LABORATORY SERVICES Brochure

2025

DE BEERS GROUP

De Beers Laboratory Services
Johannesburg/Kimberley
South Africa
Lab.Requests@debeersgroup.com

Welcome to
De Beers Laboratory Services South Africa

De Beers is an acknowledged industry leader for best practice in diamond exploration, mining, jewellery and diamond related technologies. De Beers Exploration has invested in dedicated indicator mineral and diamond laboratories along its journey to being the world's leading diamond company. The De Beers Laboratory Services consists of specialised laboratories that support both the discovery of new diamond deposits as well as resource extension projects at existing operations. These include the Indicator Mineral Laboratory (IML) based in Johannesburg, as well as the Kimberley Microdiamond Laboratory (KMDL) based in Kimberley.

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World class services

The laboratories offer world class sample treatment and analysis services including:

- Kimberlitic indicator mineral concentration through density and magnetic separation methods including Dense Media Separation (DMS), Low and High Intensity magnetic separation and Lithium Silico Tungstate heavy liquid separation.
- Kimberlitic indicator mineral recovery from both greenfields and kimberlite samples.
- Quantitative chemical analysis of minerals through Electron Probe Micro Analysis (EPMA; major elements), Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS; trace elements) and U-Pb zircon geochronology.
- Thin-section and petrographic slab preparation.
- Microdiamond recovery and analysis (MiDA), including weighing and classification of individual microdiamonds.

International Organization for Standardization ISO 14001 : 2015

International Organization for Standardization ISO 45001 : 2018

Setting the standard for diamond exploration laboratory service excellence and quality

sanas Testing Laboratory T0899

sanas Testing Laboratory T0941

About Us

and our dedication to quality and safety

Laboratory Services invests in state-of-the-art commercial and proprietary technology that has been developed in-house to meet the unique challenges associated with the processing and analysis of diamond exploration samples.

The individual laboratories regularly participate in international, national and internal proficiency testing programs. Combined with SANAS ISO/IEC 17025 accreditation, this ensures that international standards are maintained for laboratory procedures, sample treatment processes, methodology, validation, QA/QC and data handling.

The IML is ISO17025 accredited for the recovery and EPMA analysis of indicator minerals and the KMDL is ISO17025 accredited for microdiamond recovery and analysis.

Certified reference standards, simulants or spikes, in-house controls and/or blanks are used for each batch or consignment of samples processed. A re-analysis program for selected samples is undertaken to ensure consistency and confidence in reported data as part of the overall QA/QC component. Laboratory Services uses an advanced Laboratory Information Management System (LIMS) for logging of samples, tracking, quality control and electronic reporting. LIMS is hosted on a secure network with rigorous data protection protocols.

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Risk Management

Upon receipt of sample material, Laboratory Services continually and effectively manages all environmental, community, occupational health and safety (ECOHS) risks related to maintaining sample integrity, storage, handling and disposal requirements. In order to meet the specifications of the Occupational Health and Safety Act and the National Environmental Management Act, Laboratory Services conforms to the requirements of ISO14001:2015 and ISO45001:2018. Risks related to sample handling during transport from source to service are managed by the material dispatcher through the application of dedicated contractor management processes involving selection and on-going performance monitoring of experienced and suitably qualified vendors.

Business Integrity and Compliance

Laboratory Services is committed to maintaining the highest degree of confidence, confidentiality and impartiality towards all its customers. The services offered are underpinned by the De Beers values and policies which ensure compliance to local and international laws and ensure the accuracy and validity of reports and results that are provided to our customers. Laboratory Services meets the requirements of the Diamond Act and the Kimberley Certification Scheme Process as well as the Responsible Jewellery Council Best Practice Principles (RJC BPP).

Our staff receive regular Business Integrity training and are required to comply with guidance documents and procedures that specify impartiality and confidentiality of customer data at the highest standard. Our Code of Conduct sets out the standards and expected behaviours which guide how we do business.

Selection of Methods

Laboratory Services offers a wide array of sample treatment and analysis options to suit different client requirements. Accuracy and precision requirements, in combination with the intended end use of the laboratory results, should be the primary consideration for a customer when deciding on which service offering/s to select.

