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RESEARCH
INDEPENDENT INVESTMENT RESEARCH

# MTM Critical Metals (MTM)

October 2023

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INVESTMENT RESEARCH

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# Contents

# MTM Critical Metals Limited (MTM)

# October 2023 - Initiation

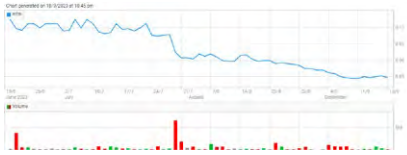
**Note**: This report is based on information provided by the company as at October 10, 2023

| Investment Profile | |
|---|---|
| Share Price - October 10, 2023 | $0.036 |
| 12 month L/H | $0.22/$0.034 |
| Issued Capital: | |
| Ordinary Shares | 99.34 m |
| Listed Options | 52.83 m |
| Unlisted Options | 0.75 m |
| Unlisted Options - Escrow | 9.50 m |
| Performance Rights | 0.7 m |
| Fully Diluted | 161.1 m |
| Market Cap - Undiluted | $3.58 m |
| Cash (30 June 2023) | $2.56 m |

| Board and Management |
|---|
| Mr John Hannaford - Non-Executive Chairman |
| Mr Lachlan Reynolds - Managing Director |
| Mr David Izzard - Non-Executive Director |
| Mr Anthony Hadley - Non-Executive Director |
| Mr Simon Adams - CFO and Company Secretary |
| Mr Antony Zebisch - Exploration Manager |

| Major Shareholders | |
|---|---|
| Mr David Izzard | 7.23% |
| Bowman Gate Pty Ltd | 5.19% |
| Mr John Hannaford | 4.90% |
| Top 20 | 69.2% |
| Board and Management | 12.85% |

**Share Price Performance**



The investment opinion in this report is current as at the date of publication. Investors and advisers should be aware that over time the circumstances of the issuer and/or product may change which may affect our investment opinion.

## THE ENERGY REVOLUTION

Following the acquisition of the highly prospective brownfields Pomme and Montveil South Projects in Quebec, Canada, and discovery of rare earth mineralisation at the East Laverton project in Western Australia, MTM Critical Metals ("MTM" or "the Company") is focussing activities on the energy metals sector, particularly REEs. Although showing some weakness at the moment, we expect that the sector should pick up, driven by the ongoing developments in the decarbonising economy.

Having acquired the Quebec projects from Geomega Resources Inc (TSX-V: GMA, "Geomega"), the Company has a head start on activities at the projects, in that it has access to Geomega's IP and personnel, with significant experience on the adjacent Montveil deposit. Geomega has worked on Montveil for over 10 years, and for which critically, significant metallurgy has been undertaken, which has resulted in the development of a patented process.

Metallurgy is the key issue in the development of rare earth projects, with significant R and D ongoing in the space (included that funded by governments), particularly given the wish to diversify supply away from China.

Montveil, a hard rock carbonatite deposit, has an NI43-101 compliant Mineral Resource Estimate ("MRE") of 266.6 Mt @ 1.46% TREO (including 0.32% NdPr, or 22% of the total REO content), and low thorium and uranium. It is the most accessible undeveloped REE deposit in Canada, and also the largest bastnaesite (a key REE bearing mineral) deposit in North America.

Pomme, just seven kilometres away is interpreted as being of the same intrusive event as Montveil (Montveil South covers part of the same body as Montveil), and recent broad spaced drilling by the Company intersected similar rock types and mineralisation in all 13 holes drilled. Assays returned to date have been very positive, with overall intersections of up to 513 m @ 0.33% TREO, including higher grade zones of up to 26.5 m @ 1.45% TREO.

These styles of deposit are important sources of rare earths, albeit with most production from upgraded weathered zones in regions of deep weathering. However, with ongoing developments in metallurgy, we would expect economic cut-off grades to fall, bringing more undeveloped fresh rock deposits into play to feed forecast demand.

In addition, the Company holds close to 2,000 $km^2$ of greenfields tenements over the underexplored, and not well geologically understood Burtville Terrane in the Eastern Goldfields of Western Australia.

Work by MTM to date has defined REE mineralisation hosted in weathered granites, similar in style to other Western Australian examples, and also lateritic Ni-Co mineralisation, similar to that at Murrin Murrin, just 100 km away from the Company's tenements. Both of these occurrences are still open, have returned good grades, and are a work in progress with the potential to find significantly more of these styles of mineralisation at East Laverton.

In addition, the Company holds the Mt Monger gold and Ravensthorpe projects, which are currently being assessed, with options being considered for Ravensthorpe.

With active exploration programmes ongoing we expect steady newsflow, particularly with the ongoing assay results from both Pomme and Western Australia.

## KEY POINTS

**Prospective geology and mineralisation - this is not moose pasture:** Pomme and Montveil South in particular a brownfields projects, however the work at East Laverton has demonstrated the prospectivity of the relatively poorly understood ground holdings.

**Ready access:** All projects are readily accessible, without the requirement for expensive, heli-supported activities. This includes year round access at Pomme, with drilling being feasible in winter.

**Continuing drive to renewables:** Despite some periods of weakness, we see the drive to renewables to remain strong overall, and thus support the relevant sectors of the market.

**Experienced and committed Board and Management:** The Board and Management have considerable experience in the resources sector; in addition insiders hold some ~13% of the stock, aligning their interests with other shareholders.

**Well geared to exploration success.** With an EV of around A$1 million, MTM is well geared to exploration success.

# SWOT ANALYSIS

## Strengths

- **Proven mining destinations:** Both Quebec and Western Australia are proven mining destinations, being ranked eight and second respectively in the Fraser Institute's 2022 Annual Survey of Mining Companies.
- **Ready access to skilled labour and services:** Due to the above, the project areas, are well served by labour and services with extensive experience in the minerals industry - this includes access to Geomega personnel (with their experience on Montveil) for the work in Quebec.
- **Prospective terranes:** Both the Yilgarn and Superior Provinces, which are of a similar Archaean age are highly mineralised, with a history of mining, and additional untapped prospectivity.
- **Encouraging results:** Results from work programmes to date have provided very encouraging results, and point to the potential for all projects to drive value.
- **Ongoing decarbonising economy:** The ongoing decarbonistion of the economy will continue to drive the relevent minerals sectors, despite the current ructions in the rare earth sector.

## Weaknesses

- **Cash position and low market capitalisation:** After completion of the drilling at Pomme, we would expect that the Company will have relatively low cash reserves.

## Opportunities

- **Exploration and evaluation success:** This is the key to generating value in MTM, as for any other junior.
- **Developments in metallurgy:** Ongoing R and D in the metallurgy of REE mineralisation should lead to breakthroughs in the treatment of the various types of mineralisation, and thus benefit all players in the space.
- **Geared to success:** With an EV of under A$1 million, MTM is highly geared to any material exploration success.
- **Acquisitions:** These are potential opportunities for any company.

## Threats

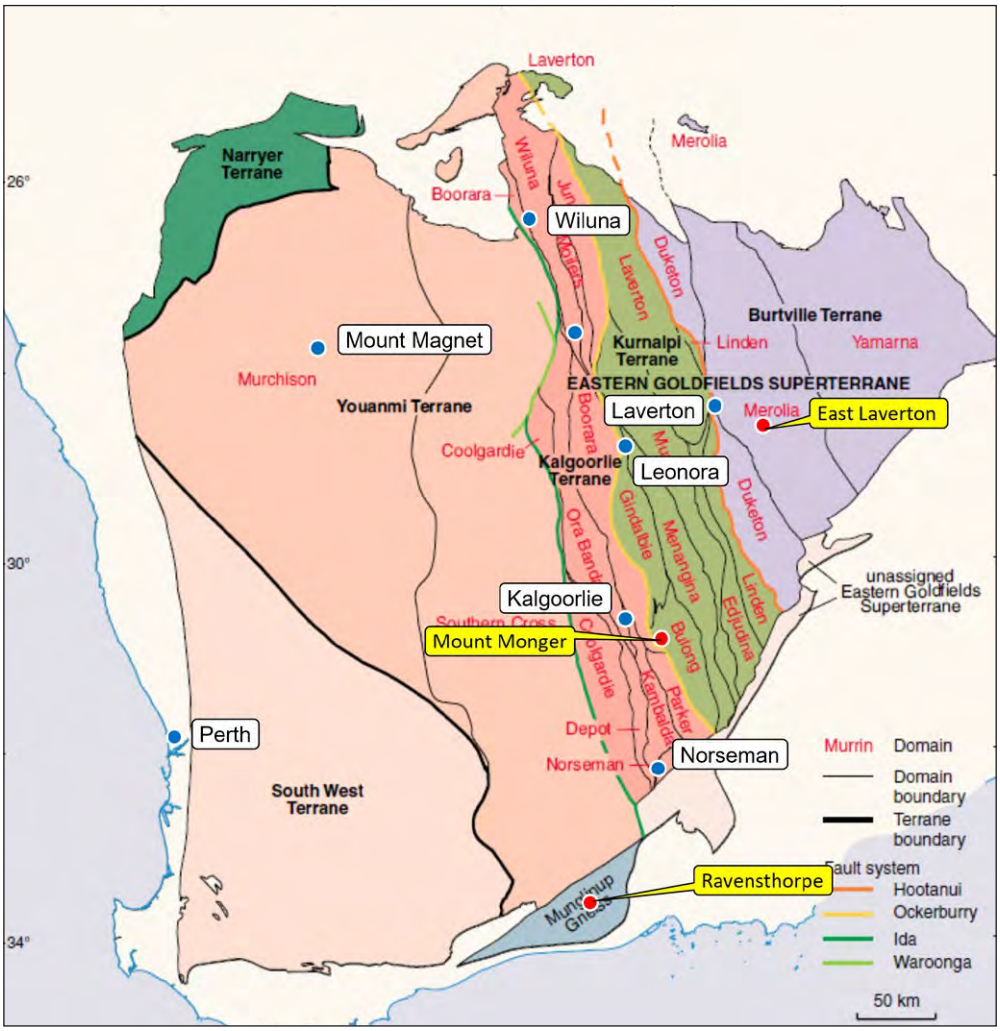
- **Equities and metals markets:** Being a junior, MTM is highly vulnerable to negative changes in the markets. Our analysis of junior exploration stocks operating in the REE space indicates that many are trading at close to 12-month lows, with the overall junior space currently lacking direction, and with investor apathy.
- **REE markets:** The REE markets are volatile, and recent times have seen a close to halving of prices from the 2022 highs - this has flowed through to the equity sector.
- **Funding:** This flows from the above, and we consider that the Company is relatively lightly funded at the moment.

