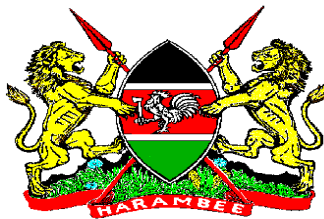


REPUBLIC OF KENYA



MINISTRY OF MINING

P.O Box 30009 – 00100,

NAIROBI

TENDER ADDENDUM

TENDER NO: MOM/DGS/004/2016-2017

FOR SUPPLY AND DELIVERY OF SPECIALIZED GEOPHYSICAL AND SEISMOLOGY EQUIPMENT AND SOFTWARES

SECTION V - SCHEDULE OF REQUIREMENTS AND PRICES

TECHNICAL SPECIFICATIONS ADDED

LOT 1 EQUIPMENT- 5. NO TECHNICAL SPECIFICATION OF SUPPLY OF PORTABLE (HANDHELD) XRF ANALYSER

Calibrations:

- Elemental range: up to 45 elements simultaneously, including Mg, Al, Si, P and S
- Multiple specific matrix calibrations based on traceable standards
- Gain check in the field with Continuous Automatic Gain Calibration (CAGC)

GeoChem Trace

- For trace elements
- Ore pathfinder elements
- Contaminants in soil or sediment
- Remediation check
- Catalytic converter

GeoChem General

- Major & minor elements
- Includes base metal ores
- Industrial minerals
- Concentrates
- Bauxite

Data Handling:

- Data storage
 - Images, Spectra, Sample Identification, and Results to be

- stored in a single protected file for easy storage and access
- Results available in both a protected and unprotected file formats
 - The unprotected file format can be imported directly into Excel or other database programs Data may be stored in internal memory or a USB flash drive or both

Detector	SDD 30/25 mm ²
Detector Shield	<p>True detector shield: HANDHELD XRF accessory protects the detector window from being punctured by sharp objects, while still allowing rapid and accurate analysis of almost any material.</p> <ul style="list-style-type: none"> • Minimizes costly detector punctures • Increases equipment up-time • No need to change window or calibration when measuring light elements • No sacrifice to analytical performance, even when measuring light elements such as Mg, Al, Si, P or S
Detector	No detector calibration shall be needed. Detector calibration shall be performed during EVERY measurement automatically
Color CMOS Camera	- Camera shall allow storage of multiple images per sample
GPS	External Bluetooth GPS receiver providing coordinates to the HANDHELD XRF
Excitation Source	Rh target X-Ray tube 50kV/ 80uA-100uA / 2W
Excitation Range	15 – 50 kV excitation range
Spot size, (mm)	8 or 5 or 3
Filter	3 Alloy mode filters
Elemental Range	Mg - U
Sample Temperature	Default to 150°C (302°F) with Ultralene® window. Up to 200°C with Kapton® window and hot surface adapter.
Weight,kg/lbs	1.6-1.5 / 3.3-3.5 with battery
Dimensions	25 cm x 28 cm x 9 cm (10 in x 11 in x 3.7 in) L x W x H
Testing Modes	Assay, Grade ID, Grade Pass/Fail, Limit testing

