



# GRAPHITE

Independent Metallurgical Operations Pty Ltd (IMO) has significant experience in the development of Graphite process flowsheets. Our team has proven capabilities in the design and management of Graphite testwork programs, project feasibility studies and operations throughout Australia and worldwide.

Our scope of service ranges from geometallurgical characterisation, through to management of process development testwork, process flowsheet design, scoping, prefeasibility and definitive feasibility studies, client representation, plant commissioning, ramp up and process plant optimisation.



## PROJECT

## CLIENT

## OUR WORK

**Graph-Mada Graphite Mine, Madagascar**

Bass Metals Ltd

Onsite process plant audit, surveys, graphite recovery increase and commissioning of upgraded equipment. Offsite and onsite metallurgical testwork utilizing current process plant to size new equipment for process plant upgrade. Process plant upgrade design and process engineering. Commissioning of upgraded process plant in Q2 2018.

**Nicanda Hill and Ancuabe Graphite Projects, Mozambique**

Triton Minerals Ltd

Management and supervision of FS testwork program including variability testwork, achieving >98% TC concentrates on selected size fractions. Client process engineering assistance.

Competent person signoff on ASX statements.

Generation of bulk marketing concentrates. Pilot Plant operation assistance and supervision.

Graphite technical marketing including product quality relative to key market specifications. Scoping and design of technical marketing product testwork and preparation of product data sheets.

**Epanko Graphite Project, Tanzania**

EcoGraf Ltd (former Kibaran Resources Ltd)

Graphite feasibility flowsheet development testwork including conventional and vibra-milling comminution, gravity and magnetic beneficiation; flotation; product dewatering and drying plus hydrometallurgical leaching studies.

Design and Management of a 2 tonne semi continuous pilot plant.

Process engineering support on client's HF-free purification process.

Metallurgy & process engineering client representative in FEED study.

Metallurgical Support.

Independent Review of South African metallurgical laboratory report.

**Nunasvaara Graphite Project, Northern Sweden**

Talga Resources Ltd

Microcrystalline Graphite flowsheet development testwork and scoping study based on parallel production of Graphite and Graphene product streams through to locked cycle testing and pilot stage flowsheet validation.

Graphene product refining to generate a >99% TC product suitable for customer testwork.

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## IMO Consulting & Operations

Independent Metallurgical Operations Pty Ltd  
 88 Thomas Street, West Perth, Western Australia, 6005  
 Phone: +61 8 9254 6900 Fax: +61 8 9322 1808  
 Email: [imo@indmetops.com.au](mailto:imo@indmetops.com.au)

## GRAPHITE (continued 1)

PROJECT	CLIENT	OUR WORK
<b>Caula Graphite Project, Mozambique</b>	Mustang Resources	Graphite Beneficiation amenability testwork and flake characterisation.
<b>Kambale Graphite Project, Ghana</b>	Castle Minerals	Metallurgical testwork characterizing the flake content and graphite grade of final saleable concentrate. Bench scale optimisation testwork followed by a bulk flotation program which generated a saleable (>95%) bulk graphite concentrate. Concentrate currently being tested to confirm lithium-ion battery suitability via downstream micronisation / spheroidisation, purification and battery testwork.
<b>Graphite Purification Project, Australia</b>	Hazer Group	Development of an electrochemical leaching and purification process to remove Iron from synthetic graphite, testwork included flowsheet scale up, based on a testwork and design data review. Testwork was followed by a conceptual study, based on full-scale ECPP circuit production expected to be 15 tonnes per day of graphite feed.
<b>Oakdale Graphite Project (Oar Resources), South Australia</b>	Battery Limits Pty Ltd	Flowsheet development and graphite beneficiation amenability testwork to produce a saleable graphite concentrate.
<b>Orom-Cross Graphite Project (Blencowe Resources), Uganda</b>	Battery Limits Pty Ltd	Bulk pilot flotation testwork program which generating a onspec saleable graphite concentrate, followed by tailings characterisation testwork.
<b>Orom-Cross Graphite Project, Uganda</b>	Blencowe Resources	Heap Leach Amenability Study using tailings produced by a graphite pilot plant conducted on Blencowe's oxide ore.
<b>Springdale Graphite Project (Comet Resources), Western Australia</b>	Battery Limits Pty Ltd	Optimised graphite flotation testwork which generated a saleable concentrate.
<b>Balama Graphite Project, Mozambique</b>	Syrah Resources Ltd	Independent technical assessment of process plant, including a technical data review based on the definitive feasibility study and historical project testwork. Examination of alignment of the supporting testwork with process plant performance and mine plan.
<b>Lump Graphite Operation, Sri Lanka</b>	Margosa Graphite Limited	Due diligence on the potential acquisition of a graphite operation in Sri Lanka, aiming to produce a refined spheroidised product suitable for the battery industry. This included on-site process plant evaluation, capital cost estimate, mass balance, process flow diagram, process design criteria (PDC) and CAPEX.