# OVERVIEW

## STRATEGY

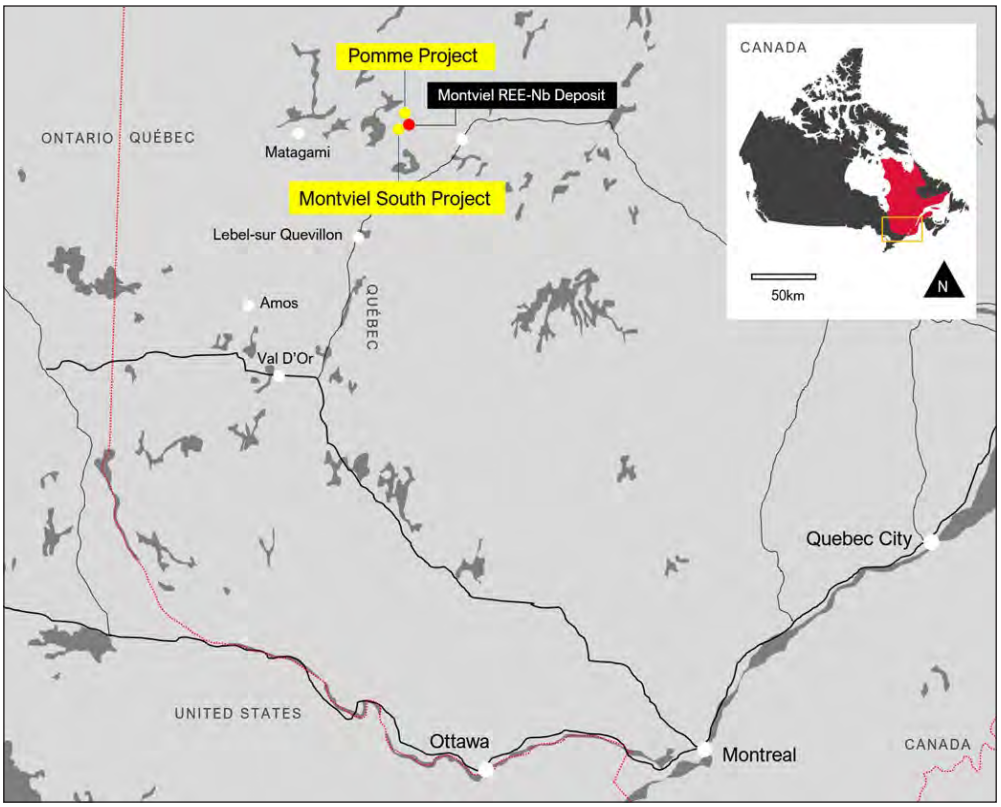
- MTM is a junior explorer with a focus on REE projects - the brownfields carbonatite hosted Pomme and Montveil South projects in Quebec (Figure 2), and the greenfields clay hosted Pt Kidman mineralisation at the East Laverton Project in Western Australia (Figure 1).
- In early 2023, the Company has entered into an option to acquire Pomme, seven kilometres from Geomega Resources Inc ("Geomega", and the vendor of Pomme) Montveil REE deposit, which has an MRE of 266 Mt @ 1.46% TREO, which was followed by entering into an option to acquire Montveil South in October 2023.
- The discovery of "clay-hosted" REEs at East Laverton, and the option over Pomme, has marked the transition to an "energy" metal focus, with, given the different field seasons between the two main projects, will also provide for year round news flow.
- The greenfields and underexplored nature of East Laverton, as well as the geology (including being largely masked by younger cover), however does not preclude the presence of other styles of mineralisation, as demonstrated by the Company's recent Ni-Co laterite discovery at the Seahorse prospect.
- MTM originally listed in September 2021, as Mount Monger Resources Limited, with the focus on two Western Australian projects, Mount Monger (brownfields, gold) and East Laverton.
- Subsequent Australian acquisitions/options included the Ravensthorpe Battery Metals Project (Ravensthorpe, for which options are being considered, and which will not be discussed further) and Albion, for which an option was entered into and then withdrawn from.
- The Company is assessing results from work at Mt Monger, with this taking a back seat to the REE projects.

**Figure 1: Western Australian project locations and Yilgarn tectonic framework**




Source: adapted from Cassidy et al 2006

**Figure 2: Pomme and Montveil South REE Project location**




Source: MTM

## CURRENT AND UPCOMING ACTIVITIES

- Current and forthcoming activities will be concentrated on compiling and interpreting received and pending results from recent work programmes, including drilling, at Pomme and East Laverton.
- This work, being undertaken in Q4, CY2023, will be used to plan an active 2024 work programme.

## FINANCIAL POSITION

- As of June 30, 2023 the Company had A$2.56 million in cash and no debt.
- Over the 12 months to June 30, 2023, the Company spent A$1.67 million on exploration and evaluation (expensed and capitalised), and A$1.64 on staff and administration.
- Over the same period the Company undertook two capital raisings:
  - A share entitlement issue of 19.5 million shares at A$0.10/share (this included 8.77 million shortfall shares that were subsequently placed) in the December quarter, 2022; and,
  - A two tranche placement of 30 million shares at A$0.10/share, raising A$3 million before cots, to be used for the Pomme REE Project in Quebec.
- The raisings were the first since the September 2021 IPO, which raised A$5 million at A$0.20/share.

## CAPITAL STRUCTURE

- The current capital structure is as follows:
  - 99.34 million fully paid ordinary, tradeable shares,
  - 52.83 million listed options, with an exercise date of November 26, 2024, and an exercise price of A$0.25.
  - 9.50 million unlisted, escrow options, with escrow dates of between 9/5/24 and 9/5/25, and exercise prices of between A$0.20 and A$0.45 per option; and,
  - 0.75 million unlisted options, with exercise dates of between 9/5/24 and 9/5/25, and exercise prices of between A$0.30 and A$0.40 per option; and,
  - 0.70 million performance rights.

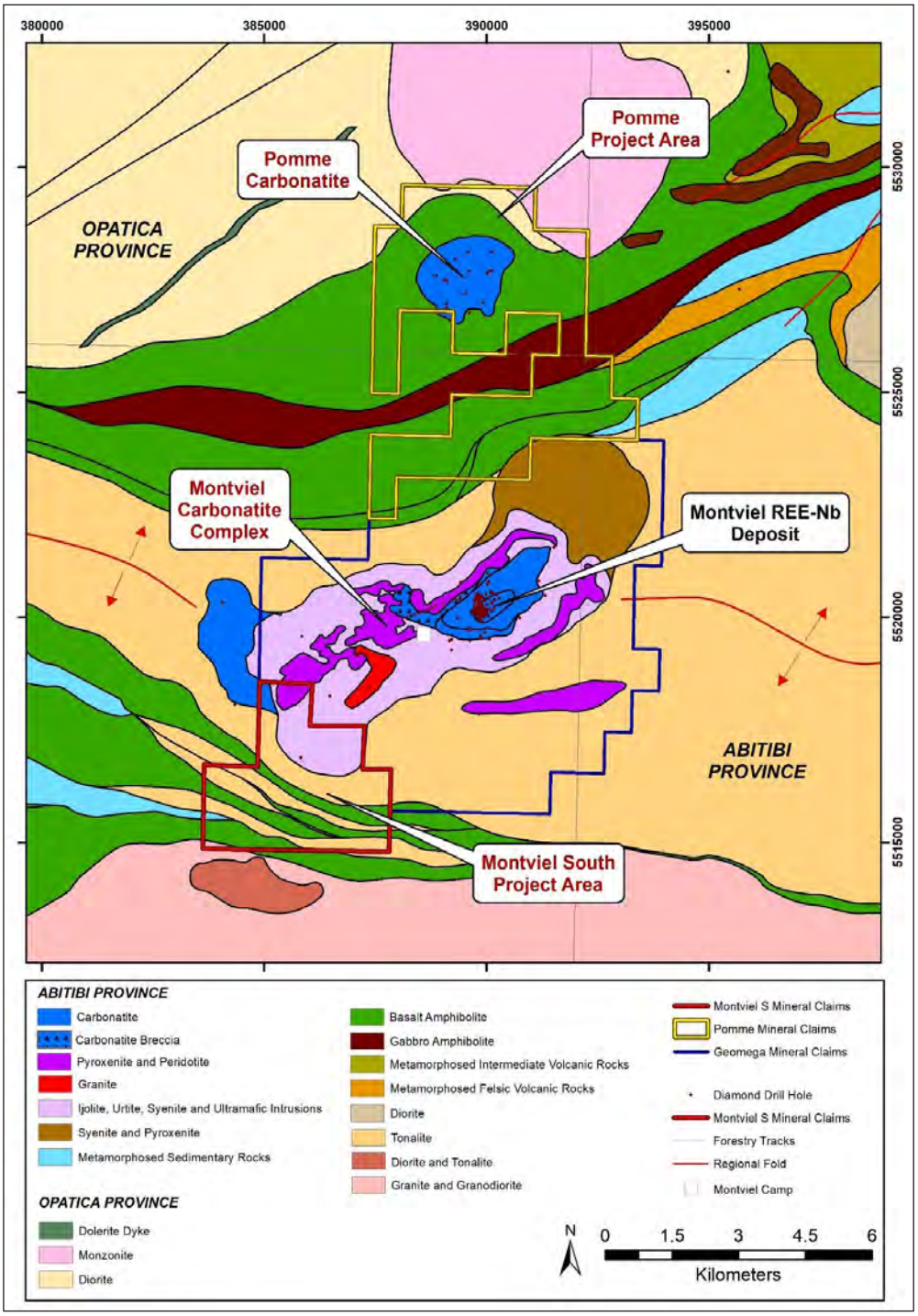
# PROJECTS

## POMME AND MONTVEIL SOUTH REE PROJECTS, QUEBEC

### Background, Location and Tenure

- Pomme and Montveil South are located south of James Bay, in South-Western Quebec, Canada (Figures 2 and 3), approximately 260 km north by road (200 km on the tarred route C113, and 60 km on formed gravel) from the major mining centre of Val-d'Or.

**Figure 3: Pomme and Montveil South claims and neighbouring Montveil property**




Source: MTM

- The nearest town is Lebel-sur-Quevillion, located 100 km south (60 km formed gravel, 40 km on route C113), with a population of ~2,000.
- Lebel-sur-Quevillion has historically been a mining and timber town, being 50 km from Nyrstar's Langlois polymetallic mine (currently under care and maintenance), and also hosting a timber pulp mill - in addition to mining the region has seen extensive logging, with the terrane being a mixture of swamps and forest.

- Val-d'Or (population ~35,000) and the "nearby" Rouyn-Noranda (population ~42,000) are the main service cities for the extensive mining in the Abitibi region, and hence Pomme has ready access to necessary skills and services.
- Pomme comprises 43 claims, each covering ~55 ha, for a total area of 23.65 $km^2$, with all in good standing, with Montveil South comprising 20 claims, for an additional ~11 $km^2$ (Figure 3).
- The lands are Category II, held by the Government of Quebec, but with the Cree having sole hunting and fishing rights, and with mining and logging rights shared.
- The claims are ultimately being acquired from Geomega, the owner of the nearby (7 km to the south of Pomme) Montveil carbonatite REE-Nb deposit (266 Mt @ 1.46% TREO & 0.14% $Nb_2O_5$).
- Critical Element Exploration Pty Ltd ("CEE"), holds an option to acquire 100% of the Pomme claims from Geomega (the CEE-GMA Option Agreement); MTM has entered into a binding option agreement to acquire all of the shares in CEE (the MTM-CEE Option Agreement).
- Total consideration for the exercise of the Pomme Options and thus acquisition of 100% of Pomme include:
  - A$1.05 million ($300,000 in cash and $750,000 in shares) over two years; and,
  - An A$2,000,000 exploration expenditure commitment over three years.
- Furthermore the A$1.05 million in cash and shares is split A$530,000 to the CEE shareholders and A$500,000 to Geomega.
- In addition, Geomega will be granted a 2% NSR royalty over all minerals produced in the tenements, with the provision for 1% to be bought back for A$1 million.
- The MTM-CEE option has been exercised, with MTM now holding all shares in CEE; the CEE-GMA option may be exercised within 120 days of completing the minimum expenditure commitments under the terms of the option.
- Total consideration for the exercise of the Montveil South Options and thus acquisition of 100% of Montveil South include:
  - C$300,000 (C$150,000 in cash and C$150,000 in shares) over two years; and,
  - A C$700,000 exploration commitment over three years.
- Geomega has a right of first refusal for all contractual work undertaken on the Project subject to charged rates being at or below standard rates for the region, and availability of personnel and equipment - Geomega personnel have extensive experience at Montveil, which can be directly translated to Pomme.

