium Production Cycle Review (IUPCR) Mission to Uganda;
- xii) Provided information on bankable projects during the East African Trade and Investment Forum, at the Serena Hotel on 16th January, 2024, a sideline event to the 19th Non-Aligned Movement Summit in Kampala, Uganda;
- xiii) Reviewed MoU in respect to developments in the Mining Sector and Mining Related Infrastructure between Kenya and Uganda under the Joint Ministerial Commission (JMC);
- xiv) Attended a presentation by Blacowe, an investor of Orom Graphite Project with plans to establish refining facility within Uganda;
- xv) Participated in the 12th Annual Mineral Wealth Conference, 2023 at Kampala Serena Hotel from 30th to 31st October, 2023;

- xvi) Gabriel Data (AC, Geology) made a virtual presentation on the Mining Sector of Uganda and Investment Opportunities in Uganda to Uganda-African American Business Summit on 2nd November, 2023;
- xvii) Participated in the Energy and Minerals Week events on 15th November, 2023 where GSD show cased mineral potential, exhibited mineral resources of Uganda, disseminated geological information and discussed during panel session on Hidden Gems: “Unpacking Opportunities in the Mining Sector in Uganda”;
- xviii) GSD Staff participated in a field trip to Eastern Uganda with the Cabinet Sub-Committee on Mineral Value Addition from 24th to 27th July, 2023 which involved visits to the following operations in the mineral value chain:
 - i) Tororo Cement Industries plant in Tororo, ii) National Cement Limited cement plant in Tororo, iii) Hima Cement Limited cement plant in Tororo, iv) Namekara Mining Limited vermiculite mine and operation in Manafwa District, v) Guangzhou Dong Song Energy Group Limited phosphate fertilizer plant in Tororo, vi) two artisanal gold mining operations in Tiira in Busia District, vii) Wagagai Mining Limited gold mining project in Alupe, Busia District, viii) Tembo Steel Limited rolling mill and direct reduced iron (DRI) plant in Iganga District, ix) Abyssinia Iron and Steel Limited DRI plant in Jinja, and x) Tembo Steel Limited rolling mill in Lugazi.
- xix) Prepared and disseminated mineral promotion materials to investors (Iron Ore, green energy minerals.);
- xx) Attended the African Mining Indaba in Cape Town from 4th to 8th February, 2024;
- xxi) Attended meeting with TREVOR at Investor Protection Unit at Nakasero and State House, Entebbe on 21st and 22nd March, 2024 on a proposal to establish indigenous patient capital in East Africa. The proposal targets to consider in-situ minerals as assets for securing financing. Delegates from TREVOR, MoFEP, BoU, NPA continued the discussions in Dar-es-Saalam, Tanzania.

- xxii) Participated in a meeting on 23rd March, 2024 to discuss Mineral Exploration and Development in the Sea under the International Seabed Authority. Uganda is to show interest and partner with investors to venture into the mineral development in the sea;
- xxiii) Provided information on gold resources of Uganda to investors from Georgia on 8th April, 2024 at GSD, Entebbe;
- xxiv) Compiled information on critical minerals for energy transition and disseminated to investors;
- xxv) Attended a meeting with GreyMatter on development of Gemstone Industry in Uganda on 9th April, 2024. The partners proposed to establish a Gemmology Laboratory at GSD, Entebbe and train the staff and other students/ players in exploration and gem cutting. Draft MoU for cooperation was prepared and is ready to be forwarded to AG for comments and consent;
- xxvi) Finalized the evaluation report of proposals for the redevelopment of Kilembe Mines on 23rd April, 2024. Proposals had been received from four (4) bidders by 15th December, 2023 after publishing the request for proposal (RFP) to seven (7) shortlisted bidders on Friday, 18th August 2023. The pre-bid meeting was held on 21st September, 2023 at Hotel Margherita in Kasese District, along with site visits of core assets of the project from 20th to 21st, September, 2023 in Kilembe and different parts of Kasese District. Mr. Chris Lubangakene, Assistant Commissioner, Laboratory and other members of the evaluation committee from the Ministry and other MDAs participated in the meeting and site visits, as well as evaluation of bids from 24th January, 2024.
- xxvii) Mr. Chris Lubangakene attended the Sixth Joint Technical Committee meeting for the Development of the Natural Gas Transmission Pipeline from Tanzania to Uganda from 5th to 7th June, 2024 at Serena Hotel, Kampala during which the evaluation report of the Expressions of Interest for the Consultancy for the Feasibility Study for the Development of the

- Natural Gas Transmission Pipeline from Tanzania to Uganda was considered and approved.
- xxviii) Mr. Chris Lubangakene attended the 2nd Uganda – Tanzania Business Forum and Exhibition, held at Johari Rotana Hotel in Dar es Salaam, Tanzania, from 23rd to 24th May 2024 where he participated in a panel discussion on Opportunities and Challenges in the Mining Industry Value Chain. The theme of the business forum was “Enhancing Our Win Win Bilateral Partnership”.
- xxix) Mr. Chris Lubangakene and Ms. Agnes Alaba, Commissioner Mines and Ms. Loyola Karobwa, Mining Lawyer, on 8th May, 2024, accompanied the Honourable Sidronious Opolot Okaasai, Minister of State for Energy to a meeting with the Committee on Environment and Natural Resources of Parliament regarding the petition by M/s. Tibet Hima Mining Company Limited to Parliament of Uganda.
- xxx) Mr. Chris Lubangakene, Assistant Commissioner Laboratory on 25th April, 2024 attended a meeting on the alignment of the proposed feasibility study for the refined products pipeline project from Tanzania to Uganda.
- xxxi) The Memorandum and Articles of Association of the Uganda National Mining Company (UNMC) were finalized and then registered by Uganda Registrations Services Bureau (URSB) and the company was incorporated on 25th April, 2024. A Draft Cabinet Memorandum on Operationalizing the Uganda National Mining Company Limited (UNMC) as well as a request for certification of clearance of implication of the same informed by a financial analysis from the perspective of government for eight (8) mining projects that company would take on was also prepared and submitted.
- xxxii) As part of the Joint Technical Committee (JTC) for the Development of a Natural Gas Transmission Pipeline from Tanzania to Uganda, Mr. Chris Lubangakene on 5th March, 2024 participated in the final review of the expression of interest (EoI) and terms of reference (ToR) as well as the work plan for Consultancy Services to Conduct Detailed Feasibility Study for the

Development of a Natural Gas Transmission Pipeline from Tanzania to Uganda.