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## GRAPHITE (continued 2)

PROJECT	CLIENT	OUR WORK
<b>Sarytogan Graphite Project, Kazakhstan</b>	Copperbelt AG	Graphite flotation development and optimisation testwork, determining the distribution and quality of flake graphite of the project.
<b>Sarytogan Graphite Project, Kazakhstan</b>	Sarytogan Graphite Ltd	Bench scale optimisation and bulk flotation testwork program to generate a bulk graphite concentrate for further downstream refinery and battery testwork.
<b>Lac Rainy Graphite Prospect, Canada</b>	Corporate Recovery Services	Independent review of previous metallurgical testwork program. Scoping and management of an additional testwork program which generated sufficient material for downstream refinery and battery testwork.
<b>Springdale Graphite Project, Western Australia</b>	Comet Resources Ltd	Graphite flowsheet development to produce a saleable concentrate. Graphene flowsheet development including electrochemical exfoliation. Graphene Nano Platelet generation. Battery testwork management.
<b>Yongwon Graphite Project, South Korea</b>	Peninsula Mines Ltd	Graphite flowsheet optimisation on a fine graphite ore. Achieved a 97% TC final concentrate grade from flotation only. Competent person signoff on ASX statements.
<b>Mongolian Graphite, Mongolia</b>	Asian Battery Minerals	Flowsheet development and metallurgical testwork to characterise the flake content and graphite grade of a final saleable concentrate.
<b>Geumam Graphite Project, South Korea</b>	Battery Mineral Resources Ltd	Data review, flowsheet development for the production of a saleable graphite concentrate and scoping of testwork program.
<b>Tanzanian Graphite Project, Tanzania</b>	Eminent Minerals Ltd	Metallurgical testwork to characterise the flake content and graphite grade of a final beneficiation concentrate generated from a graphite bearing ore.
<b>Burke Graphite Project, Queensland</b>	Strike Resources Ltd	Process flowsheet development for the production of a saleable graphite concentrate. Metallurgical testwork determining the amenability of graphene electrochemical exfoliation on the project's ore.

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## GRAPHITE (continued 3)

PROJECT	CLIENT	OUR WORK
<b>Graphite Bull Project, Western Australia</b>	Buxton Resources Ltd	Production of a saleable (>95%) graphite concentrate utilised in a downstream process which generated a final spheroinised purified (>99.95 TGC) product suitable for use in lithium-ion batteries.
<b>Burke Graphite Project, Western Australia</b>	Lithium Energy	Metallurgical bulk flotation program to generate a saleable bulk graphite concentrate for further downstream refinery testwork.
<b>Donnelly River Graphite Deposit, Western Australia</b>	CSA Global Pty Ltd	Metallurgical testwork (flotation) to characterise the amenability of the deposit's ore to beneficiation.
<b>Ajana Graphite Project, Western Australia</b>	Anson Resources Ltd	Graphite flowsheet optimisation and sample characterisation testwork program management. Competent person signoff on ASX statements.
<b>Toamasina Graphite Project, Madagascar</b>	Cougar Metals NL	Graphite flowsheet development testwork to produce a high flake (>65% +180 µm) high grade (>98% TGC) graphite concentrate. Competent person signoff on ASX statements.
<b>Kookaburra Gully Graphite, South Australia</b>	Lincoln Minerals Ltd	Design and Management of PFS level Metallurgical Testwork covering: Comminution, Flotation and Comprehensive Tailings Characterisation.  Development testwork as potential purification method.
<b>Antsirabe Graphite Mine, Madagascar</b>	Power Stand Development Ltd	Testwork management and metallurgical testwork: Graphite ore comminution characterisation and graphite processing flowsheet development and flake characterisation.
<b>Leliyn Graphite Project, Northern Territory</b>	Kingsland Minerals Ltd	Flowsheet development and graphite beneficiation amenability testwork to produce a graphite concentrate.
<b>Balama Graphite Project, Mozambique</b>	Mustang Resources	Process flowsheet development testwork on oxide ore to determine potential graphite flake content using a proven flowsheet and expandable graphite testwork on specific concentrate fractions.

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