## Geology and Mineralisation

- The project is located over units of the Archaean Superior Province, near the boundary of the Opatica and Abitibi Sub-Provinces - the boundary is marked by south dipping thrusts, and the north-dipping subduction of the Abitibi Sub-proveince under the Opatica Sub-province.
- The Superior Province is the largest of the global Archaean cratons (which include amongst others the Yilgarn and Pilbara Cratons in Australia), with Superior Province ages ranging from >4 Ga to ~2.7 Ga years - the Superior Province is comprised of several accreted "microcontinents", each with different characteristics and provenances, with the boundaries marked by suture zones.
- In the Pomme area the rocks date from 2.8 to 2.6 Ga, similar in age to the Eastern Goldfields of Western Australia.
- The carbonatites however are significantly younger, with Montveil being Paleoproterozoic, dated at 1,894 +-4 Ma - Pomme is interpreted as being part of the same event.
- It is thought that the alkaline intrusive complexes of which the carbonatites are part were associated with the development of the Seguenay Rift, a failed continental rift.
- Continental rifts are a common terrane for the development of the highly fractionated alkaline intrusive complexes, with current examples including the East African Rift Zone, which hosts numerous carbonatite complexes, including the Ol Dionyo Lengai volcano in Tanzania, the only currently active carbonatite volcano globally.
- The highly fractionated nature leads to enrichment in incompatible elements, with these including the valuable REEs (dominantly Light REEs, "LREE") and niobium - as such they are a valuable source of REEs globally.

- Notable examples include Lynas's (ASX: LYC) Mt Weld deposit, with the mined material being a laterite developed above the primary carbonatite, and mineralisation in the Bayan Obo district in China, related to Proterozoic carbonatite dykes.
- Carbonatite complexes themselves can include several phases, including, amongst others:
  - Calciocarbonatite,
  - Ferrocarbonatite,
  - Silicocarbonatite; and,
  - Mixed carbonatites and polygenetic intrusive breccias.
- Different phases commonly display complex overprinting relationships.
- At Montveil and Pomme, REE mineralisation is most strongly associated with the calciocarbonatites and ferrocarbonatites, with, at Pomme these forming an outer ring, and at Montveil, the core of the relevant intrusive complex.
- The mineralisation at Montveil is interpreted as largely magmatic, with some metasomatic mineralisation, however enrichment of REEs in carbonates can also occur through hydrothermal, supergene and a combination of processes.
- Supergene enrichment (through weathering) is an important process in some deposits, including Mt Weld, however given the climatic history of the Superior Province this is not a factor at Montveil or Pomme - all mineralisation is in fresh rock.
- As mentioned earlier, mineralisation includes fluoro-carbonate and phosphate minerals, which include various amounts of the different REEs, which are dominated by the LREEs.

## Exploration History

- The Pomme carbonatite has seen little exploration, except for that which culminated in two holes drilled by Geomega in 2012.
- This followed on from a programme of surface geochemical sampling ("MMI" - mobile metal ion, which can "see" below cover) and airborne magnetics-radiometrics geophysical surveying.
- It needs to be noted that the area is covered by between 15 m and 31 m of transported glacial till, making traditional surface geological mapping and geochemical sampling useless.
- The drilling confirmed the presence of a multiphase, REE-Nb mineralised carbonatite, with intersections including:
  - **MVX-12-01** - 508.3 m @ 0.43% TREO, 413 ppm $Nb_2O_5$ and 1.48% $P_2O_5$, from 73.7 m,
    - Including: 7.5 m @ 1.28% TREO, 499 ppm $Nb_2O_5$ and 1.43% $P_2O_5$ from 319.5 m,
    - 16.5 m @ 1.44% TREO, 92 ppm $Nb_2O_5$ and 0.46% $P_2O_5$ from 403.5 m; and,
    - 7.5 m @ 1.77% TREO, 183 ppm $Nb_2O_5$ and 0.59% $P_2O_5$ from 483 m.
  - **MVP-12-02B** - 478.1 m @ 0.12% TREO, 340 ppm $Nb_2O_5$ and 2.14% $P_2O_5$, from 25.9 m to EOH.
- What is pertinent, and will be discussed, are the extensive activities undertaken by Geomega on the neighbouring Montveil property, which has a NI43-101 compliant MRE as shown in Table 1, and which was estimated in 2015.

**Table 1: Montveil NI43-101 compliant MRE**

| Montveil NI43-101 compliant MRE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Resource | | | $Pr_2O_5$ | | $Nd_2O_3$ | | $Nb_2O_5$ | |
| Category | Tonnes (Mt) | TREO (%) | Grade (ppm) | Metal (t '000) | Grade (ppm) | Metal (t '000) | Grade (ppm) | Metal (t '000) |
| Indicated | 82.4 | 1.51 | 766 | 63.2 | 2,452 | 202.0 | 1.715 | 141.3 |
| Inferred | 184.2 | 1.43 | 746 | 137.4 | 2,433 | 448.3 | 1,315 | 242.3 |
| **Total** | **266.6** | **1.46** | **752** | **200.5** | **2,439** | **650.2** | **1,439** | **383.5** |

Source: MTM

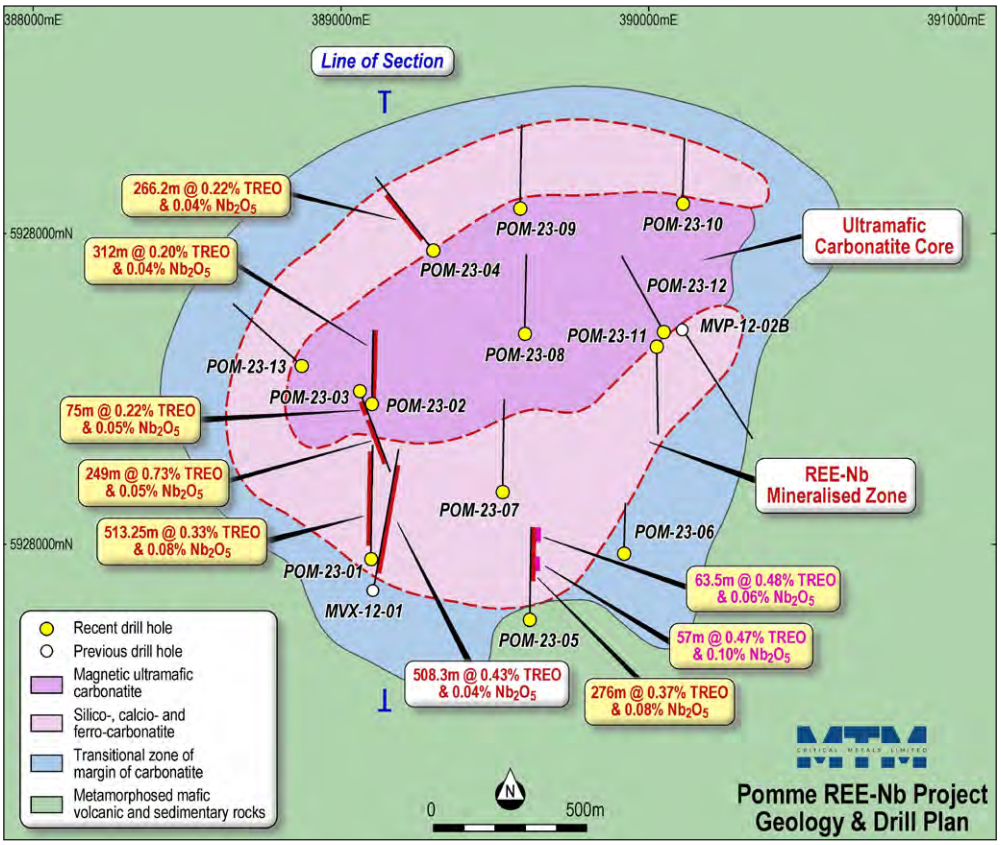
- Defined mineralisation at Montveil covers an area of 900 m (NE-SW), 650 m (NW-SE), and has been intersected to a depth of 750 m - as such it is the largest undeveloped Bastnaesite dominant REE resource in North America, and is hosted in an alkali intrusive complex measuring 10 km x 3 km (Figure 3).
- Geomega acquired the property in 2010, and between then and 2013 completed three drill programmes, which included 89 holes for 36,346 m.

- Extensive metallurgical testwork was undertaken between 2013 and 2015, with this resulting in the development of a patented metallurgical process for treatment of the mineralisation at the optimisation stage - the principal mineral is Bastnaesite.
- Since that time Geomega has had the Project on standby, to allow for the development of the scale up of Geomega's processing techniques - Geomega has changed strategy to a REE processing R and D, and REE recycling focus.
- MTM will however be able to leverage off Geomega's IP in advancing Pomme, and is using Geomega personel where possible.

## Work by MTM

- Since becoming involved in the Project in early 2023, MTM has undertaken active exploration programmes, taking full advantage of the relatively short field season.
- Initial activities included a drone magnetics survey, resulting in a detailed magnetics image of the carbonatite complex that has been used in developing the geological interpretation and drill planning (Figure 4) - different intrusive phases have distinct magnetic signatures.
- The main activity has been drilling, with the recent completion of a 13 hole diamond drilling programme, comprising 5,718 m - hole locations are shown in Figure 4.
- The estimated higher grade mineralisation is associated with a ring of silicocarbonatite, calciocarbonatite and ferrocarbonatite, which surrounds a core of magnetic ultramafic carbonatite (Figure 4).
- The fluoro-carbonate REE bearing minerals bastnaesite and cebaite have been tentatively identified, along with monazite, an REE bearing phosphate, with, in this case the monazite being relatively low in uranium and thorium.

**Figure 4: Pomme carbonate magnetic image and drillhole traces**




Source: MTM

- The drilling intersected significant mineralisation in all holes (refer to Figure 5 for an example), with this over a +2 km$^2$ area, and to a maximum depth of ~450 m (assuming no deviation in the deepest hole, which was drilled to 582 m at a surface dip of -50°).
- The drilling is also relatively wide spaced at ~500 m, and thus future drilling will include infill as necessary, particularly in areas of higher grade intersections.
- As mentioned earlier, assays have been received for three holes, with these being very encouraging (including with NdPr contents of around 20% to 22% of the TREO in broader intercepts), with examples below, and an indicative section presented in Figure 6 - the section line is shown on Figure 4.