We encourage clients to discuss their projects with us and, where possible, to visit the laboratories to assist with selection of the most suitable methods to address their needs.

IML
Indicator Mineral Laboratory

Kimberlitic Indicator Mineral Sample Treatment & Concentration

The IML operates a flexible treatment circuit with two separate streams: one for reconnaissance samples and one for kimberlite samples. The streams operate in isolation to prevent any possibility of cross-contamination. Upon receipt, samples are first logged into LIMS. Following crushing and wet and dry screening to the requested size fraction, samples are treated through a mini-DMS. This is followed by ultrasonic bath cleaning before low intensity magnetic separation and lithium silico tungstate heavy liquid separation. Depending on the mineral composition, high intensity separation and electrostatic separation can be applied. Sample treatment processes can be tailored for each project to suit sample mineralogy.

Standard size fractions:

+0.250 -0.500 mm

+0.425 -0.710 mm

+0.500 -1mm

+0.710 -1mm

>1mm

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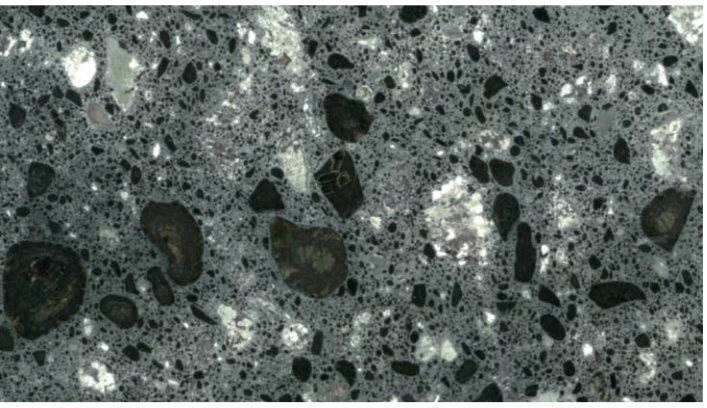
Thin Section and Slab Preparation

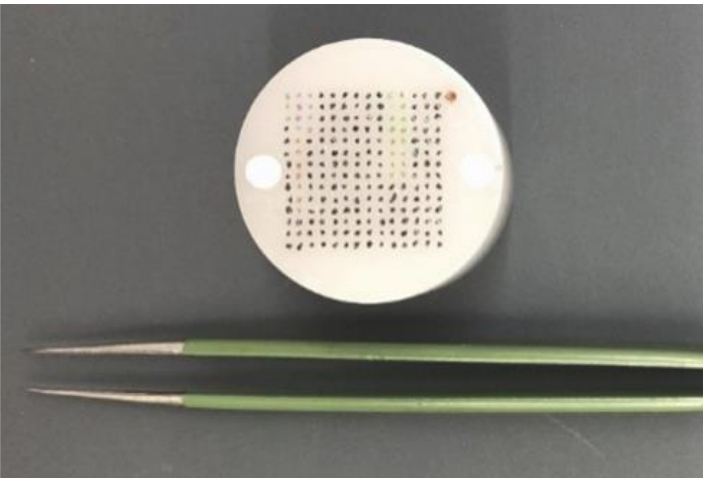


The Petrographic Services section can prepare thin sections and polished slabs from rock samples for petrographic examination and microanalysis. Thin sections can also be prepared from drill chip material, provided the chips are of adequate size. Depending upon the intended end-use, the thickness of the thin sections will be prepared accordingly.