- xxxiii) Mr. Chris Lubangakene and Ms. Ruth Nassingwa, Senior Laboratory Technician undertook a trip on 22nd November, 2023 to Woodcross Smelting Company Limited tin smelter in Ruti, Mbarara District to assess its readiness prior to being granted a Mineral Smelting Licence.
- xxxiv) Laboratory technical staff undertook a field visit to the following mining companies which have laboratories handling geological materials and with similar laboratory techniques in November, 2023: i) M/s. M/Ss. Guangzhou Dongsong Energy Group Company Limited, ii) Tororo Cement Limited, iii) Namekara Mining Company Limited, and iv) Wagagai Mining Limited. The purpose of the field visit was for the team to learn and establish a framework of cooperation in laboratory services.
- xxxv) Mr. Chris Lubangakene attended meetings of the Joint Technical Committee, Steering Committee and Joint Permanent Committee for the Natural Gas Transmission Pipeline from Tanzania to Uganda, in Dodoma, Tanzania, from 8th to 10th November, 2023, in Dodoma, Tanzania. The meetings culminated in the signing of the Bilateral Agreement between the Government of the United Republic of Tanzania and the Government of the Republic of Uganda relating to Conducting a Joint Feasibility Study for the Development of a Natural Gas Pipeline from Tanzania to Uganda on 10th November, 2023.
- xxxvi) Mr. Chris Lubangakene, Assistant Commissioner Laboratory and Mr. James Francis Natukunda, Principal Geologist attended a preparatory meeting on Friday 18th August, 2023 in preparation for the fifth Joint Technical Committee (JTC) meeting for the Development of the Natural Gas Pipeline from the United Republic of Tanzania to the Republic of Uganda which was to be held on Tuesday, 22nd August, 2023 to prepare for a meeting of the Steering Committee and the Joint Project Committee to sign the bilateral agreement between the Governments to carry out the

feasibility studies for the proposed project but was postponed to a date yet to be communicated by the Tanzanian counterparts.

- xxxvii) Mr. Chris Lubangakene and Ms. Grace Lajwe, Principal Chemist, attended the 12th Annual Mineral Wealth Conference 2023 at Serena Hotel, Kampala, from the 30th to 31st October 2023. The theme of the conference was, “Creating a Viable and Feasible Roadmap for Uganda’s Mineral Sector to Contribute to Economic Transformation”.
- xxxviii) Laboratory staff attended a presentation on the progress of Consolidated African Resources Limited Orom-Cross Graphite Project in Kitgum on 12th October, 2023 in the Mineral Development Programme Main Boardroom in Entebbe.
- xxxix) On 11th September, 2023 drafted and submitted for review and forwarding to Ministry of Foreign Affairs for submission to Ministry of Justice and Constitutional Affairs and Office of the President for clearance a Memorandum of Understanding between the Government of the Republic of Uganda and the Democratic Republic of Congo (DRC) for Cooperation on the Development of the Mineral Sectors of both States.
- xl) Mr. Chris Lubangakene participated in the first and second preparatory meetings for the 8th Session of the DRC – Uganda Joint Permanent Commission (JPC) at the Ministry of Foreign Affairs on 2nd and 23rd August, 2023 and provided updates to the implementation status of decisions of the last JPC as well recommendations, and as well as participated in the JPC which was held in Kinshasa, DRC on 13th and 14th October, 2023.
- xli) Accompanied Hon. Dr. Peter Teko Lokeris, Minister of State for Mineral Development to the National Workshop on Mineral Value Addition at the Office of the President Conference Hall on 24th August, 2023 where the Honourable Minister of State gave a keynote speech and Mr. Chris Lubangakene, Assistant Commissioner, Laboratory made a presentation

on Mineral Value Addition in the Ugandan Context. The workshop was organised by Minerals Africa Development Institution (MADI).

- xlii) Prepared a draft Cabinet Memorandum to report on the status of incorporating the Uganda National Mining Company (UNMC) which is provided for under Section 21 of the Mining and Minerals Act, 2022, among others and was presented to the Ministry Senior Management on 14th August, 2023 and comments raised were incorporated.
- xliii) Mr. Chris Lubangakene, Assistant Commissioner Laboratory attended a virtual meeting of the Committee fast-tracking the incorporation of the Uganda National Mining Company on 10th August, 2023 where a draft of a Cabinet Memorandum on the same was reviewed.
- xliv) Technical staff attended a presentation by Rwenzori Rare Metals Limited of its Makuutu Rare Earths Project as well as a feasibility study report for an application for a mining license on 3rd August, 2023 at the Geological Survey Main Boardroom.
- xlv) Prepared the first draft of the Cabinet Memorandum on the Proposed Implementation Mechanism of the Ban on the Export of Unprocessed Mineral Ores and Concentrates.
- xlvi) Mr. Chris Lubangakene and other technical staff from Geological Survey (GSD) and Mines (MD) participated in a field trip to South Western and Western Uganda and Eastern Uganda with the Cabinet Sub-Committee on Mineral Value Addition from 12th to 14th July 2023 and 24th to 27th July, 2023, respectively, which involved visits to the following operations in the mineral value chain as well as activities: i) Karukara iron ore deposit in Rubanda District, where there were issues between the location licence holder and the community, ii) Sinomine iron ore mine in Buhara in Kabale District, iii) a presentation at White Horse Inn in Kabale by M/s. KIR3 Limited on its Nyamuliro tungsten mining operation, iv) Ministry of Energy and Mineral Development Mineral Beneficiation and Training Center in Ntungamo, v) African Panther tin processing plant in Kikagati in Isingiro