- **POM-23-03:** 398 m @ 0.54% TREO & 0.05% $Nb_2O_5$ from 16 m, including:
  - 30.5 m @ 1.13% TREO & 0.03% $Nb_2O_5$ (from 311.5 m) including,
    - 26.5m @ 1.45% TREO & 0.02% $Nb_2O_5$.
  - 51 m @ 0.92% TREO & 0.06% $Nb_2O_5$ (from 216m) including,
    - 9 m @ 1.21% TREO & 0.03% $Nb_2O_5$; and,
    - 8.5 m @ 1.62% TREO & 0.03% $Nb_2O_5$.
  - 36 m @ 0.92% TREO & 0.06% $Nb_2O_5$ (from 174 m); including,
    - 18m @ 1.16% TREO & 0.03% $Nb_2O_5$.
- **POM-23-01:** 513 m @ 0.33% TREO & 0.08% $Nb_2O_5$ (from 32m), including:
  - 131 m @ 0.47% TREO & 0.05% $Nb_2O_5$ (from 317 m) including,
    - 2.65 m @ 1.47% TREO & 0.02% $Nb_2O_5$, and,
    - 2.65m @ 1.48% TREO.
  - 43.4 m @ 0.45% TREO & 0.12% $Nb_2O_5$ (from 216.1m)

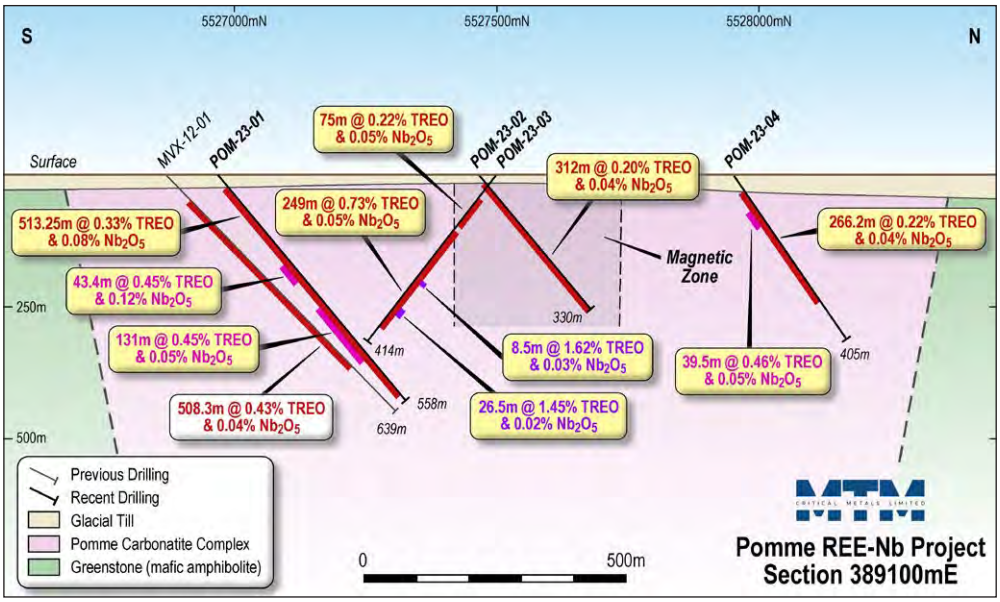
**Figure 5: Pomme drill core - description in caption at bottom**


*Figure 3: Diamond drill core (NQ, approximately 4.8 cm diameter) from hole POM-23-09 containing abundant visible REE mineralisation (dark red colour) hosted within calcio- (pale) and silico-carbonatite (dark). Approximately 474 to 482m down hole.*

Source: MTM

- What needs to be noted is the wide spaced nature of the drilling - given the large scale of the mineralisation this could be considered as "scout" drilling, with further drilling now required to define coherent higher grade zones.

**Figure 6: Pomme section, looking west**



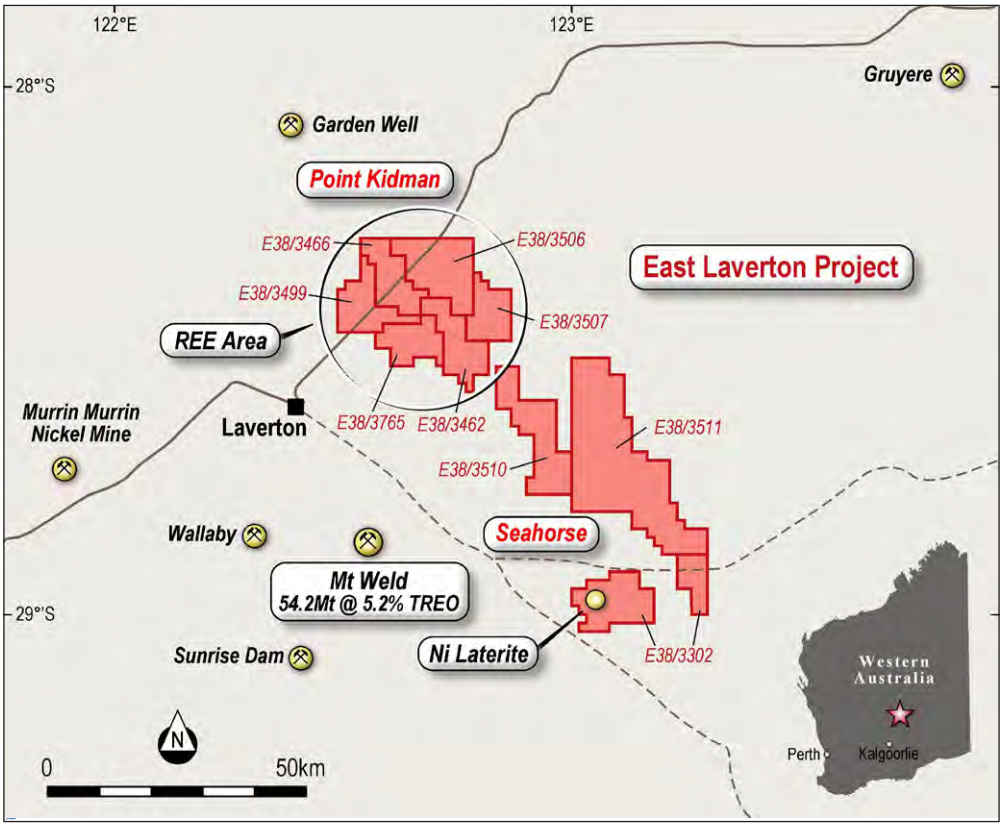

Source: MTM

# EAST LAVERTON PROJECT, WESTERN AUSTRALIA

## Background, Location and Tenure

- The greenfields East Laverton project comprises nine exploration licences ("EL") for 1,935 km$^2$, located to the east of the town of Laverton in the east of the Yilgarn Craton (Figure 7).
- The Company holds 100% of six tenements, and has earned 51% of the other three - all are in good standing, and were part of the September 2021 IPO of MTM.
- The three 51% owned tenements are under an agreement with Tevel Pty Ltd ("Tevel"), whereby MTM can earn up to 75% through:
  - Earn 51% through the expenditure of at least A$700,000 during a three year period (satisfied); and,
  - Earn an additional 24% (taking the total to 75%) through the expenditure of an additional A$1,000,000 within three years after the initial earn-in period, and completing a BFS within five years after the end of the initial earn-in period (or at a mutually agreed date).
- At either satisfaction of the initial earn-in period (if the Company elects to not enter into the second earn-in period), else on satisfaction of the second period, the Company and Tevel shall enter into an unincorporated JV with customary terms and conditions.
- The package is centred ~70 km east of the town of Laverton (population ~1,200, and administrative centre of the eponymous shire) - Laverton is 360 km by tarred road from the major mining centre of Kalgoorlie (Goldfields Highway to Leonora, and the Laverton-Leonora Rd), and is served by air from Perth.

**Figure 7: East Laverton tenement, prospect areas and geology**



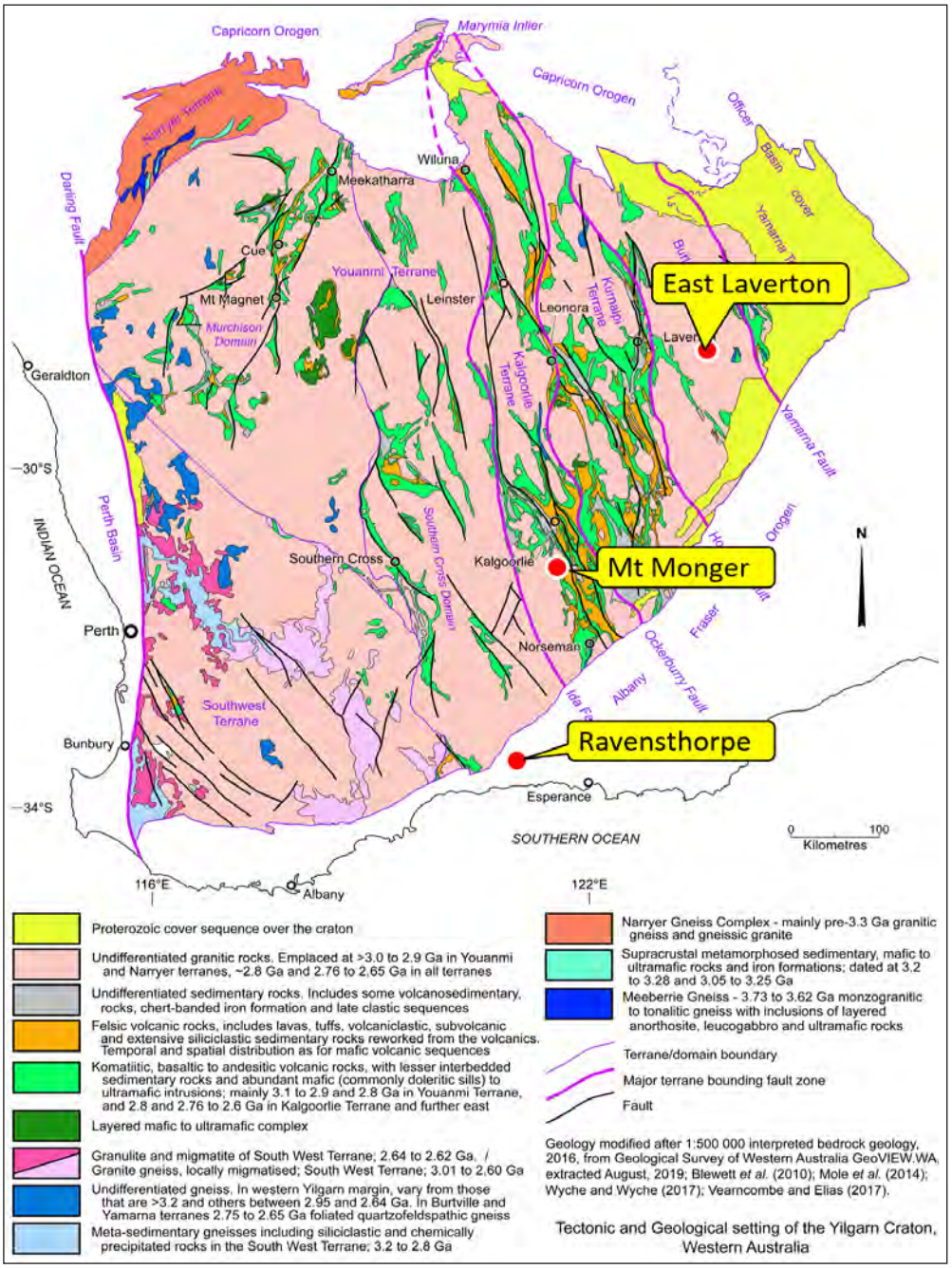

Source: MTM

- Laverton is the service centre for the surrounding mining region, which hosts several world class nickel and gold mines, as shown in Figure 7 - estimated historic production from the Laverton Greenstone Belt is + 28 Moz, with operations including Wallaby (8 Moz) and Sunrise Dam (10 Moz).
- To the east of the project is the Yamarna Greenstone Belt, which hosts the 6 Moz, granitoid hosted Gruyere deposit, and, further east, within the Albany-Fraser Belt, is the 7.5 Moz gneiss hosted Tropicana gold deposit.
- Access to and through the project area is via gravel public roads, station tracks and fencelines, with access generally reasonable over the generally flat topography.

## Regional Geology

- In this section will cover the geology of the Yilgarn Craton, including the East Laverton and Mount Monger projects - Ravensthorpe, for which the Company is looking at options, will not be discussed.
- East Laverton is located in the Burtville Terrane, a relatively under-explored and poorly understood terra of the Eastern Goldfields Superterrane, which comprises the eastern third of the Yilgarn Craton, and includes (from west to east) the Kalgoorlie, Kurnalpi, Burtville and Yamarna Terranes (Figure 8).