Kimberlitic Indicator Mineral Recovery and Characterisation

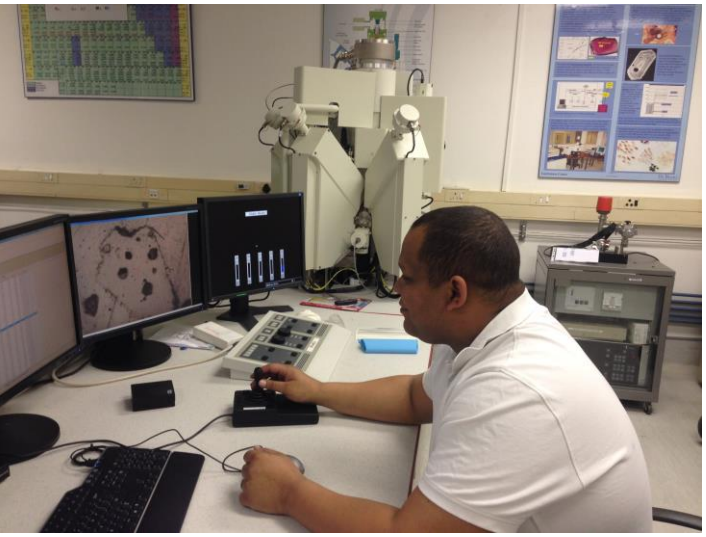
The IML routines recovers garnet, chrome diopside, ilmenite, spinel, diamond and olivine for major and trace element analysis, as well as zircon for geochronology. Quality control checks aim to ensure 80% recovery of kimberlitic indicator minerals. Characterisation of grains for colour, breakage, abrasion and texture, depending upon the mineral species, can be undertaken upon request. The IML is ISO17025: 2017 accredited for the recovery of kimberlitic indicator minerals.

Mineral Grain Mounts



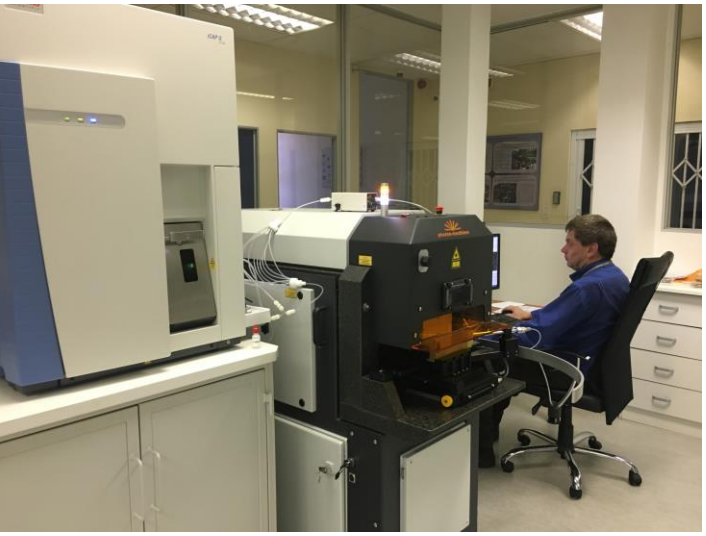
Preparation of extracted minerals into polished mounts for microanalysis on analytical instrumentation (e.g., EPMA, LA-ICP-MS, SEM) is available as a separate service offering. Grains as small as +0.25mm can be prepared into epoxy grain mounts containing over 100 grains per grain mount (dependent upon the grain size).

Electron Probe Micro Analysis



Mounted grains are individually digitized to generate reference locations. Thereafter, grains are analysed using microbeam technology on one of three Cameca SX100 or SXFive generation EPMA instruments. This technique produces non-destructive, quantitative major element chemical concentrations of extracted minerals. The IML is ISO17025:2017 accredited for EPMA of indicator minerals. A 10 second analysis time is standard, but this can be increased as required. The IML follows rigorous quality standards to ensure results are as accurate as possible. Details regarding the calibration and optimisation of the EPMAs is available on request.

Laser Ablation Inductively Coupled Plasma Mass Spectrometry and Geochronology



Trace element concentrations (including rare earth elements) in kimberlitic garnets and chrome diopsides are obtained from LA-ICP-MS, using NIST610 and internal calibrated standards. LA-ICP-MS analysis of mantle and crustal zircons can be performed for geochronological calculations. Geochronology verified standards (GJ-1 and 91500) are routinely used for verifying age calculations. For each method, one or more standard analysis is undertaken for every 10 unknown analyses to ensure that the results issued are accurate. Details regarding the calibration and optimisation of the LA-ICP-MS instruments are available on request.

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Following completion of QA/QC activities, a detailed report is generated for each consignment. Reports include a PDF document summarizing the methodology used and the overall quality of results, and a database of analytical results.