District, vi) Site in Ruti in Mbarara District for tin smelter planned for installing by M/s. Woodcross Smelting Limited, vii) Tororo Cement Industries plant in Tororo, viii) National Cement Limited cement plant in Tororo, ix) Hima Cement Limited cement plant in Tororo, x) Namekara Mining Limited vermiculite mine and operation in Manafwa District, xi) Guangzhou Dong Song Energy Group Limited phosphate fertilizer plant in Tororo, xii) two artisanal gold mining operations in Tiira in Busia District, xiii) Wagagai Mining Limited gold mining project in Alupe, Busia District, xiv) Tembo Steel Limited rolling mill and direct reduced iron (DRI) plant in Iganga District, xv) Abyssinia Iron and Steel Limited DRI plant in Jinja, and xvi) Tembo Steel Limited rolling mill in Lugazi.

xlvii) Mr. Chris Lubangakene; Mr. Adrian Kalajja, Mineral Dresser; Mr. Eddy Miiro, Mineral Dresser; and other technical staff from the Mines (MD) visited the Abyssinia Iron and Steel Limited 150 tons per day direct reduced iron (DRI) plant in Jinja as well as the Tembo Steel Limited rolling mill and 150,000 tons per annum DRI plant in Iganga District on 7th July, 2023 as part of inspection of investments responding to the export ban on raw mineral ores and concentrates imposed to allow for the country's mineral resources to be used in such a manner that they make a historical and durable contribution to the future of the country. Production capacity expansion to 250,000 tons per annum was underway at the M/s. Tembo Steel facility whereas M/s. Abyssinia indicated they were to expand to 350 tons per day.

3.3.3 Geodata sales

Airborne geophysical data acquired under SMMRP Project worth UGX.12,713,169 was sold to M/s Steel and Tube Plant Limited, M/s West Nile Nickel Resources pvt. Ltd. and M/s Gecko Minerals Uganda. Individual Assessments were made and funds were directly paid to URA.

3.4 HEALTH AND SAFETY

3.4.1 Earthquake Monitoring and advisory services

GSD continued to monitor earthquakes and geotectonic events in the country and surrounding areas. Interpretation of data collected revealed 37 earthquake events within the region, two of which were within Uganda (Appendix 5.2) and Figure 29).

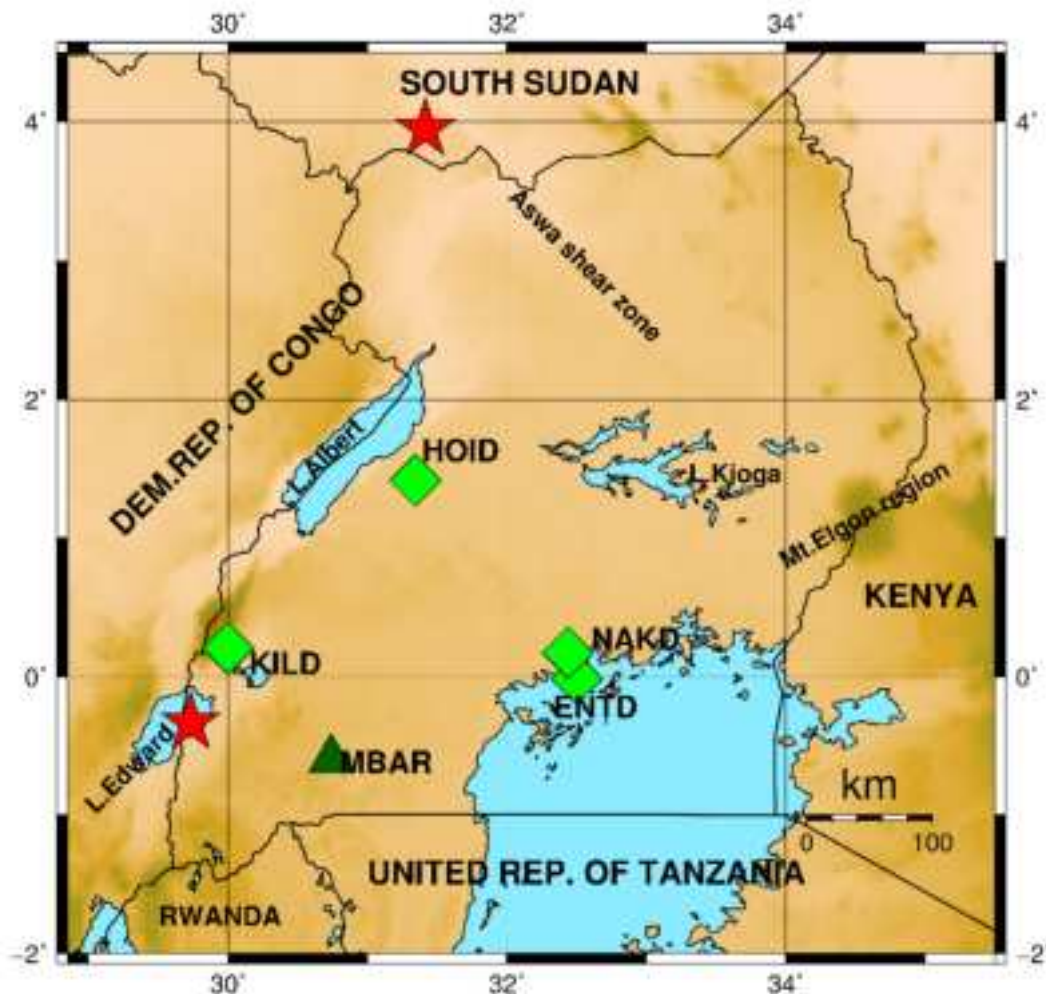


Figure 19: Seismicity of Uganda and surrounding areas. Map showing earthquake events that occurred in or close to Uganda for FY2023/24. The red stars denote the epicentres of the recorded earthquakes, light green diamonds represent the location of the seismic stations and the dark green triangle is the location of IRIS Global Seismographic Station (MBAR).

Earthquakes are natural phenomena which cannot be stopped. Awareness and advisory services on how to leave with them therefore key preserving life and property of the people of Ugandan. The entire population and contractors are therefore advised to adhere to construction designs and recommendations while constructing houses, roads, dams, railways and any infrastructure, since the country will continue to experience these earthquakes although only two events were recorded for FY2023/24.