**Figure 8: Yilgarn Craton tectonic framework and geology**




Source: adapted from portergeo.com.au/database

- The Kalgoorlie and Kurnalpi Terranes form the Kalgoorlie-Kurnalpi Rift ("KKR"), originally formed through rifting on the eastern edge of the proto-Yilgarn Craton - this is the most strongly mineralised portion of the Yilgarn, and contains the highest density of greenstone belts, as well as, on average, the youngest rocks.
- The flanking Burtville and Youanmi Terranes, which formed the proto-Yilgarn Craton, have ages going back to at least 2,960 Ma and 3,000 Ma respectively.
- Rifting in the KKR commenced at ~2,720 Ma, and is associated with the eruption of tholeiitic basalts and komatiites between 2,720 Ma and 2,690 Ma within the Kalgoorlie Terrane.

- Calc-alkaline volcanism, possibly related to arc tectonics, commenced in the Kurnalpi Terrane at ~2,730 Ma, and continued through to ~2,660 Ma, with this transitioning up from generally basaltic to andesitic lavas and hyaloclastites (with some dacitic and rhyolitic rocks) to volcaniclastic and epiclastic rocks derived from the volcanic complexes.
- Within the Kalgoorlie Terrane, the basal basalts are overlain by the largely volcaniclastic Black Flag Group, with a significant amount of material derived from intermediate to felsic igneous rocks - deposition of these units continued to about 2,660 Ma.
- The final stage of deposition was sedimentation in late stage basins from ~2,665 Ma, initiated by the D3 extensional event.
- Four main periods of granitic magmatism have been identified, with two, a mafic and a high-Ca event largely coincidental with the later stages of basin development (with the earlier high-Ca event being coeval with deposition of the Black Flag Group). An earlier high field strength element ("HFSE") related event is also recognised, being contemporaneous with greenstone development.
- The two later events are largely associated with the D4 and D5 compressional events, although the third, a syenitic event, commenced with the onset of the D3 extensional tectonics that led to the development of the later sedimentary basins.
- Several stages of deformation have been identified in the KKR:
  - $D_e$ - 2720 to 2665 Ma E-W to ENE-WSW extension, leading to development of the greenstone basins,
  - ?$D_1$ - 2,675 - 2,675 Ma - N-S thrust stacking and recumbent folding, not recognised by all,
  - $D_2$ - 2,675 - 2,665 Ma - ENE-WSW shortening, resulting in NNW trending folds,
  - $D_3$ - 2,665 - 2,660 Ma - E-W extension, resulting in the formation of granite domes and the late stage sedimentary basins,
  - $D_4$ - 2,660 - 2,645 Ma - compression, with various orientations ranging from E-W to NW-SE ($D_{4b}$) to ENE - WSW ($D_{4a}$), resulting in tightening of $D_2$ folds and upright folding of late stage basins, and sinistral strike slip movement on NNW trending faults; and,
  - $D_5$ - 2,645 - 2,620 Ma ENE - WSW shortening, and dextral movement on NNW trending structures.
- The intensive deformation has led to the development of the complex structure, including re-folded folds and faults/shears as seen throughout the region.
- The Burtville Terrane is comprised of three domains, namely the Duketon, Merolia and Yamarna Domains, with the East Laverton Project being located largely over the Merolia Domain.
- The Burtville Terrane Archaean rocks are largely covered by younger transported units, and thus has seen little work, either by public/private companies or government agencies.
- The eastern tenements (Dexter and Dexter North) are located over the largely covered Irwin Hills - Lake Lightfoot Greenstone Belt (Figure 7), with the Pt Kidman and Seahorse areas located over granites to the east of the Duketon Greenstone Belt.
- In the west of the Yilgarn Craton, the geological history of the Youanmi Terrane is broadly similar, however there are older greenstone belts dating back to 3.1 Ga (Figure 8), and some differences, particularly to do with ages, in the earlier deformation events.
- The Southwest Gneiss Terrane is dominated by orogenic granites, and highly metamorphosed (up to granulite facies) remnants of greenstone belts, including sediments, volcanics and intrusives, with the pre-cursor rocks generally being aged from 3.01 Ga to 2.60 Ga, however with gneisses aged at >3.2 Ga present on the western margin of the Yilgarn Craton.

## Regional Mineralisation

- The following briefly describes some of the styles of mineralisation found within the Yilgarn Craton, and applicable to the activities of MTM.

### Gold

- The KKR is noted by its gold endowment, with, as of 2015 the region having a total gold endowment (including current resources and previously mined) of 7,154 tonnes (230 Moz), or 71% of the Yilgarn's total endowment of over 10,000 tonnes (311 Moz). Of this, the Kalgoorlie Domain hosts 5,910 tonnes (185 Moz).

- Since 2015, approximately 1,200 tonnes (37.5 Moz) of gold has been mined in Western Australia, with the majority from the Yilgarn Craton.
- Assuming that depletion has been fully replaced, and that proportions between terranes remains constant, replacement of depletion results in a current endowment of approximately 11,200 tonnes (350 Moz) for the Yilgarn, and 7,952 tonnes (249 Moz) for the KKR.
- This does not account for new discoveries and resource additions above depletion during the same period.
- The main period of gold mineralisation was over a 20 million year period from 2.65 to 2.63 Ga contemporaneous with the compression, however there were minor periods associated with earlier periods of magmatism contemporaneous with development of the greenstones. - Witt et al (2020) have defined two main styles of orogenic gold mineralisation, being O-PIR (proximal intrusion related) and O-DSR (distal source related).
- O-PIR style mineralisation (which could be considered akin to intrusion related gold "IGRS" mineralisation, albeit associated with oxidised rather than reduced intrusives) has ages of between 2,750 Ma to 2,630 Ma, with the O-DSR mineralisation having ages of 2,650 Ma to 2,630 Ma - the O-PIR mineralisation is also spatially associated with the mafic group and syenite group granites, which form the domes in the region.
- There is also an earlier non-orogenic gold mineralising event, associated with the HFSE granites.
- Gold mineralisation will occur in different settings, dependent upon physical and chemical changes that result in the precipitation of gold.
- The major, generally NNW trending crustal scale structures form conduits for the transport of the orogenic mineralising fluids, and it is commonly splays off these that host the gold mineralisation.

**Nickel**

- In addition to gold, the region is one of the world's premier nickel provinces, as exemplified by the Kambalda deposits, which, in addition to nickel can also contain copper and PGEs.
- The main style of deposit in the region are those related to lava channels, with the generally massive sulphide nickel mineralisation occurring at the base of channelised komatiitic lava flows - these are largely associated with domes, including Kambalda and Widgiemooltha amongst others.
- Mt Keith, located near Wiluna at the northern end of the KKR, occurs as disseminated sulphides in a thickened komatiite cumulate unit, and is one of the world's largest deposits of its type.
- The komatiite-associated deposits are contemporaneous with the flows and intrusives, and formed in a tight time frame ~2,710 Ma years ago - although older komatiite laves are found in the Yilgarn these generally do not host nickel mineralisation.
- In addition to primary deposits, there are several laterite Ni-Co deposits in the Yilgarn, with these formed by the weathering of ultramafic rocks, generally of komatiite affinity - an operating example is Glencore's Murrin Murrin operation, located 45 km east of Leonora, and within 100 km of MTMs Seahorse discovery.
- Base Metals
- There is also potential for volcanogenic massive sulphide ("VMS") base and precious metal mineralisation in the KKR (as well as the rest of the Yilgarn), with examples including the Teutonic Bore Camp and Anaconda.
- These` have been dated at ~2,690 to 2,700 Ma, and are largely associated with the felsic volcanics found within the Kurnalpi Terrane.

**Rare Earth Elements**

- The region is host to Lynas's world class Mt Weld operation, with current resources of 54.7 Mt @ 5.3% TREO, a carbonatite hosted deposit located ~45 km SSE of Laverton (Figure 7).
- Mt Weld, like Pomme, is hosted in a carbonatite intrusion, and is of a similar age to the Canadian examples, being ~2 Ga years old, significantly younger that the rocks that have been intruded.
- However, high grade mineralisation at Mt Weld is hosted in weathered material, in which the REEs have been upgraded - drilling below the currently planned pits has intersected fresh carbonatites with primary grades of ~2.2% to 2.7% TREO.

- More recently, there has been a focus on exploration for "clay hosted" REE mineralisation, which are developed in the weathering profiles above suitably REE enriched gneissic or granitic primary rocks.
- Exploration for this style of deposit is relatively immature, however that work that has been undertaken has discovered relatively widespread areas of mineralisation within, not just the Laverton region, but the broader Yilgarn.

## Exploration History

- Given the extensive cover, the Burtville terrane has seen little exploration; this is also due to the western tenements being largely located over what have either been mapped as, or interpreted as granites, which, prior to the recognition of the prospectivity for "clay-hosted" REE mineralisation, have largely been ignored by explorers in the Yilgarn.
- What work that has been completed has however returned some encouraging results, with most work being undertaken since 2000 - follow up work by MTM has confirmed the prospectivity of some areas.
- Much of the previous work has included geochemical sampling and reconnaissance drilling (including auger, aircore and RAB) - there has also been some limited reverse circulation ("RC") drilling.
- Amongst others, in the western tenements this has recognised:
  - Ni, Au, Cu, Pt and Pd anomalism along a broad Ni anomalous zone, corresponding with a 1.8 km long zone of outcropping greenstones within E38/3499 in the Pt Kidman area,
  - High grade metamorphics, considered similar to those hosting the Tropicana gold deposit,
  - Other Ni-Cu geochemical anomalism within the same tenement,
  - REE mineralisation within the Pt Kidman area, that has been the subject of further work by MTM; and,
  - Nickel anomalism in several areas, indicating the presence of previously unrecognised greenstone outliers - the Company has followed up some of these areas, resulting in the delineation of the nickel laterite mineralisation in the Seahorse area.
- Work in the eastern tenements (Dexter and Dexter North) has identified gold anomalism in auger and aircore drilling, however there has been little follow up of these underexplored greenstone belts, with this also exacerbated by the cover.
- More detailed descriptions of historic activities are in the Company's Prospectus.

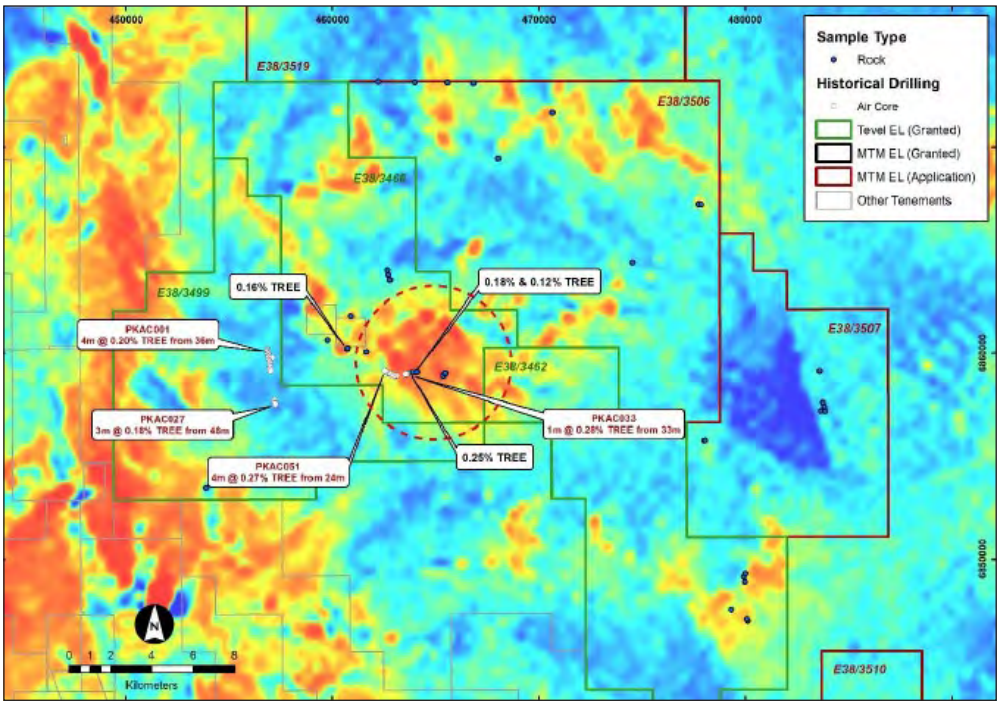
## Work by MTM

- Work by MTM has concentrated on two areas - Point Kidman (REE) and Seahorse (base and precious metals) - this work has returned very encouraging results, however activities were initially slowed whilst tenement grants and heritage surveys were awaited.
- It needs to be stressed that these are still very early days at East Laverton - there are large prospective areas that are yet to be worked on by the Company, that also have had very limited historic work.

