Proposal for procurement of 66 nos. of Handheld XRF Analyser for Geological Survey of India

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1.0. Background

Over the years, mineral exploration activities in GSI have increased manifold for ensuring the sustainable development of the national economy and to meet the increasing demand of various stakeholders. The activities include **Mineral Development projects** potential to generate auctionable blocks concerning systematic mineral exploration projects of G2, G3, G4 stages for various mineral commodities in both land and offshore areas. In GSI, adequate thrust has been given to mineral exploration programmes with special emphasis on **strategic-critical elements** including fertilizer mineral exploration programs, and accordingly multiple of such projects have been formulated. In addition, GSI is also engaged in the **Mineral discovery projects** that concern regional mineral targeting (RMT) items covering thousands of sq.km. areas, research and assessment of Pegmatites for strategic and critical minerals, critical mineral assessment programme (C-MAP) in the lateritic soil profile, Specialised Thematic Mapping (STM) with mineral bias, Multispectral/Hyperspectral-mapping, Mineral Prospectively Analysis (MPA) using AI/ML technologies, Geothermal projects (GT) to carve out potential areas for G4 stage mineral investigations.

Keeping in view the above demand of the nation and planned strategy in mind, GSI is taking up large number of mineral exploration programmes for different commodities including coal and lignite. During FS **2024-25**, a total of **450 Mineral Development programs** have been taken up by GSI which includes **196** projects on **Strategic and Critical commodities**. In addition during FS 2024-25, **87 Mineral Discovery** projects are also being executed. These numbers of projects are more or less evenly distributed across India, and are being executed by all the 33 nos. of State Unit Offices of GSI under respective regions.

2.0. Rationale behind procuring Handheld XRF Analyser

Keeping in view the demand of the nation in augmentation of the natural mineral resources, it is felt vital that to facilitate, and optimise the analyses in laboratories, techniques of elemental analysis at field need to be adopted in large numbers for optimising and prioritising the sample locations, types, and number of required samples for actual and optimised laboratory analyses. To cope up the above requirement, there is a need of procurement of at least 66 nos. of handheld XRF instruments for field use by geoscientists for the 33 different State Unit offices of GSI. The use of Hand held XRF in field gives ready and quick estimation of mineralogical constituents of different rock types which will also help promptly the geoscientists at field itself to prioritize identification of the sample locations, type, and number very easily for optimising the costly laboratory analysis. This will prove to be not only cost effective but will foster targeting mineral finds with first-stage scientific assessment in field after homogenization of the samples, and the same will immensely help in planning focused and targeted fieldwork and search of mineral resources.

2.1. The usage of handheld XRF may be advantageous in GSI's quest in mineral augmentation under the following mineral systems:

- Base metals such as Cu, Pb, Zn, Ag, and Mo
- Gold, including pathfinders, and litho-geochemistry
- Uranium +/- rare earth elements and pathfinders
- Nickel sulfide and laterite deposits
- Iron ore and bauxites
- Rare earth elements (REEs) such as La, Ce, Pr, and Nd
- REE pathfinders including Y, Th, and Nb

- Phosphates, potash, limestone, magnesite, and other industrial minerals
- Epithermal Sn, W, Mo, Bi, and Sb deposits
- Mineral sands such as Ti and Zr etc.

2.2. It is also understood that XRF can be used for a variety of analysis of the environment, including geology, soil surveys, and field analysis. Due to the versatility of XRF, it can be used to examine everything from sewage sludge, car exhausts, river water. It can also detect gold in field samples. XRF if purchased will offer non-destructive analytical technique to determine the elemental composition of materials by measuring the fluorescent (or secondary) X-rays emitted from a sample when excited by a primary X-ray source.

2.3. The intent of increasing the in-house capacity of Handheld XRF Analysers in GSI is also for supplementing the progress of its continued venture into the newer realms of exploration of critical and strategic minerals and hassle-free services for at least five more years in the future (03y-ear Standard warranty+02-year post-warranty AMC support) in order to achieve the desired aspirations and future requirements of GSI in field by introducing this field-based instrument in adequate numbers in GSI to suitably support GSI's continuing mineral investigation programs.