Calibration	Should be Full remote recalibration with data reevaluation possible. To Include Limestone / Cement calibration
Operating Environment	Operating Temp: -10°C to +50°C (+14°F to 122°F); Splash and dust proof (IP54)
Power	Li-Ion battery (7.2V nominal); Battery Charger; AC Adapter DC @ 3A)
Display	3.5" adjustable or fixed
Software	flexible software that , user controllable report generator and spectrum viewer that allows the complete customization of the report format
PC Operating System	Windows® XP, Windows® 7 or Windows® 8
PC Software	<p>This is for report generation and spectrum viewing software can communicate with & controls the HANDHELD XRF</p> <ul style="list-style-type: none"> • Software for remote control of the HANDHELD XRF • Software to communicate with the instrument manipulate data from the HANDHELD XRF. Features include:
Data Storage	Internal memory: 8,000 readings with spectra (maximum) USB flashdrive: 80,000 readings with spectra (minimum)
Data Traceability	Full data traceability
Data Transfer	BT, USB Direct data export and data back up on USB stick
System Safety	Password protection; no sample (backscatter) shutoff, IR proximity sensor
Dedicated desktop (5 No)	At least 1 TB Hard disk, Processor i7, 4GB RAM, 4GHz speed Monitor Size at least 20 inch, Sound, Radio and TV Card, Most current OS with own licence.
Dedicated laptop (5 No)	Rugged type At least 1 TB Hard disk, Processor i7, 4GB RAM 4GHz speed, WiFi, Screen Size 14- 17 inch, Most current OS own license. Shock proof casing and carrier bag
Language	English
Certification	CE, cTÜVus, IEC 61010-1:2010 by TÜV SÜD, EN 61326-1:2007
Environmental Standard	<p>The HANDHELD XRF should be designed to withstand field operation in all environments, including humid and dusty conditions.</p> <ul style="list-style-type: none"> • Sealed against moisture and dust • Ruggedized with rubber over-molding • Protection from dirt and windblown dust • Operating Temperature: -10°C to +50°C
Training	Training package for at least 20 officers

LOT 2 EQUIPMENT- 4. NO

SPECIFICATION OF SUPPLY OF PORTABLE XRD

SPECIFICATIONS	
XRD resolution	0.25° 2θ FWHM
XRD range	5-55° 2θ
Detector type	1024 × 256 pixels - 2D Peltier-cooled CCD
XRF energy resolution	250 eV at 5.9 keV
XRF energy range	3 to 25 keV
Sample grain size	<150 μm crushed minerals - (100 mesh screen, 150 μm)
Sample quantity	~15 mg
X-ray target material	Cu or Co (Cu standard)
Elemental range	Should provide full phase ID of major, minor and trace components with a qualitative XRF scan of elements Ca - U
X-ray tube voltage	30 kV
X-ray tube power	10 W
Data Storage	40 GB - Ruggedized internal hard drive
Wireless Connectivity	802.11b/g for remote control from web browser
Operating Temperature	-10 °C to 35 °C
Weight	14.5 kg with four batteries
Size	48.5 cm × 39.2 cm × 19.2 cm (19.1 in. × 15.4 in. × 7.6 in.)
Enclosure	IP67, MIL C-4150J rugged case
Field autonomy	~4 hours (hot swap batteries)
Capabilities	Search/Match & XRD Quantitative Analysis Software to be Included. The software should be embedded in the unit itself
pattern interpretation	third-party programs should be easily accessible.
field portability	well suited for those applications where field portability

	and/or ease of use, has to be rugged, fully portable field instrument
Dedicated desktop (4 No)	At least 1 TB Hard disk, Processor i7, 4GB RAM, 4GHz speed, Monitor Size at least 20 inch, Sound, Radio and TV Card, Most current OS with own licence.
Dedicated laptop (4 No)	Rugged type At least 1 TB Hard disk, Processor i7, 4GB RAM, 4GHz speed, WiFi, Screen Size 14- 17 inch, Most current OS with own license. Shock proof casing and carrier bag
Guarantee	2 years plus maintenance
Training	Training package for at least 20 officers

LOT 4 SOFTWARES : DATA ANALYSIS(5 LICENCES)
TECHNICAL SPECIFICATION OF SUPPLY OF GRAVITY AND MAGNETIC DATA ANALYSIS AND INTERPRETATION SOFTWARE:

Should be a package capable of Gravity and magnetic data analysis and interpretation latest version with training component for at least 20 officers, and orientation on delivery for the user is mandatory. The programme features to Include:

- Real-time forward modeling while moving vertices, moving or rotating bodies.
- Inverse modeling with selected parameters.
- Control over free parameters.
- Locking together of vertices.
- User friendly prevention of illegal bodies.
- Hotkeys to allow quick changes to graphics - show locks, free vertices or color fill.
- Toolbar buttons to offer quick access to most-used functions.
- Virtually no limit on size of data or model.
- Automatic and user-specified labels.
- User-specified line colors.
- Annotated color fill for body parameters.
- Spreadsheet data editors with copy & paste.
- Spreadsheet model editors.
- Optional grid lines on display.
- ASCII File import and export of data, synthetics and models.
- Import of programme files.