**Point Kidman**

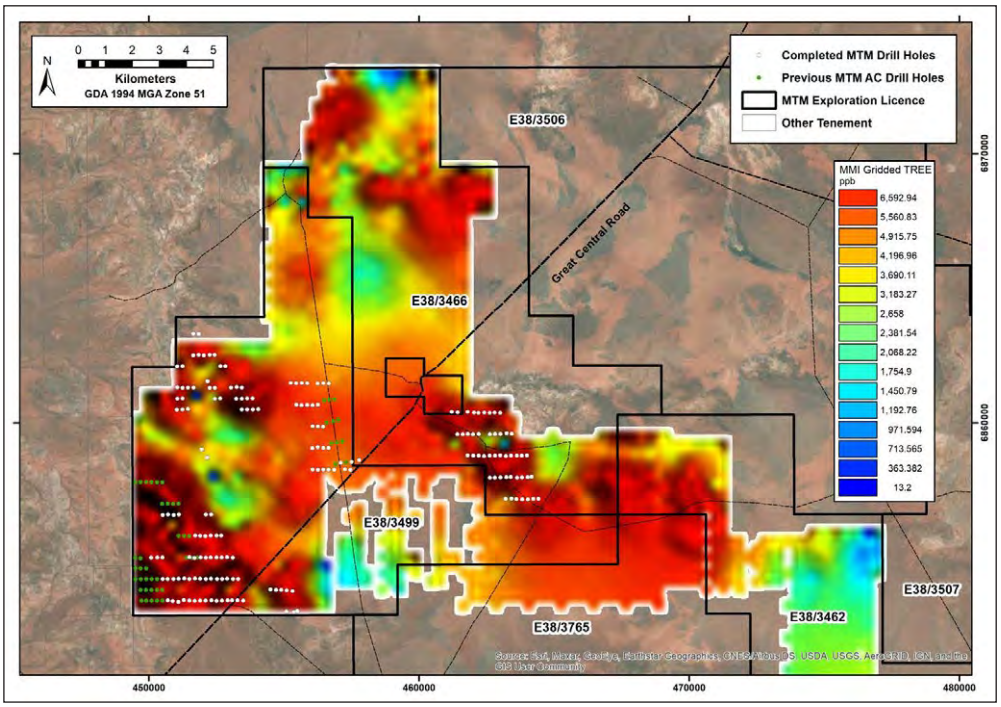
- The prospectivity of Point Kidman was recognised from the presence of high-thorium granites, and results of limited previous drilling and rock chip sampling, which returned positive REE results in the weathering profile (Figure 9).
- Initial work included MMI geochemical sampling in the southwest of E38/3499 (one of the Tevel JV tenements), with an anomaly generated from this then followed up by initial aircore drilling - the initial drilling returned significant results, including:
  - 15 m @ 1,461 ppm TREO from 21 m (22ELAC048); and,
  - 5 m @ 1,790 ppm TREO from 27 m (22ELAC003).
- This initial programme included 48 reconnaissance aircore holes for 1,084 m (green holes on Figure 10), with depths ranging from 2 m to 59 m, with 29 holes returning intersections of >300 ppm TREO, and 10 holes with intersections > 1,000 ppm TREO, which we consider significant and, comparable with, and better than similar projects held by other companies.
- Drilling was generally on 400 m spaced E-W lines, with along line spacing of 200 m.
- A second programme of 174 aircore and six RC holes was completed in 2023, with this successfully extending the previously identified mineralisation.

**Figure 9: Point Kidman area on thorium image**




Source: MTM

**Figure 10: Point Kidman drilling on gridded MMI REE image**

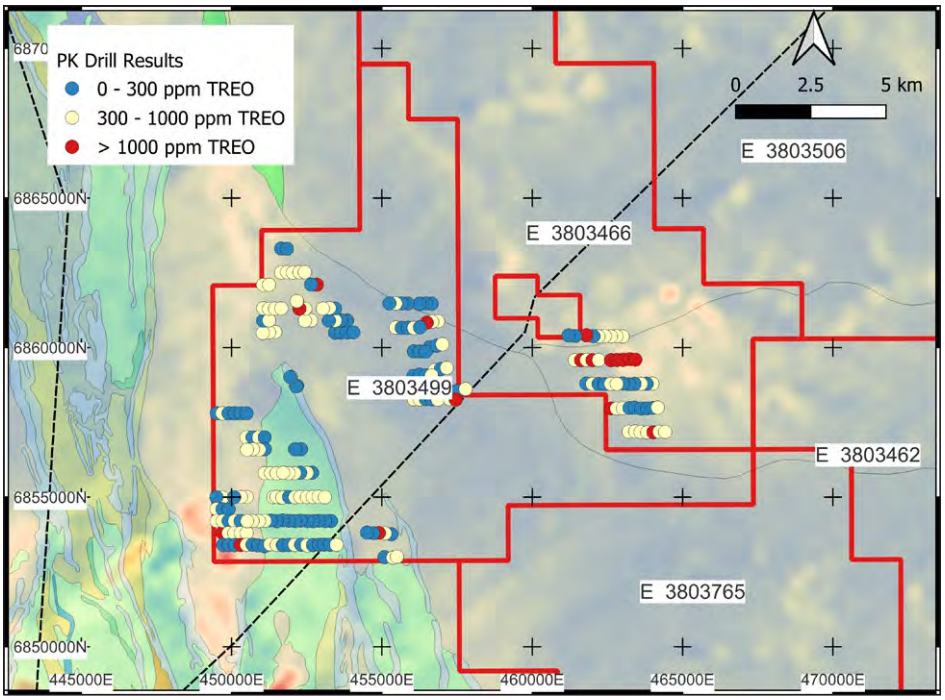



Source: MTM

- This returned 14 holes with intersections of >1,000 ppm TREO, with these including:
  - 29 m @ 1,667 ppm TREO from 11 m (23ELAC137; and,
  - 29 m @ 2,116 ppm TREO from surface (23ELAC146).
- The mineralisation has an attractive mix of the different oxides, including ranging between 20% and 30 % for magnet REOs ("MREOs", Dy, Pr, Dy, Tb oxides), averaging around 20% for Nd/Pr oxides, and averaging around 7% for the heavy REOs ("HREOs").
- These oxide mixes are, like overall grades, comparable with those of other similar Australian projects.
- Figure 11 shows the Point Kidman REE drill collars coloured by TREO - these are taken from overall intersections, and not higher grade sub-intervals.

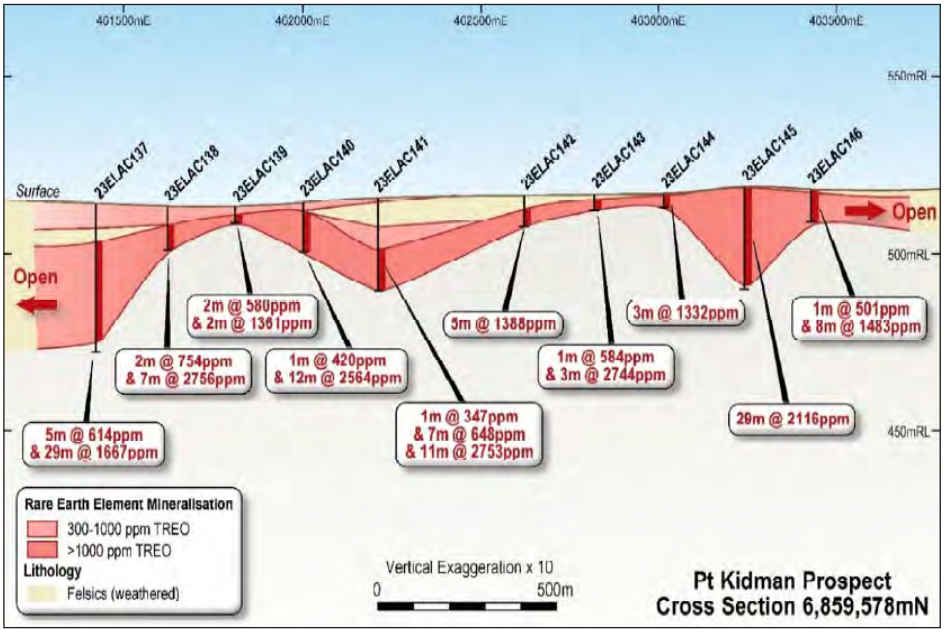
- The background is geology, draped over the thorium image - greens etc in the west are greenstones, with the rest of the geology mapped as granites, but, as mentioned elsewhere, actually containing some areas of greenstones.
- This highlights groupings of REE mineralisation, with some of the defined mineralisation being open - this is especially so in the drilling within E38/3466 (where it fringes the higher thorium signature to the east); we have also included section 6,859,578 mN, the higher grade section within E38/3466 as Figure 12.
- This confirms the prospectivity for large areas of this style of mineralisation.

**Figure 11: Point Kidman drilling results on geology/thorium image**




Source: IIR analysis

**Figure 12: Point Kidman section 6,859,578N**




Source: MTM

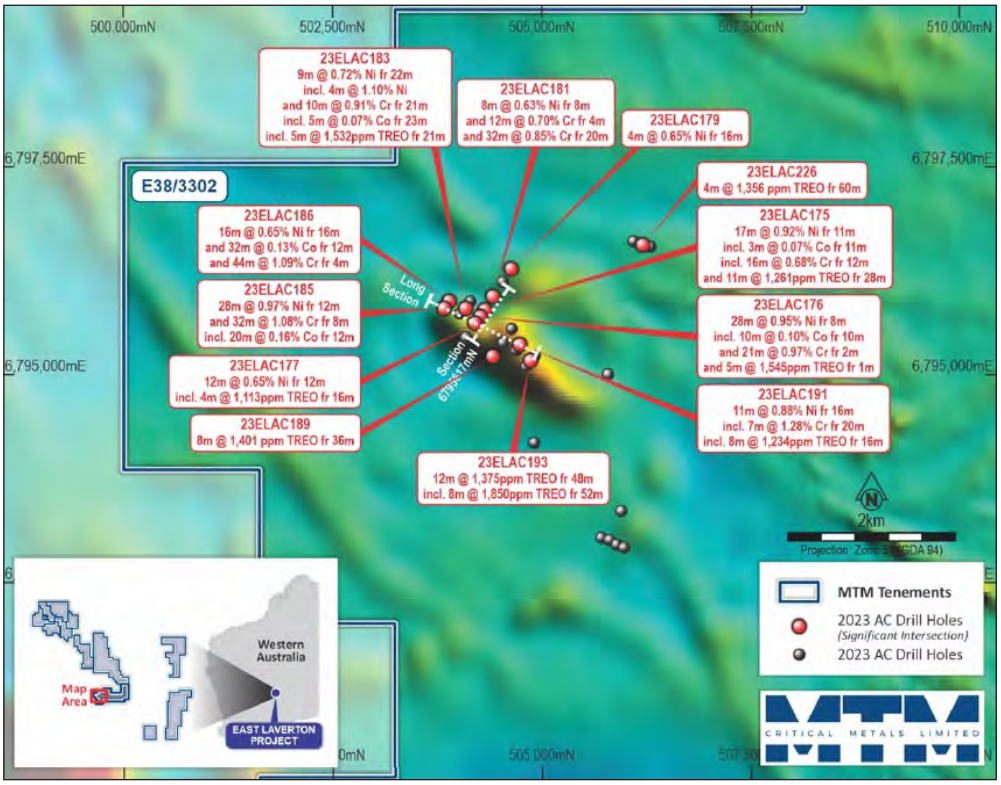
- The Company is currently undertaking metallurgical test work, with aims to:
  - Characterise the REEs by host phase (ion exchange, colloidal or mineral),
  - Determine the REE recoveries; and,
  - Outline a preliminary process flowsheet if favourable results are obtained.
- The results of this work will inform further activities, including the scope of additional drilling, and whether the mineralisation is potentially economically viable.