3.4.2 Assessment of geo-hazards in Eastern Uganda

The field team carried out geo-hazard and geotechnical assessment of the reported widening cracks in Manafwa, Bududa, Mbale, Sironko, Bulambuli and Kapchorwa Districts in November, 2023.

a) Objective of the investigation

The main object is to carry out assessment of extent of geo-hazard and geotechnical investigations as well as follow up recommendations accrued from a preliminary assessment carried out by District Disaster Management Committee and the District Natural Resources Officers of Mbale, Bududa, Bulambuli, Sironko, Manafwa and Kapchorwa districts respectively.

b) Regional Geology of the investigated areas

The region is predominantly composed of biotite granite overlain by volcanic rocks, comprising angular to sub-rounded, porphyritic nephelinite lava fragments in an unsorted, grey to greenish grey tuffaceous matrix.

Methodology of data collection

The assessment team made geological observations, conducted face-to-face interviews and focus group discussions. The sample area was targeted (cracked area).

Global Positioning System (GPS) instrument in datum WGS 1984 was used to map the cracks; tape measure to determine width and depths of displacements, geological compass to read strike and dip, a geological hammer to expose fresh rock surfaces for petrographic study; and a binocular to observe extents for the cracks. The risk of slumping was assessed taking in to consideration the geological factors.



Figure 20: GSD Field team with the CAO and the DCAO of Bulambuli District

Face-to-face interviews were held with the Chief Administrative Officers (CAOs), District Natural Resources Officers (DNROs) and LC III Chairman of the affected Sub-counties in the respective districts (Figure 19). DNROs or their representatives and the LCIII Chairpersons or their representatives accompanied the GSD team during fieldwork to confirm information on emergence of cracks in the area and establish the affected households.

Work done

The team carried out geo-hazard assessments and geotechnical investigations including mapping of the cracks and hanging rocks to accurately zone out all the landslide/ rock slide prone areas in Kapnarbaba Parish, Gamoga Sub-County and Kererat crack (663173E & 157684N) in Siron Parish, West Division, Kapchorwa Municipality in Kapchorwa District (Figure 17).



Figure 21: GSD field team on Kerate rack (L). The boy on the right (with RED Short) is standing on a hanging rock. Note the relative with of the widening crack.

In Bulambuli District, geo-hazard assessments and geotechnical investigations were carried out in Kikolo Village (648870mE, 141904mN) and Nakitwe Village (648807mE, 141491mN) in Kibanda Parish, Sisy Sub-County Bulambuli District where huge cracks were found (Figure 18). The crack caused destruction of two (2) houses in the area.



Figure 22: Geo-hazard assessment and geotechnical investigations of cracks in Nakitwe village, Kibanda Parish in Bulambuli District.

In Sironko District, geo-hazard assessments and geotechnical investigations were conducted in Nakitali Village (646014mE, 137647mN) and Semi Village (644490mE, 139854MN) in Elgon and Butandiga Sub-Counties respectively (Figure 19).



Figure 23: The team assessing the extent of cracks at Elgon Sub County

In Mbale District, cracks were observed in Nachere Village, Bumboi Parish (637240mE, 117707mN) and Kidobo Village (636828mE & 117407mN) where geo-hazard assessments and geotechnical investigations were done.

In Bududa District, Bunabutiti and Bushiika Sub-Counties were the most affected where huge cracks caused landslides claiming lives and destruction of property. The cracks in Bunandala village (650137mE, 119379mN) and Nangwe Village in Bufusa parish (650153mE, 119319mN) were mapped including landslide scarp (Figure 20).



Figure 24: Subsidence causing house wall crack in Nachere Village, Bumboi Parish in Bududa District.

In Manafwa huge cracks perpendicular to each other were mapped in Shibanga Village at location coordinates 650077mE, 108986mN. The cracks

resulted into ground subsidence thus displacing people from their homes (Figure 21).



Figure 25: Crack and subsidence at Shibanga Village, Manafwa District.

Conclusions of geo-hazard assessments

The cracks in the area were probably caused by a combination of the followings:

- i) Shearing due to the sinistral strike slip Aswa-Auma fault zone;
- ii) A very steep slope exceeding 60° ;
- iii) Heavy rains increasing the water content of the soil;
- iv) Human activities.

Mt. Elgon slopes is water logged and dominated by runoff and seepages/springs as observed when climbing up to the reported main source of the crack in many of the investigated areas. Friction between saprolite-soil interface will be overcome by the weight of soils on a steep terrain as long as the critical point of saturation of the soils is reached.

Recommendations of the geo-hazard assessments

Short term

- a) The Local Governments of Kapchorwa, Bulambuli, Sironko, Mbale, Bududa and Manafwa Districts should engage the Central Government about the impending disaster and work towards relocating the communities living in the disaster prone areas. It is noted that in all the investigated areas, Manafwa is at a very high risk and it should therefore be prioritized;
- b) Regulate the human activity on the steep slopes of Mountain Elgon.

Mid-term

- c) As for the crack and the consequent hanging rocks in Gamogo Sub County, Kapchorwa District, geo-nailing is recommended to avert the continuous cracking.
- d) To better understand the effects of earthquake as a trigger to cracking and eventually to land slide events, it is recommended that passive seismic monitoring techniques be installed in the region and applied to detect possible seismic signals triggered by slope dynamics. At least three (3) seismic stations installed at three different most affected villages and should be left to run for at least one month.

Long-term

- e) Government should carry out geo-hazard mapping and characterization of the entire Mt. Elgon Region for landslides susceptibility to support land use planning. However, some mapping has been done in particular areas and generally intended to answer specific questions for the areas.
- f) The geo-hazard mapping and characterization programme should consider:
 - i). Soil mapping (including analysis of soil samples);
 - ii). Determination of the critical parameters for landslides to occur;
 - iii). Carrying out topographic survey using high spatial resolution elevation data (e.g. LiDAR) and monitor any changes;

- iv). Establishment of differential GPS network to monitor land subsidence;
- v). Undertake monitoring of precipitation in Elgon Region.
- g) A detailed hydrogeological assessment needs to be undertaken to determine the recharge mechanism around the Mt. Elgon aquifer system;
- h) A permanent seismic station is recommended to be installed in Mt. Elgon region.