Quotes are prepared on a per project basis, dependent upon specific client requirements. For more information, please contact Dr Louise Coney at Lab.Requests@debeersgroup.com

Dr Louise Coney (Pr. Sci. Nat, FGSSA)
Technical Manager: IML

Microdiamonds

KMDL Kimberley Microdiamond Laboratory

The KMDL is a dedicated microdiamond recovery facility. Following receipt and logging into the LIMS system, samples are dried at 110 °C for about 17 hours, with the exact length of time varying according to sample type, mass and moisture content. Aliquoting is undertaken for samples greater than 25 kg to ensure they are amenable to chemical treatment in the reactors. Samples are then crushed using oscillatory crushers customized to minimize diamond breakage by increasing inter-particulate comminution. Two crusher gap settings can be preselected by clients. Operating diamond mines running resource extension programs normally prefer the 6 mm parameter due to higher likelihood of encountering larger diamonds. For ore bodies that are competent or have a high hardness score, an additional primary crushing operation is performed.

A combination of hydrofluoric acid and hydrochloric acid (HF/HCl) are used to liberate the entrained microdiamonds. The chemical processing parameters have been carefully formulated to optimize microdiamond recovery. Kimberlitic rocks reduce extremely well with the formulation developed over many years. Difficult sample materials e.g., those having a high proportion of country rock with refractory minerals may require additional retreatment steps to achieve the required mass reduction (>99%) for hand sorting.

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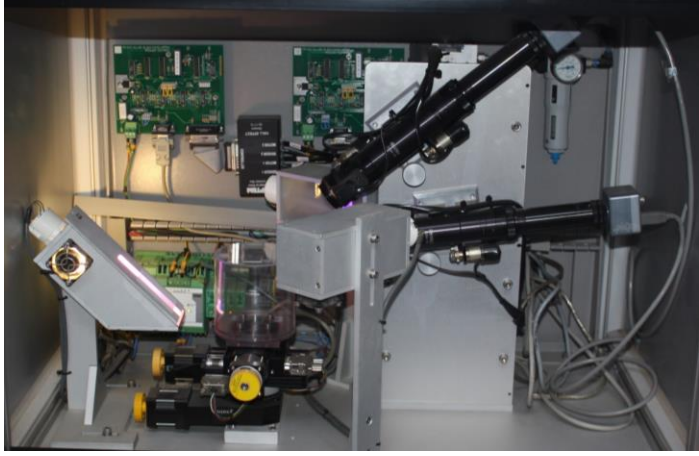


Samples that weigh >2 kg after HF/HCl acid treatment undergo a two-hour High Temperature Induction Melting (HTIM) treatment using a flux at 500 °C to further reduce the quantity of resistate and refractory minerals. The remaining concentrate is dry screened for ease of sorting under a microscope. The process involves screening a nominal <3 g concentrate sample using a sieve shaker fitted with proprietary anti-static measures to ensure that very fine microdiamonds are not lost.

The screened concentrate is hand sorted, and any microdiamonds present are recovered. This process depends on highly skilled individuals trained to correctly identify microdiamonds and characterize diamond features. Microdiamonds are individually picked, weighed and shape classified with any additional notable features captured for each microdiamond such as colour and inclusions. The KMDL utilizes internally developed proprietary technologies that can weigh individual microdiamonds down to 1 microcarat.