- The Company plans further soil sampling and drilling to define additional areas of mineralisation - timing and extent of this work will be partially reliant on obtaining statutory approvals from government authorities, and heritage clearances from the local Native Title holders.

**Seahorse**

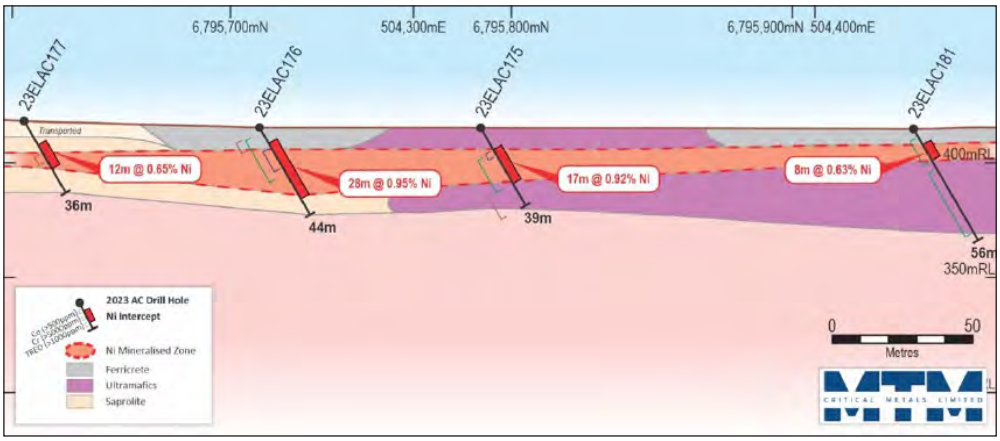
- Initial work at Seahorse included geochemical sampling, partially following up on historic work that had identified moderate gold anomalism, and lithologies similar to those that host the nearby Tropicana Gold Mine.
- Several soil grids were sampled, returning variable precious and base metal anomalism, with rock chip sampling also returning positive results, particularly for nickel.
- One outcome of the work was the recognition of several greenstone inliers in an area that had previously been mapped as granites, with this upgrading the prospectivity of Seahorse.
- One such feature is what is now the Seahorse nickel laterite prospect (Figures 13 to 15), and on which the latest work has been undertaken by MTM - this included aircore drilling, comprising 55 holes for 2,809 m, testing the nickel laterite, as well as a gold target in the NE of E38/3302.
- The Seahorse Ni prospect has returned strong Ni and Co results, comparable to other nickel laterites in the Yilgarn, as well as returning REE results typical of other Yilgarn clay-hosted deposits.
- Nickel mineralisation, which is interpreted as being related to an underlying ultramafic unit (characterised by a high magnetics signature), has been intersected for a strike length of ~1.2 km and local widths in excess of 200 m - downhole intercepts are up to 29 m.
- This has only tested one such target - there is the potential for additional similar mineralisation in the project.

**Figure 13: Seahorse nickel laterite drilling**



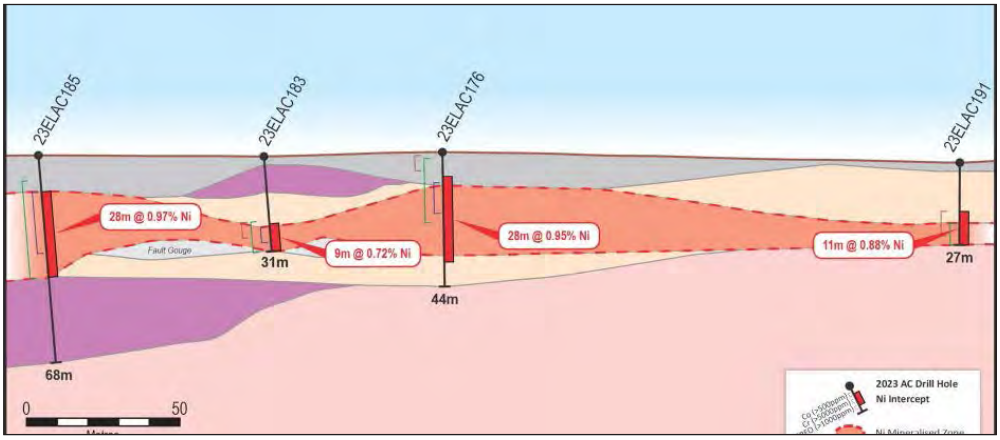

Source: MTM

**Figure 14: Seahorse Ni laterite long section**




Source: MTM

**Figure 15: Seahorse Ni laterite cross section**



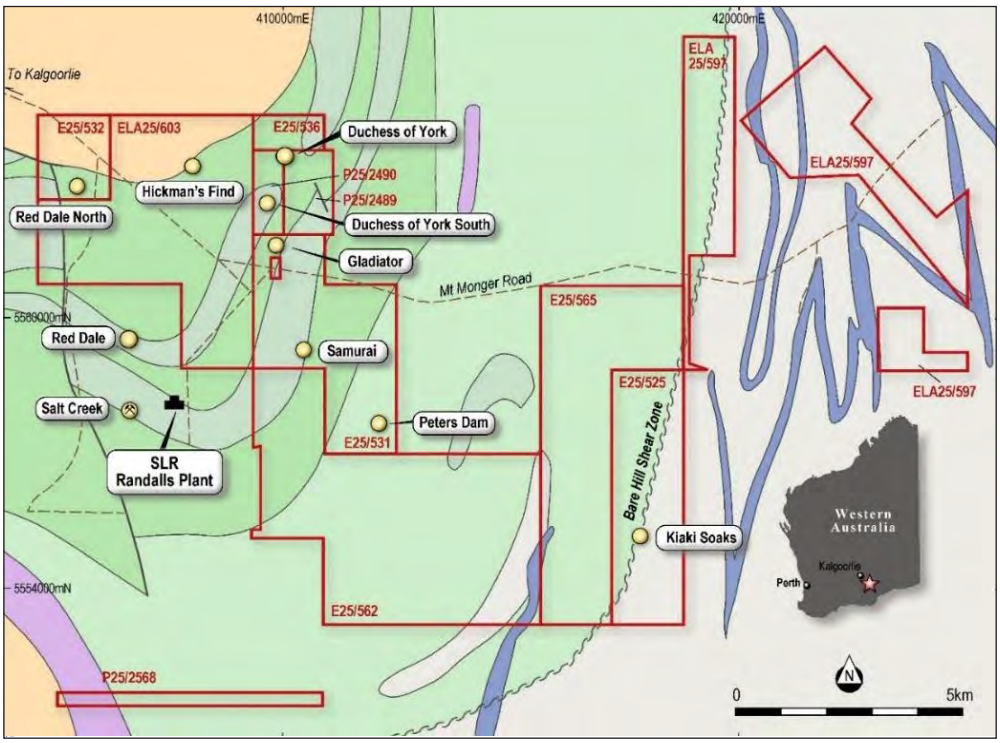

Source: MTM

## MT MONGER GOLD PROJECT

### Background, Location and Tenure

- Mt Monger, which comprises six ELs, one ELA and three prospecting licences ("PL") for ~85 km$^2$, is located in the Bulong area some 80 km SE of Kalgoorlie (Figure 16).

**Figure 16: Mt Monger Project tenements and geology.**




Source: MTM

- Tenements P25/2568 and E25/562 are held 80% by MTM under an agreement with Jindalee Resources; all other tenements are held 100% by MTM.
- The Jindalee consideration included 500,000 MTM shares, and two option payments, each of A$20,000 cash.
- The area is readily accessible by all weather road from Kalgoorlie, with it being adjacent to Silver Lake Resources (ASX: SLR) 1.3 mtpa Randalls mill, and with the Mount Belches Mining Centre immediately to the east (Figure 16).

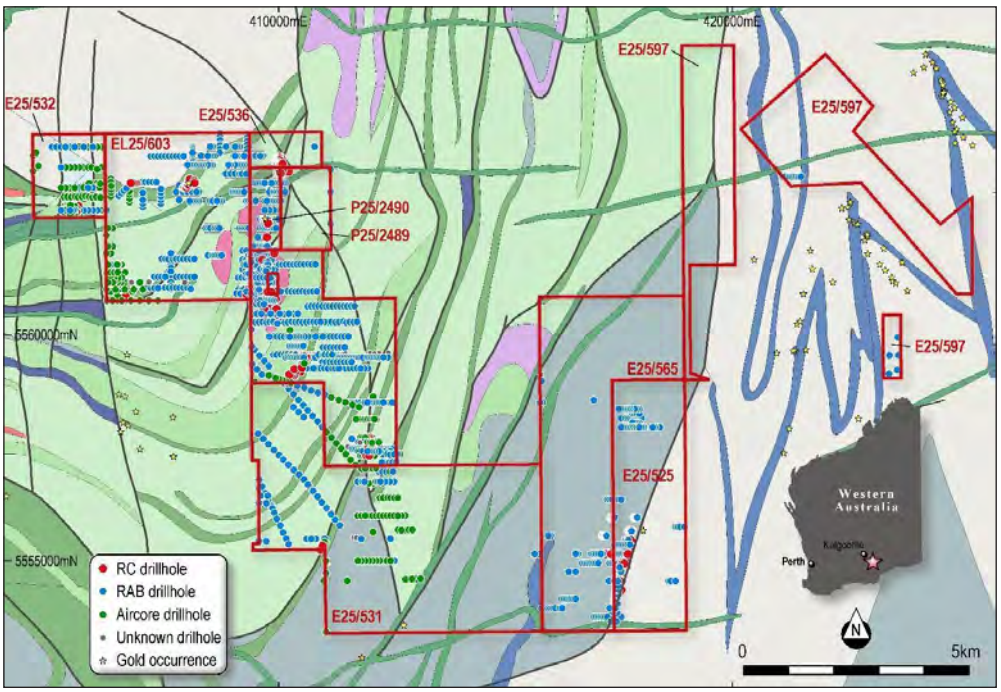
## Local Geology and Mineralisation

- The Project is largely over the SW-plunging Bulong Anticline (green units in Figure 17), which includes felsic to intermediate volcanics in the core, overlain by mafic volcanics, with the latter characterised by high-Mg basalts, spinifex textures and several mafic-ultramafic intrusives.
- The top of the felsic sequence is marked by clastic rocks, including cherts and shales, which form good marker units for mapping.
- The Bulong Anticline is truncated to the east by the Randalls Shear Zone (Bare Hill Shear Zone, a major domain-bounding structure), with the rocks to the east comprising metasediments of the Mt Belches sequence.
- The Mount Belches sequence comprises strongly folded turbidites (with no other clear equivalents within the Kurnalpi Terrane), as well as banded iron formation layers, with the BIFs interpreted as representing periods of diminished sediment supply into a deep marine basin.
- Much of the Archaean geology is masked by relatively thin laterite and transported cover.
- Gold mineralisation is largely structurally controlled, and located at sites of chemical and rheological variability.
- Shears, which largely trend parallel or subparallel to the anticlinal axis, are key controls on localisation of mineralisation, as are the sheared contacts between the felsic and overlying mafic units.
- In the Mt Belches area, mineralisation is largely confined to the BIF units.