3.4.3 Assessment of geo-hazards in Central Uganda

The field team undertook geo-hazard and geotechnical assessment of the unstable and collapsing quarries in Wakiso District. The main objective of the field work was to carry out geotechnical and geological assessment of unstable and collapsing quarries in Wakiso District.

3.4.3.1 Location and accessibility

Wakiso District is located in the Central part of Uganda bordering with Nakaseke District and Luwero District to the north, Mukono District to the east, Kalangala District in Lake Victoria to the south, Mpigi District to the southwest and Mityana District to the northwest. The District Headquarters is located in Wakiso Municipality and can be reached by road approximately 20 kilometres northwest of Kampala City on Hoima Road.

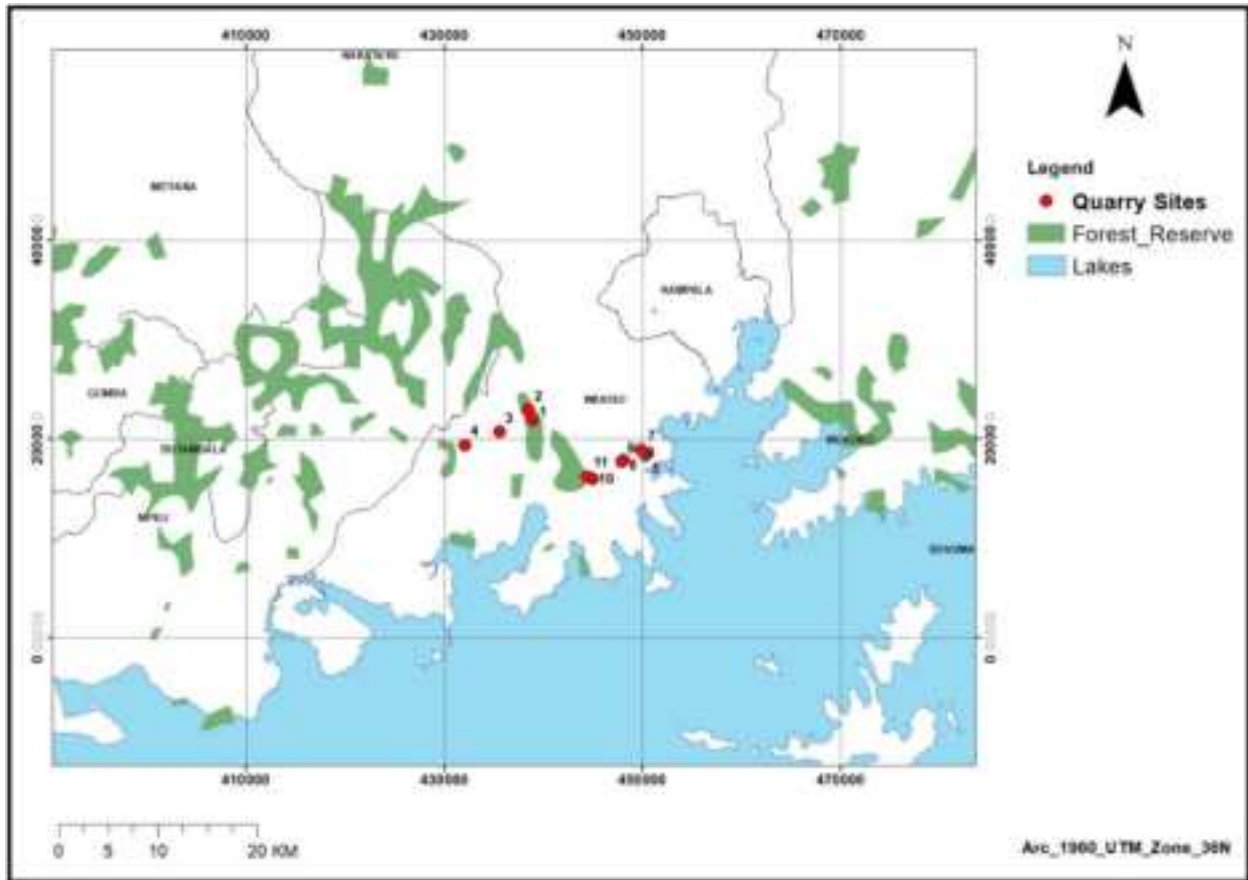


Figure 26: Locations of study areas in Wakiso District.

Geology

The geology of the area is mainly composed of shales, phyllites, quartzites and alluvium and lacustrine deposits of the Victoria Formation. The resistant, greyish, pinkish or pure white quartzite varieties often rise tens of meters above the surrounding, forming east-west trending, steep hills or long continuous ridges. Victoria Formation lies between the Archean granitoids and pelitic schists of the Nile Formation.