3.0. Technical specifications of each of the Handheld XRF Analyser

1. X-Ray Tube voltage: 50 KV/4W or more.
2. Anode target: Rhodium/Silver; air cooled.
3. Should have Primary Beam Filtration 8-position auto selected filter per beam per mode. **4. X-ray current range:** 5 - 200 μA
5. Detector type: Silicon drift detector(SDD) with graphene window and minimum active area of 25 mm^2
6. Detector Resolution: < 140eV FWHM @5.95 keV
7.Analytical requirement: **Elements from Magnesium (Mg) to Uranium (U) in geological samples.**
8. Limit of detection: Need to comply with following limits of detection (attach Brochure and test data) **a.** Cu, Pb, Zn, Zr, U, Th : > 5 ppm or better **b.** Mg : > 3000 ppm or better **c.** Al : > 400 ppm or better **d.** S : > 300 ppm or better **e.** P : > 300 ppm or better
9. Calibration: Instrument must be able to analyse Geological samples (e.g. automated and user selectable calibrations for oxide and sulphide matrices). **The instrument must have following calibrations –** a. **Empirical Calibration** – Instrument must have Empirical factory calibration. The supplier must provide calibration details. b. **Fundamental Parameters** – Instrument must also have Fundamental Parameters Calibration (Standard-less Calibration).
10. Color CMOS Camera: In-line aiming camera for focusing collimation area. **The system should have provision for 2nos. collimeter positions (e.g., ≤ 3mm & 8 mm) enabling discrete analyses of select domains of samples.**
11. Built-in GPS with provision for saving spectrum tagged with sample image (s) and GPS location, height etc.
12. GPS Tracking: Option for tracking the instrument using whenever it is powered on.
13. Detector Protection: The protection preferably has to be a Mechanical shutter activated/deactivated by trigger or an equivalent mechanism to be provided. Supplier must provide

details of protection along with the offer. The above said protection is in addition to the polypropylene (similar material) sheet.
14. Fail-safe proximity sensor to ensure that the analyser is in contact with the sample before starting the measurement.
15. Weight with battery: should be less than 2 kilograms.
16. Control and view live spectrum and chemistry on the colour, touch-screen display.
17. Field Stand Kit for hands-free measurement.
18. Li-ion battery (rechargeable) pack one in use and one spare; 6-8 hours' battery life continuous operation **Battery Charging accessories-Docking Station** Possibility of charging two battery (Internal & External)
19. Provision for USB storage
20. Total memory: >=16GB (combination of internal & SD card/USB pen drive)
21. Excel formatted/ csv data export
22. Sealed rugged carrying case
23. Bluetooth, USB and Wi-Fi connectivity with PC/Laptop
24. Windows 10/11 compatible PC software for offline data analysis and processing. **Software :** All Relevant software for data transfer to computer & Proper operation Of the Analyzer.
25. Sample cups: 100 numbers
26. Operating Environment **Temperature:** -10 °C to 50 °C (Continuous duty cycle with internal Fan) **Humidity:** 10% to 90% relative humidity non-condensing.
27. Polypropylene Roll of 4-micron thickness and 91.4 metre length or Polypropylene film: 1000 Units.
28. Should have Radiation safety certificate AERB.
29. Water and shock resistant storage case.
30. Dust, water protection: Either IP55 or Ip54 compliant or better.
31. As the instrument is meant for rugged usage during the field operations, preferably should comply with Drop Test Military Standard 810-G 4-foot (1.3 M) or equivalent.
32. Certification: CE compliant.
33.Essential Requirements: i. **Warranty: Three years' comprehensive warranty followed by 02 year AMC including X-ray tube against bad workmanship and manufacturing defects except any breakage or damage.** ii. **Make & Model:** Make & Model of the hand held XRF analyser is to be mentioned in the quotation. iii. **Certification:** Company must be ISO certified company. Supporting documents should be provided. iv. **The System should be of latest generation fully, should be user friendly and versatile for varieties of samples and should be able to display highest sensitivity (e.g., expected CPS 5 lakh or better) for geological samples of lower concentration as well (i.e., for e.g.,<10ppm) with high accuracy and reproducibility.** v. **Supporting Documents:** Supporting brochures/catalogues/order copies of the quoted model

is to be provided.