Data entry options:

- Import of data from flat ASCII files.
- Import of data from XYZ style ASCII files.
- Import of data from ASCII files or of data and model from binary files.
- Copy and paste of data from other spreadsheets into the data editor

LOT 4 SOFTWARE: REMOTE SENSING (20 LICENCES)

TECHNICAL SPECIFICATION OF SUPPLY OF REMOTE SENSING PROGRAMME

1.Updated Sensor and Data Support

Because of the updated sensor and data support, you can add valuable information to your GIS from almost any sensor/data type you use:

Sensor Support: supports the integration of new and emerging data from both airborne and satellite sensors such as ASTER, AVIRIS, AVHRR, Landsat 8, NPP VIIRS, Quickbird, RadarSat, TerraSAR-X, SkySat-1, SPOT 7, TMS, USGS DEM Data, WorldView-3, Pleiades, GeoEye, RapidEye, AlSat-2A, Deimos-1, Gaofen-1, GRIB-1 and GRIB-2, Multi-page TIFF, Ziyuan-1-02C and -3A and many more.

Data Support : Supported data include to; Panchromatic, Multispectral, Hyperspectral, Infrared, Thermal, RADAR, LiDAR, HDF5, Full motion Video, NetCDF-4, Proba-V S10 TOC products, including NDVI, Proba-V S1 TOA and TOC products and many more. ENVI plays videos files, including those from Skybox Imaging. The Full Motion Video player displays MISB metadata if the video file contains it. Export individual frames to the display for further analysis, or convert a video file to a time-enabled raster series. Supported video formats include; flv, .f4v, .swf, .gif, .mov, .avi, .webm, .mkv), .mjpeg, .mjpg, .mj2, .mpeg, .mpg, .mpl, .m2v, .ts, .mpeg, .mpg, .mp2, .mpg2, .mpeg2, .mpv, .m2v, .3gp, .3g2, .mp4, .mpg4, .mpeg4, .m4v, .h264, Skybox (SkySat) video files among others.

2.Interface

The intuitive user interface should allow quick and easy viewing, exploring and analyzing imagery. The layer manager to allow displaying ArcGIS layers with Imagery, giving the ability to view vector information with same styling, symbology and rendering as the GIS Applications. To have the Multiband Analytic Display (MAD) feature to allow; viewing datasets of any size, navigation through the data with a picture-in-picture window, visualizing and geographically linking multiple images simultaneously using the GeoLink Views option, create scatter plots and explore pixel signatures using the 2D Scatter plot tool, utilize the layer manager to toggle and edit parameters and more, animate and view-time enabled raster stacks by selecting Display > Band Animation. Can also Export the contents of a display view to a Geospatial PDF file, Chip the view at display resolution, Export the contents of a display view to Google Earth, Preview option is available for NN Diffuse, Pan Sharpening, Classification Aggregation, and Spectral Indices that allows you to dynamically preview processing results for the area displayed in the Image window before processing the full image among other features.

3.ArcGIS Integration

Integration with ArcGIS to make advanced image analysis tools conveniently available through the ArcGIS Toolbox. This is to take advantage of the tools directly from ArcGIS and should quickly extract information from imagery, easily add it to a

GIS, and make more informed decisions-the tight integration between the two products eliminates the need to switch between software packages, saving time and money.

The Remote Connection Manager should allow: the same Enterprise SDE Geodatabase connections as ArcCatalog software's "Database Connections." Ability to display the same user interface dialogs as ArcGIS for Desktop software, for establishing Enterprise SDE Geodatabase connections.