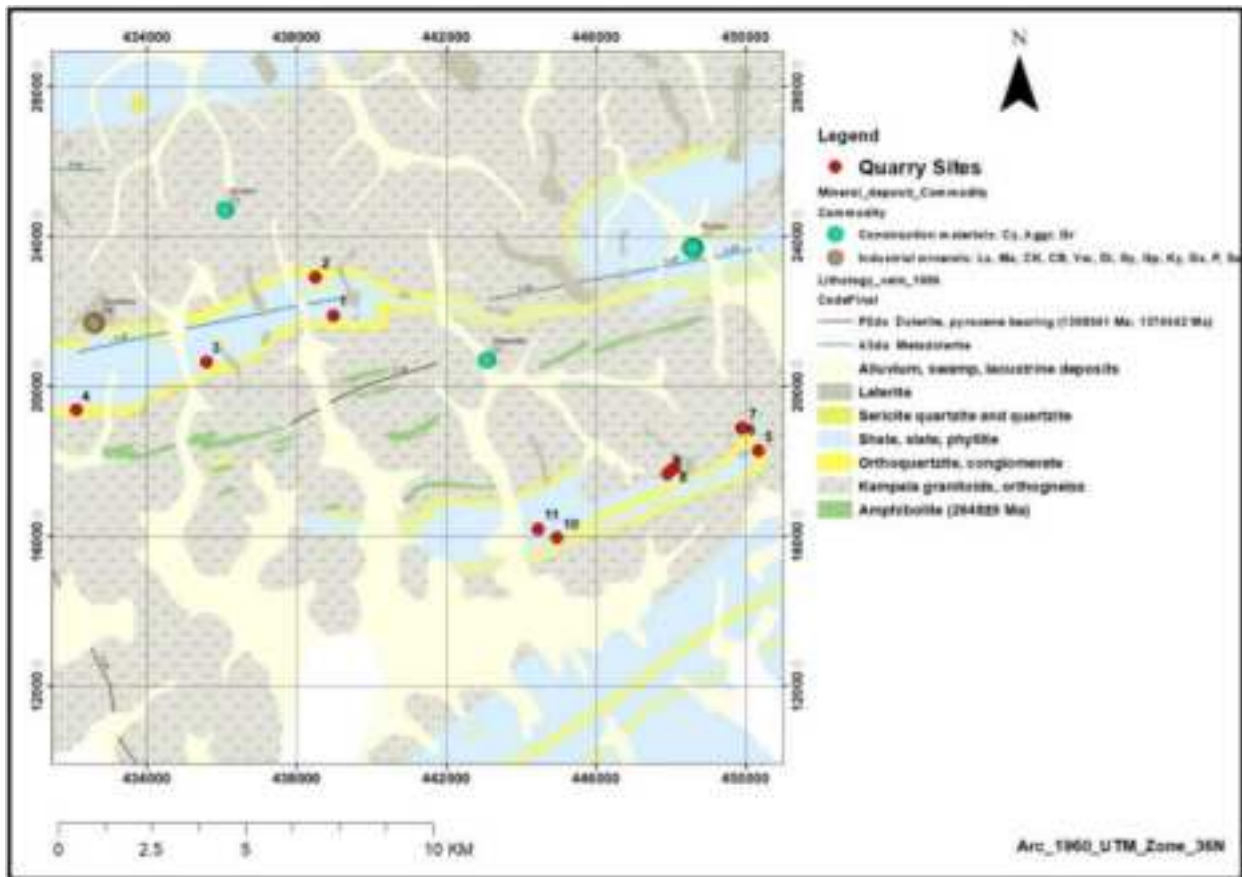


Figure 27: Geological map of the study area in Wakiso District.

Work done

Geo-hazard assessments and geo-technical studies were conducted in Dyango Quarry (438968mE, 21885mN). It was found out that there are many open pits in the area which were mined out and abandoned. Some of the pits were filled with water which poses a safety and health threat to the miners and communities leaving around the area. The quarrying is taking place in a deeply weathered quartzites with steep walls which are likely to collapse during heavy rains, the artisanal miners did not have proper PPE's which exposes them to stone cuts and other mining related accidents.



Figure 28: Steep walls of Dyango quarry Nakawuka.

Bukaiba Quarry in Kamunye village (432103mE, 919360N), it was observed that Quarrying of quartzite rock which is crushed into aggregates. The quartzite was deeply weathered and therefore the aggregates were mixed with too much soil, there were no children on site, the artisanal miners did not have PPE's, there was poor disposal of plastic bottles. Some of the mined-out pits were filled with water, Steep hanging walls prone to collapse.



Figure 29: Abandoned open pits filled with water in Bukaiba quarry.

Other Quarries assessed are: Dyango Ku tractor quarry (438500mE, 22911mN), Kitooro Quarry Bumpenje Village, Jungu Parish (435583mE, 20651mN).

Nganjo Quarry (450335mE, 18270mN), Jjanyi Trading Center (449883mE, 18879mN), Dundu Village (449911mE, 18887mN), Kasali Village (448058mE, 17789mN) and Bukasa quarry in Rutaba Village (444955mE, 15945mN). In all the above quarries, it was observed the quarries had unstable faces which could collapse and landslide / rock falls occur.

Table 7: Summary of assessment of Quarry Sites in Wakiso District

	Location	UTM-X (mE)	UTM-Y (mN)	Issues
1	Dyango Quarry	438968	21885	Open abandoned pits filled with water, quarrying face has steep slopes.
2	Bukaiba Quarry	432103	21936	No PPEs, littered plastic bottles, pits filled with water, steep hanging walls.
3	Dyango KT Quarry	438500	22911	Unstable mining faces prone to collapse and landslide/ rock fall
4	Kitooro Quarry	435583	20651	Unstable mining faces prone to collapse and landslide/ rock fall
5	Nganjo Quarry	450335	18270	Unstable mining faces prone to collapse and landslide/ rock fall
6	Jjanyi Trading Center	449883	18879	Unstable mining faces prone to collapse and landslide/ rock fall
7	Dundu Village	449911	18887	Unstable mining faces prone to collapse and landslide/ rock fall
8	Kasali Village	448058	17789	Unstable mining faces prone to collapse and landslide/ rock fall
9	Bukasa quarry	444955	15945	Unstable mining faces prone to collapse and landslide/ rock fall

3.4.3.2 Conclusions and Recommendations

In most of the Quarries assessed, the quarrying faces are observed to be unstable due to poor quarrying methods and therefore the walls are likely to collapse especially during heavy rainfall. This pose a high risk to the miners.

Quarrying is one of the major sources of income for many families within the district and therefore the Building Substances Laws that is being formulated

will regulate this sub-sector will help to streamline the different roles of different parties involved and also protect the miners.

The following recommendations were made;

- i) There is need to sensitize all the miners on best mining practices and methods that include reducing the slopes of quarry walls and use of personal protective equipment like overalls, helmets, gumboots, gloves among others;
- ii) The of Geological Survey should and NEMA should undertake joint inspections of the Quarry operations in Wakiso District to monitor and regulate the activities to ensure proper management of social, environment, health and safety aspects;
- iii) There is need to encourage the local miners to form associations and register a formal entity. This will help them to access training and funds like Emyoga and PDM from government that are intended to increase household income of families;
- iv) Women should be encouraged and empowered to participate in quarrying sub-sector since it was observed that they form the largest part of the workforce within the quarries;
- v) Discourage children involvement in quarrying.