vi. **Operation Manual:** Operation Manual for User with Do's & Don'ts. (Hard and soft copies).

vii. **Technical Manual:** Technical Manual is to contain Wiring, Power & Control Circuit Diagram & Quick Troubleshooting Guide. (Hard and soft copies).

viii. **User List:** The bidder or company should have supplied the similar instrument to IITs, NITs, CSIR labs etc. or any government organization/institute in the last 5 years. Bidders must attach the Purchase Order (PO) copies along with list of users with their phone numbers, email addresses and instrument installation reports.

ix. **Service Support:** Supplier should respond within 72 hours from the lodge of the complaint about service.

x. **Free Installation, Commissioning & Training:** To be provided.

xi. **Compliance statement with supporting documents**: The bidder has to attach a compliance statement sheet as per tender requirements with OEM'S supporting documents. Each required points of tender must be available in the attached OEM's supporting documents such as catalogues/brochures/technical data sheets/manuals.

xii. **Spares**: state availability of spares for five years.

xiii. **Consumable & spares:** List of the consumables and spares to be supplied with the system.

xiv. **Guaranteed specifications to be demonstrated at the time of installation**. Any necessary standard samples for that purpose should be brought by the Service Engineers

xv. **On – site training of our staff in operation and maintenance** is essential by factory trained personal.

xvi. **Printed literature** in support of compliance to the prescribed specifications is to be submitted.

xvii. **Compliance report** needs to be submitted as a part of the technical bid.

xviii. **Details of the standard samples** to be provided by the company for testing the instruments at the time of installation at site for the demonstration of the performance of equipment. Essential standards for checking the analytical reproducibility and accuracy of instrument should be provided by the vendor along with instrument.

xix. In case during shipment period **newer versions of software**/hardware is available with vendor in lieu of the existing one for which Letter of Credit was opened, then improved version should be made available without any extra cost.

xx. **GSI reserves the right to visit installation in India** of similar capabilities the details with to regard to such installation should be given as a part of technical bid

xxi. **Technical evaluation** by the GSI may include demonstration to verify functionalities and capabilities of the system quoted.

4.0. Product Price details (Tentative):

The product price **as mentioned below is based on the outcome of GSI's most recent procurement of one such instrument through GEM in April 2024 (GSI PO dated 06.04.2024 is attached) at GSI, Bengaluru office.**

Item description	**No. of units required**	**Unit price (INR)**	**Tax bifurcation**	**Price (Inclusive of all Duties and Taxes in INR)**
Handheld XRF Analyser	66	2,250,042	NA	14,85,02,772
AMC details				
Service year		**AMC frequency**	**AMC percentage**	**AMC amount (INR)**
AMC charges for 1st year after		Bi-annually	3.5	51,97,597

warranty period in % of cost of equipment			
AMC charges for 2nd year after warranty period in % of cost of equipment	Bi-annually	3.8	56,43,105
		Total Cost	**15,93,43,474/-**

5.0. **Fund Requirement:** The total estimated cost for sixty six (66) nos. of Handheld XRF Analyser with 03 (three) years warranty and 02 (two) years post-warranty AMC including the custom duty, IGST, GST on AMC cost, and other statutory Govt. duties/ taxes is INR **15,93,43,474/-(Rupees Fifteen crores Ninety three lakhs Forty three thousands and four hundred seventy four).**

6.0. Procurement challenges and Timeline for procurement, Installation, Commissioning, and Payment liability:

	FY: 2024-25								FY: 2025-26
Activities	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**April, 2025**
Proposal submission to NMET									
Approval by NMET									
Tendering Phase									
Issue of PO									
Manufacturing phase									
Shipment & LOC payment (90%)									
Payment after commissioning and training (10%)									