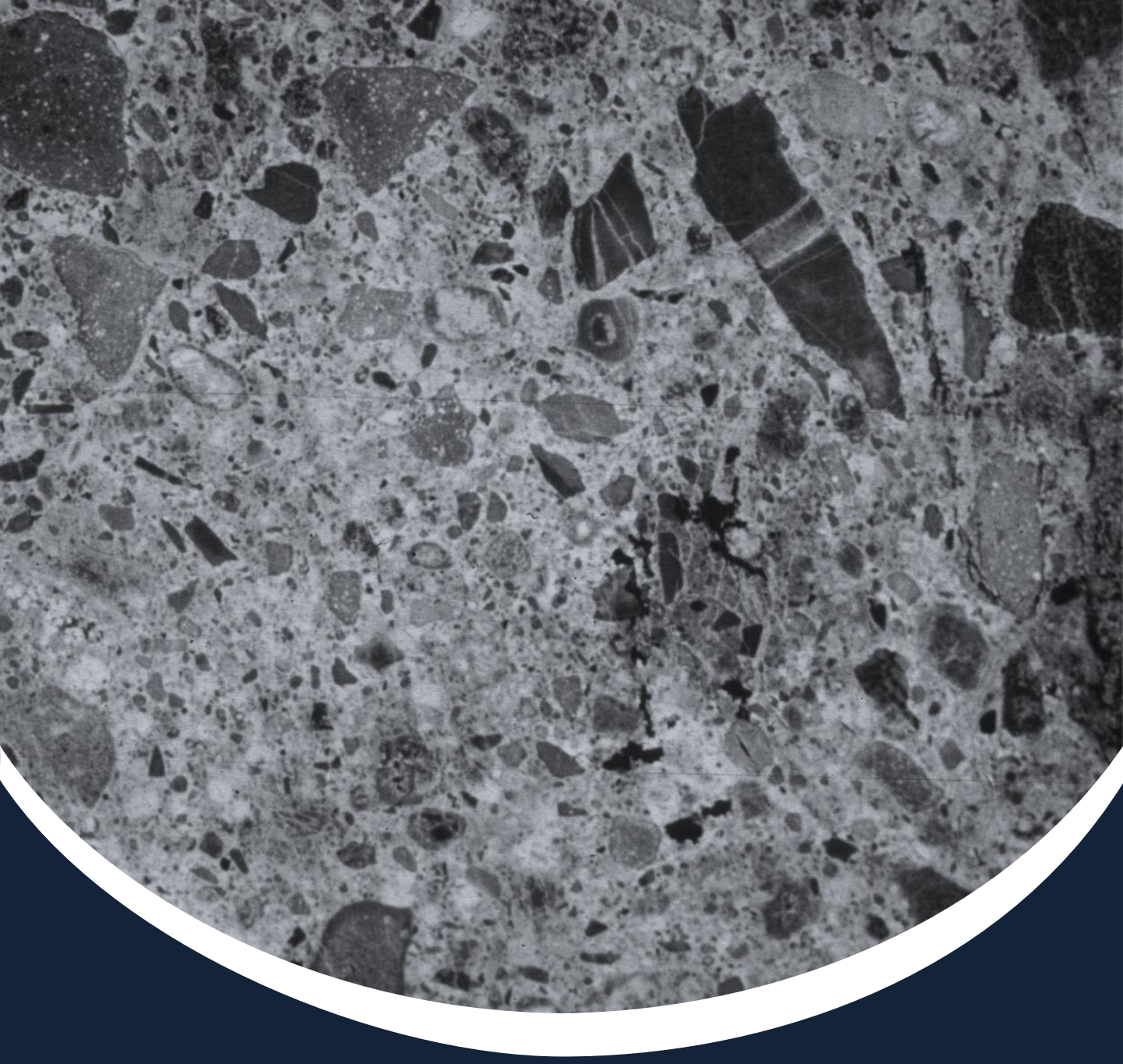
Following completion of QA/QC, a detailed report is generated for each consignment, including a PDF document and a database of microdiamond recoveries. A summary of the overall quality of the results is included in the PDF document.

Please be sure to discuss freight and transport arrangements with us when submitting samples. We routinely coordinate sample transport on behalf of clients, but these costs are passed on to the client and prices are subject to change. Our Technical Administrator, based in Johannesburg, provides assurance and guidance in terms of diamond movement (locally and internationally). This is undertaken in accordance with Best Practice Principles and relevant legislation including the Diamonds Act and the Kimberley Process. The Technical Administrator also liaises with SARS Customs and the South African Diamond and Precious Metals Regulator, maintaining a good working relationship with these government departments.

For more information and quotations, please contact Gwyneth Adams or Jesse Moyo at Lab.Requests@debeersgroup.com

Jesse Moyo

Technical Manager: KMDL



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