3.5 CROSS CUTTING ACTIVITIES

3.5.1 ACP-EU Development Minerals Project

Since August, 2016 in collaboration with the Ministry of Energy and Mineral Development. UNDP is implementing the ACP-EU Development Minerals Programme in Uganda. The capacity building programme aims to build the profile and improve the management of Development Minerals (industrial minerals; construction materials; dimension stones; and semi-precious stones). The programme is an initiative of the African, Caribbean and Pacific (ACP) Group of States, financed by the European Union and the United

Nations Development Programme (UNDP) and implemented by UNDP. It has so far covered twenty-five districts, evenly distributed across the country.

Development Minerals matter in the progress to achieve the Sustainable Development Goals (SDGs), particularly those on poverty reduction, decent work and economic growth, and sustainable cities and communities. Moreover, Development Minerals – in the way they are mined, transported, and transformed into products – can affect the goals related to environmental sustainability, climate action and sustainable production and consumption. Making Development Minerals value chains more environmentally and socially sustainable and responsible can significantly support the progress to the latter goals. The following are key milestones achieved during FY2023/2024.

- i). Formalized 125 ASM associations in 25 districts;
- ii). Undertook a needs assessment and supported district local governments to provide extension services to over 800 leaders of mining enterprises in 25 districts to improve mining practices for sustainability;
- iii). Launched the formalization and business development acceleration strategy for the development minerals sector in Uganda;
- iv). Supported a national stakeholder workshop to inform the draft building substances bill;
- v). Conducted one dialogue to discuss the skills gap between vocational training and the construction market place to inform the review of Uganda's building curriculum. The dialogue included officials from the Department of industrial training, private sector, civil society organizations and academia;
- vi). Supported women in mining to participate in study tours on innovation and value addition in ceramics, stone cladding and materials testing. The learning visits helped the various clay miners, quarry workers and local government officials to appreciate opportunities for innovation and value addition to clays, dimension stone, and aggregate;

- vii). Uganda, represented by MEMD, ASMs and other grantees participated in the development minerals forum in Zambia. The forum was designed to harness efforts for inclusive value chains. Uganda's representatives showcased results from training in innovations, digital solutions for the construction sector and utilization of low carbon materials for construction;
- viii). Currently, Uganda has been selected to implement phase 3 of the ACP-EU Development Minerals Programme which will focus on supporting ASM Enterprises to access markets, add value and practice responsible and sustainable mining.

3.5.2 Organization of African Geological Surveys (OAGS)

The Organization of African Geological Surveys (OAGS) has a mandate to foster and sustain geoscience programmes and excellence on the African continent in the quest for socio-economic development and poverty alleviation, with special reference to mineral resource assessment, sustainable land use and development, natural hazard mitigation and environmental protection. Uganda is an active member of the Organization with Gabriel Data, Asst. Commissioner/ Geology as the Vice President for Eastern Region. OAGS partners with global geoscience organizations/institutions such as the European Union (EU), African Union (AU), African Mineral Development Centre (AMDC) and European Geological Surveys (EGS) to enhance capacity of African Geological Surveys in managing the natural resources. It is under the collaboration with the organization that a number of staffs from the Geology Division undertook. Training on the AMREC/ PARC, a mineral classification system, is being conducted for its use in attracting meaningful investment and sustainable management of Africa's Mineral Resources.

Capacity building in various disciplines of geosciences are being conducted continent wide under PANAFGEO Project funded by European Union. Over 8 Geology Division staff benefitted from the training this financial year in-country and abroad.

3.5.3 Women's day celebrations

The department participated in the organization and attendance of the Ministry Women's day celebrations under the theme: "Invest in women - accelerate progress" which was held on 22nd 2024 at the MEMD offices.

3.5.4 Gender workshop

GSD participated in the gender workshop titled MEMD Women in leadership gender training at Protea Hotel, Entebbe from 7th May 2024 to 9th May 2024

4 Challenges and recommendations

4.1 CHALLENGES

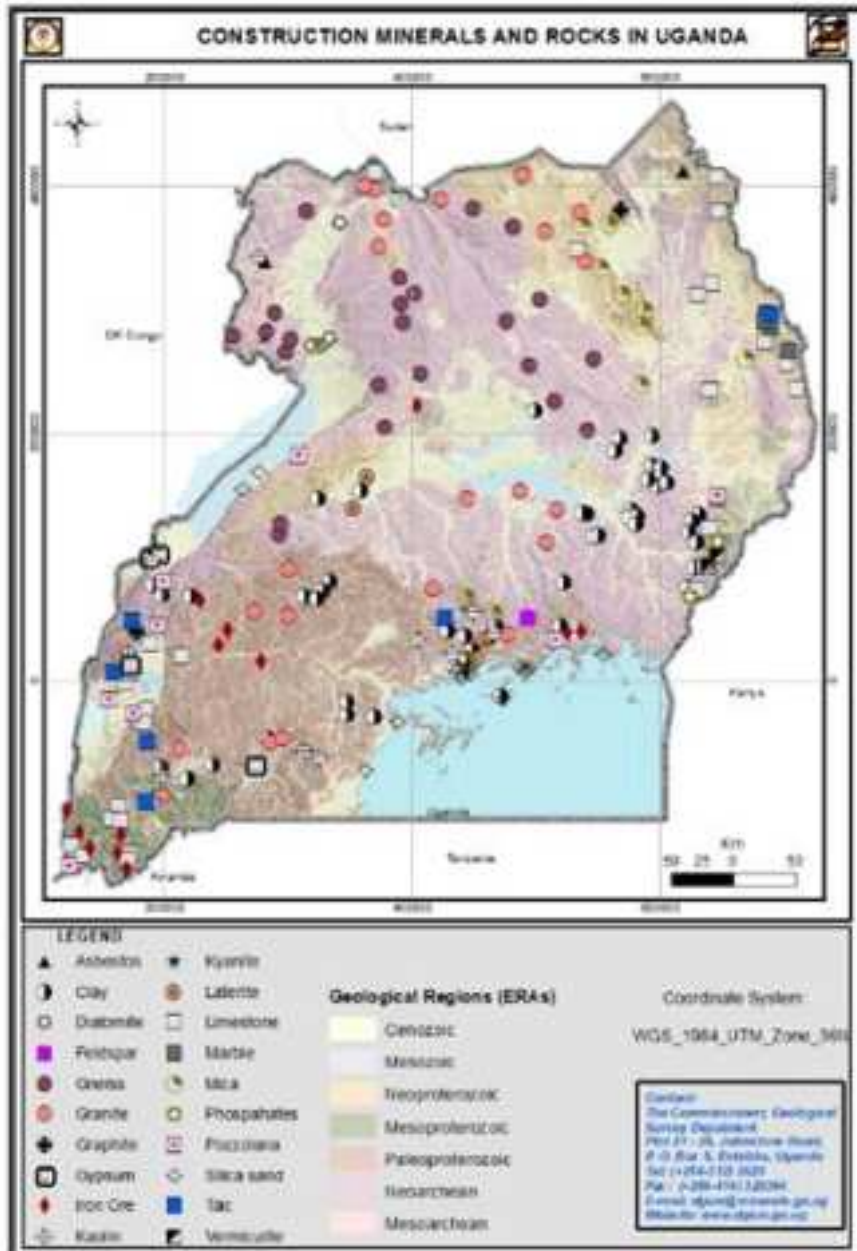
- i) Financial resources allocated to the are not adequate to equip the institution and also undertake planed activities
- ii) Delays in the procurement process.
- iii) Lack of staff due to transfers and promotions.