4. Image Processing

Preprocessing tools

The programme to provide automated pre-processing tools that allow to quickly and easily prepare imagery for viewing or additional analysis;

- Orthorectify imagery using the rigorous orthorectification workflow
- Register two or more images using programme Image registration workflow
- Calibrate imagery using the radiometric correction and radar calibration tools
- Correct imagery for atmospheric correction with atmospheric correction tools
- Create vector layers with the programme vector create and editing tools
- Create digital elevation models (DEMs) using the DEM extraction Wizard
- Can Perform Pan sharpening, masking, and mosaicking easily and quickly
- Resize, rotate, or convert the data type using the File-Save As option
- Reproject raster to any coordinate system using the reproject raster tool

Image Analysis Tools

The programme to include comprehensive suite of image analysis tools that allow access to proven algorithms to quickly, easily and accurately analyze imagery. Scientific image analysis processes should be automated through workflows; so that any user can achieve expert level results, regardless of their understanding or prior training in image analysis – which gives a significant time and resource savings to our organization. These Workflows to include:

- Classification Workflow for Supervised and Unsupervised Classification
- Region of Interest Tool (ROI) for Identifying Region of Interest
- Target Detection Workflow
- Feature Extraction Workflow
- Image & Thematic Change Detection Workflow
- Anomaly Detection Workflow
- Sub-Pixel Spectral Processing tools
- Terrain Categorization (TERCAT) Workflow
- Lines Of Communication (LOC) tools
 - Spectral Band Indices for computing various indices including vegetation, geology, man-made features, burned areas, and water

- Viewshed Analysis workflow
- Topographic Modelling and Features tools
- SAR Polarization Signatures Extraction tools
- Spatiotemporal Analysis tools: build a raster series for spatiotemporal analysis, which provides the ability to understand and predict Earth surface processes or human activities over space and time.

5. Customization

Need for an API Programming Guide Help to explain how to write IDL scripts to extend the programmes functionality. These new routines allow you to write scripts that perform image-processing tasks.

The programme and Modules to include

Programme Software	License Type
Programme +IDL	Network Floating
ProgrammeLiDAR	Network Floating
Modules	
Rigorous Orthorectification	Network Floating
Feature Extraction	Network Floating
DEM Extraction	Network Floating
Atmospheric Correction	Network Floating

Training component: for at least 20 officers,

Should have a Remote Sensing Training Solution

The **Format:** Instructor-Led ,

- **Duration:** 3 days (24 hours)
- **Software:** Newest version
- Authored by programme developer

This course should quickly get the trainee to an up-to-speed on the full-featured functionality offered by the programme which is remote sensing exploitation package. The course should enable learning about the core functionality of the programme and also work with Feature Extraction, the object-oriented classification workflow. An introduction to hyperspectral data analysis that can be used as a stepping-stone for learning about hyperspectral analysis capabilities of the programme. Data from various multispectral, hyperspectral and radar sensors, including ASTER, AVIRIS, Quickbird, RadarSat, AVHRR, SPOT, Landsat, TMS, and USGS DEM data to be used in a mixture of lectures and exercises.

Audience

The audience has basic level of remote sensing knowledge necessary to take advantage of this kind of training as outlined here below.

Course Outline

Mastering the Basics

- Setting preferences
- Display management
- Working with Portals
- Chipping and Saving
- Spectral Profiles

Raster Data Management

- Reading raster data

Image Display Concepts

- Contrast Stretching
- Color Tables
- Raster Color Slices
- Band Combinations

Seamless Mosaicking

- Adding Scenes to a Mosaic
- Removing No data Regions
- Applying Color Correction
- Applying Feathering

Vector Data usage

- Working with vectors
- Editing vectors
- Intelligent Digitizer – linear feature extraction

Image Classification

- Supervised Classification
- Classification Workflow
- Post Classification Analysis

Introduction to Spectral Analysis

- Spectral Profiles and Spectral Libraries
- Endmember extraction (SMACC)
- Whole Pixel Analysis (Spectral Angle Mapper)

Data Fusion and Color Transforms

- Saturation Stretches
- Synthetic Color
- Pan Sharpening

Feature Extraction (Object-based Classification)

- Rule-based Classification

- Editing Vector layers

IMAGE ANALYSIS

- Format:** Instructor-Led
- Duration:** 3 days (24 hours)

Overview

The course should cover data preprocessing – getting your data ready to analyze. focus more on example applications in analysis. This should include exercises on Image Registration and Change Detection. The bulk of the work should cover various topics related to the spectral analysis of vegetation and rocks with multispectral and hyperspectral data. Data from various multispectral sensors should be used in a mixture of lectures and exercises. The class should also be introduced to integration with other geospatial software's.