4.2 RWCOMMENDATIONS

- i) Increase financial resources allocation to the
- ii) Framework contracts for office consumables faster approvals and execution of procurements initiated
- iii) Recruit Officers into the vacant public service positions
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5 APPENDICES

5.1 MINERALS AND ROCKS FOR CONSTRUCTION OVERLAID ON GENERAL GEOLOGY MAP OF UGANDA



**5.2 TABLE OF EARTHQUAKE EVENTS IN UGANDA AND
NEIGHBOURHOODS FOR FY2023/24**

S/No	Date (DD.MM.YYYY)	Time (HH.MM.SS)	Lat. (Deg)	Lon. (Deg)	Depth (Km)	Mag. (mb)	Geographical Region of Location
1	13.11.2023	18:54:20	3.9481	31.4148	10	4.9	Moyo, Uganda
2	11.11.2023	6:26:50	5.164	36.8056	10	4.9	Ethiopia
3	06.11.2023	23:04:25	-5.4817	34.9021	10	4.3	Kilimatinde, Tanzania
4	06.11.2023	1:51:09	-6.465	29.492	10	4	Kalemie, DR Congo
5	01.11.2023	5:27:06	-5.5237	34.8726	10	4.4	Kilimatinde, Tanzania
6	31.10.2023	15:35:49	4.7782	32.0502	10	4.8	Juba, South Sudan
7	28.10.2023	14:34:01	-7.2867	28.0291	10	4.5	Dem. Rep. of Congo
8	26.10.2023	19:00:25	-7.297	27.9293	9.5	5.2	Kabalo, DR Congo
9	15.10.2023	22:16:08	-5.5267	34.9544	10	4	Kilimatinde, Tanzania
10	24.09.2023	14:21:55	-2.3738	29.5431	10	4.5	Nzega, Rwanda
11	23.09.2023	16:52:07	-5.2917	29.8427	10	4.7	Lake Tanganyika region
12	17.09.2023	18:09:29	-5.4035	34.8348	10	4.3	Ikungi, Tanzania
13	09.09.2023	18:21:29	-1.377	26.6765	10	4.6	Kindu, DR Congo
14	05.09.2023	15:42:20	-5.4349	34.9283	10	5.1	Tanzania
15	28.08.2023	13:00:06	-5.438	34.8665	10	4.3	Ikungi, Tanzania
16	27.08.2023	13:53:37	-5.3811	34.8727	10	4.7	Ikungi, Tanzania
17	27.08.2023	11:00:19	-5.4436	34.8787	10	4.6	Ikungi, Tanzania
18	24.08.2023	22:01:04	-0.3355	29.7329	10	4.6	Rukungiri, Uganda
19	24.08.2023	14:32:37	-5.3116	34.8581	10	4.2	Ikungi, Tanzania
20	19.08.2023	22:01:10	-5.4054	34.8713	10	4.1	Ikungi, Tanzania
21	14.08.2023	15:12:33	-5.3515	34.8855	10	4.3	Ikungi, Tanzania
22	13.08.2023	20:13:08	-5.3917	34.8373	10	4.2	Ikungi, Tanzania

23	13.08.2023	18:38:17	-5.4028	34.8873	10	4.2	Ikungi, Tanzania
24	11.08.2023	17:22:24	-5.3061	34.8894	14.2	4.5	Ikungi, Tanzania
25	10.08.2023	2:24:54	-5.4338	34.8948	10	4.3	Ikungi, Tanzania
26	08.08.2023	23:15:25	-5.3514	34.8858	10	4.4	Ikungi, Tanzania
27	08.08.2023	22:58:50	-5.3797	34.8709	10	4.3	Tanzania
28	08.08.2023	22:32:45	-5.4322	34.9861	10	4.5	Tanzania
29	08.08.2023	20:28:13	-5.3107	34.8895	10	4.8	Ikungi, Tanzania
30	08.08.2023	17:24:49	-5.4282	34.9396	10	4.5	Ikungi, Tanzania
31	08.08.2023	15:31:18	-5.4436	34.9505	7	5.5	Ikungi, Tanzania
32	04.08.2023	22:06:16	-5.1108	29.6299	10	4.8	Kigoma, Tanzania
33	02.08.2023	22:00:08	-4.2799	35.2579	10	4.5	Bashanet, Tanzania
34	16.07.2023	6:20:11	-4.3546	35.2209	10	4.1	Basotu, Tanzania
35	15.07.2023	2:26:49	-7.8986	38.0125	10	4.3	Kisanga, Tanzania
36	13.07.2023	23:11:56	-5.403	34.8926	10	4.4	Ikungi, Tanzania
37	07.07.2023	22:00:33	-2.1729	28.9431	10	4.4	L. Kivu region, DR Congo