Audience

The audience has basic level of remote sensing knowledge necessary to take advantage of this kind of training as outlined here below.

Data Preprocessing

- Radiance data
- Atmospheric and solar irradiance corrections
- Methods for conversion to reflectance

Example Application: Vegetation Analysis

- Metafiles
- Preprocessing multispectral data (Calibration & Atmospheric Correction)
- Image Linking and Dynamic Overlays
- Topographic Modeling
- Image Registration
- Masks
- NDVI
- 3-D Surface Modeling

Change Detection: Using Landsat Data to Map Burn Severity

- Compare Before and After Scenes
- Calculate the Burn Ration (NDBR)
- Quantify Burn Severity
- Creating a Fire Boundary Polygon-Raster to Vector
- Vector Visualization and Editing

Examining Spectra Using Spectral Libraries

- Extract and examine spectral profiles from hyperspectral data
- Collect unique spectra in the same plot window for comparison
- Learn how and why to use spectral libraries
- Compare data-derived spectra to known library spectra

Whole Pixel Analysis Techniques

- Use the Spectral Angle Mapper (SAM) classifier

- Evaluate classification results using Rule images
- Examine continuum-removed spectra
- Map the presence of specific minerals with Spectral Feature Fitting (SFF)

Sub-Pixel Analysis techniques

- Apply the Linear Unmixing model and evaluate its results
- Learn about partial solutions of the unmixing model that provide more robust results
- Run Matched Filtering and Mixture Tuned Matched Filtering analyses

Regions of Interest and Classification Techniques

- Scatter Plots
- ROI Tool
- Classification Techniques
- Terrain Categorization (TERCAT)
- Post Classification Tool

EXTRACTING INFORMATION FROM LiDAR

- Format:** Instructor-Led
- Duration:** 2 days (16 hours)

Overview

The course should equip participants to be able to transform geo-referenced LiDAR point clouds into geographical information systems (GIS) layers that can be exported to many output formats and to 3D visual databases.

Audience

The audience has basic level of remote sensing knowledge necessary to take advantage of this kind of training as outlined here below.

Mastering the Basics

- Getting started with LiDAR
- Open a new project and import a LiDAR point cloud
- Navigate elevation map
- Generate a density map
- Check raw LiDAR data density

LiDAR Projects and Quality Assurance

- How to start a new project
- How to make manual edits to features

Working with DEM and DSMs

- How to define an area to process using a TIFF image
- Work with DEMs and DSMs
- Use of Band Math to analyze results

DEMs in Rugged Terrain

- Parameters to use for generating DEMs in rugged terrain.
- Use ENVI to compare DEMs from different dates.

CityScape and Ground-Based LiDAR

- Experiment with other types of LiDAR data: RGB data and ground-based XYZ, IRGB data

Dedicated desk top (10 No)

At least 1 TB Hard disk, Processor i7, 4GB RAM, 4GHz speed, Monitor Size at least 20 inch, Sound, Radio and TV Card, Most current OS with own licence.

Dedicated laptop (10 No)

Rugged type At least 1 TB Hard disk, Processor i7, 4GB RAM, 4GHz speed, WiFi, Screen Size 14- 17 inch, Most current OS with own license. Shock proof casing and carrier bag

TENDER CLOSING DATE

Tender closing date has been changed from **23RD FEB 2017** at **11.00 a.m.** To **2ND MARCH 2017** at **11.00 a.m.**

**Head Supply Chain Management Services
For: Principal Secretary,**

20TH FEB 2017