## Historic Exploration and Mining

- Gold was initially mined in the Mt Monger area in the 1890s, and continues to this day with the operations of Silver Lake Resources.
- As such, the area has seen comprehensive exploration, with a summary shown in Figure 16.
- Within MTM's tenements, this has largely been concentrated within the Bulong Anticline, however with some work in the Mt Belches area, largely along the Randalls Shear Zone.

**Figure 17: Historic exploration summary - Mt Monger.**

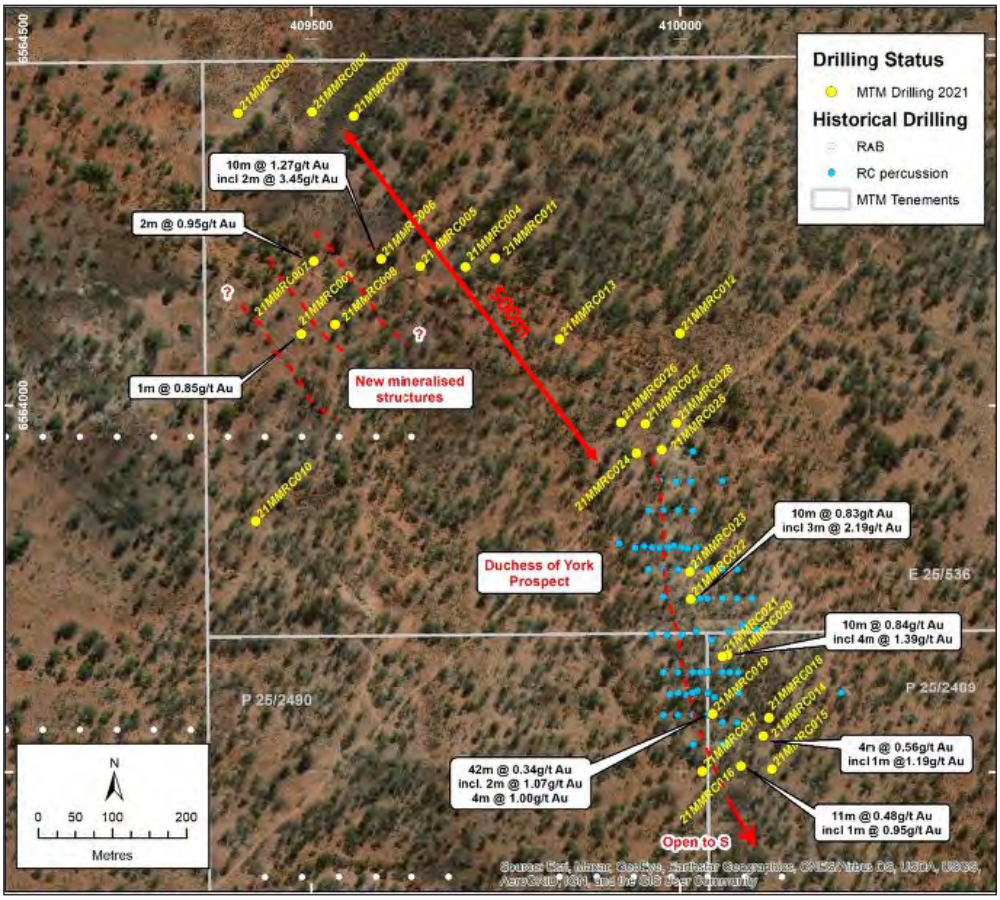



Source: MTM

## Work by MTM

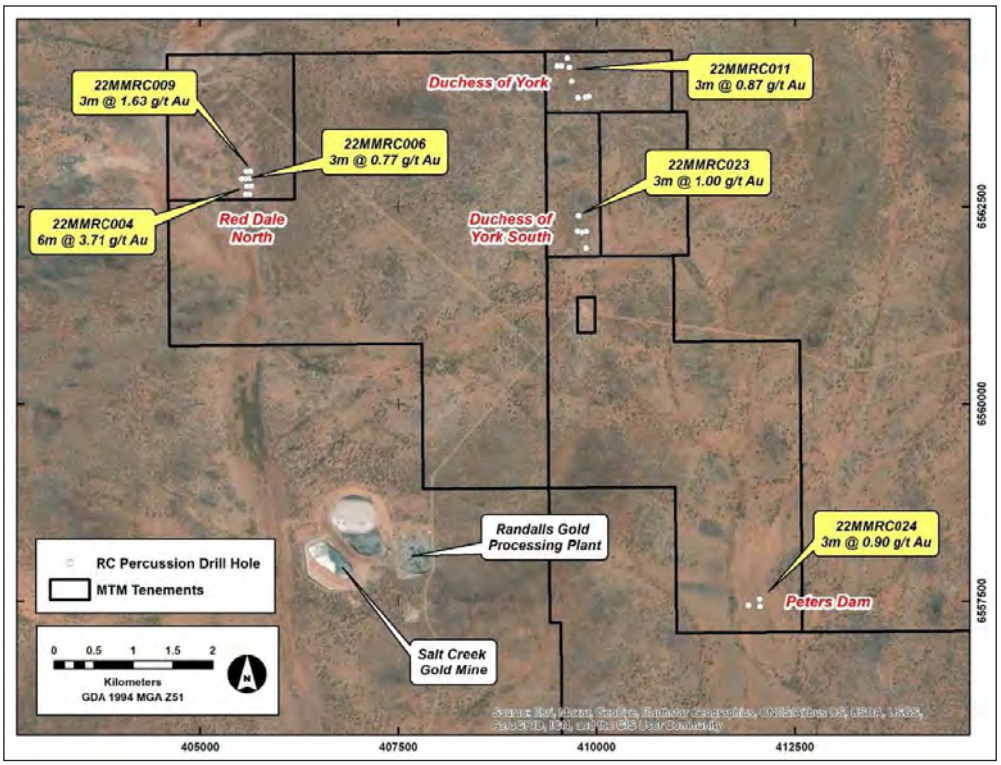
- Work by MTM has included soil sampling over large parts of the tenement package, and two RC drilling programmes - a 28 hole programme for 3,226 m largely over the Duchess of York prospect in 2021 (Figure 18), and 26 RC holes for 1,731 m in 2022 over several targets (Figure 18).
- Both programmes have come up with some encouraging results, with the best intervals including:
  - 10 m @ 1.27 g/t Au from 63 m in hole 21MMRC006 (DoY),
  - 10 m @ 0.84 g/t Au from 20 m in hole 21MMRC006 (DoY),
  - 6 m @ 3.71 g/t Au from 48 m in hole 22MMRC004 (Red Dale North); and,
  - 3 m @1.63 g/t Au from 45 m in hole 22MMRC009 (Red Dale North).
- The mineralisation is generally related to relatively narrow, N-S trending structures, with that at Duchess of York being mineralised over a strike length of some 250 m; as shown in Figure 19 the Duchess of York work has also identified some additional structures.
- Work subsequent to the drilling has included assessing the results and rehabilitation of drill pads and access tracks.
- Ongoing activities include targeting mineralised structures that have the potential to host a significant gold resource.

**Figure 18: Duchess of York drilling - 2021.**




Source: MTM

**Figure 19: 2022 RC drilling.**




Source: MTM

## PEER GROUP ANALYSIS

- Table 2 presents a selection of ASX-listed companies (and Geomega) exploring for or looking to the development of rare earths projects.
- Junior REE focussed companies, unless well differentiated from peers, are currently trading at close to 12 month lows - one reason is recent sharp falls in rare earth prices, driven by economic headwinds in the west, as well as the effects of Chinese actions, the dominant rare earth miner and supplier of separated products.
- There is also an element of investor fatigue - a key element of this space is the lack of delivery of economically viable metallurgy for the low grade clay hosted mineralisation, which, except for Ionic Rare Earth's (ASX: IXR) Mukuutu deposit in Uganda, are yet to present financial outcomes to the market.
- It has to be noted that the treatment and development of low grade REE mineralisation is at an immature stage outside of China, with, the added proviso that in the west economic feasibility is a necessity to get a project off the ground.
- With ongoing research and development in metallurgy (with positive results) we should see the sector improve.
- One of the stand outs in the group include Meteoric - this is largely by virtue of high grade for a clay hosted deposit, which has also delivered positive metallurgical results.
- Likewise American Rare Earths has remained relatively strong, largely by virtue of the large Halleck Creek deposit in Wyoming, which, despite a relatively low grade of 0.33% TREO for a hard rock deposit, has demonstrated good beneficiation characteristics to a concentrate, however extractive metallurgy on the concentrate is ongoing, with results yet to be released.
- With an EV of around A$1 million MTM is well leveraged to positive results - strong assays from Pomme should drive value, as well as the delineation of a large resource at Pt Kidman.
- We are seeing grades at Pomme comparable to, and better than those at ARR's Halleck Creek, which has some similarities to Pomme, being hard rock mineralisation in fresh, and not weathered material, albeit with different REE mineralogy and a different host rock type.

**Table 2: MTM peer group comparison - note that figures relate to Resources, and not Reserves**

| MTM Peer Group Comparison | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Company** | **Current Price** | **% above 12 month low** | **EV** | **Projects/Notes** | **Global Tonnes (mt)** | **TREO ppm** | **MREO % of basket** |
| American Rare Earths Limited | $0.135 | 9.09% | $47.8 m | Halleck Ck, WY USA, hard rock | 1,430 | 3,300 | 22.20% |
| Australian Rare Earths Ltd | $0.225 | 6.92% | $19.6 m | Koppamurra SA, Ionic Adsorption Clay. Has completed trial mining | 186 | 712 | 24.50% |
| Geomega Resources Inc. | $0.161 | 24.77% | $18.5 m | Own Montveil, however concentrating on recycling | 267 | 14,600 | 22.20% |
| Hastings Technology Metals Ltd | $0.680 | 0.44% | $59.1 m | Yangibana, WA, hard rock, owns 22% of TSX listed NEO | 30 | 9300 | 36.60% |
| Heavy Rare Earths Ltd | $0.072 | 7.52% | $2.8 m | Cowalinya WA, weathered igneous | 28 | 625 | 25.00% |
| Ionic Rare Earths Limited | $0.023 | 21.88% | $80.0 m | Makuutu IAC, Uganda. Completed Stage 1 DFS, own 60% | 532 | 640 | 26.50% |
| Meteoric Resources NI | $0.215 | 77.19% | $400.0 m | Caldiera, MG, Brazil, Ionic Adsorption Clay | 409 | 2,626 | 24.00% |
| MTM Critical Metals Limited | $0.036 | 1.08% | $1.0 m | Pt Kidman WA, weathered igneous, Pomme, Quebec, primary carbonatite - assays awaited | Pre-resource, however up to 0.73% TREO in broad intervals in the limited drilling to date, with an NdPr content of around 20% to 22%. | | |
| Rarex Limited | $0.030 | 0.00% | $13.8 m | Cummins Range, WA, monazite rich carbonatite dykes, with higher grades in regolith. Looking to extract phosphate as well as REEs. | 519 | 3,170 | 22.80% |

Source: Excel Stock Data, Company reports, IIR analysis

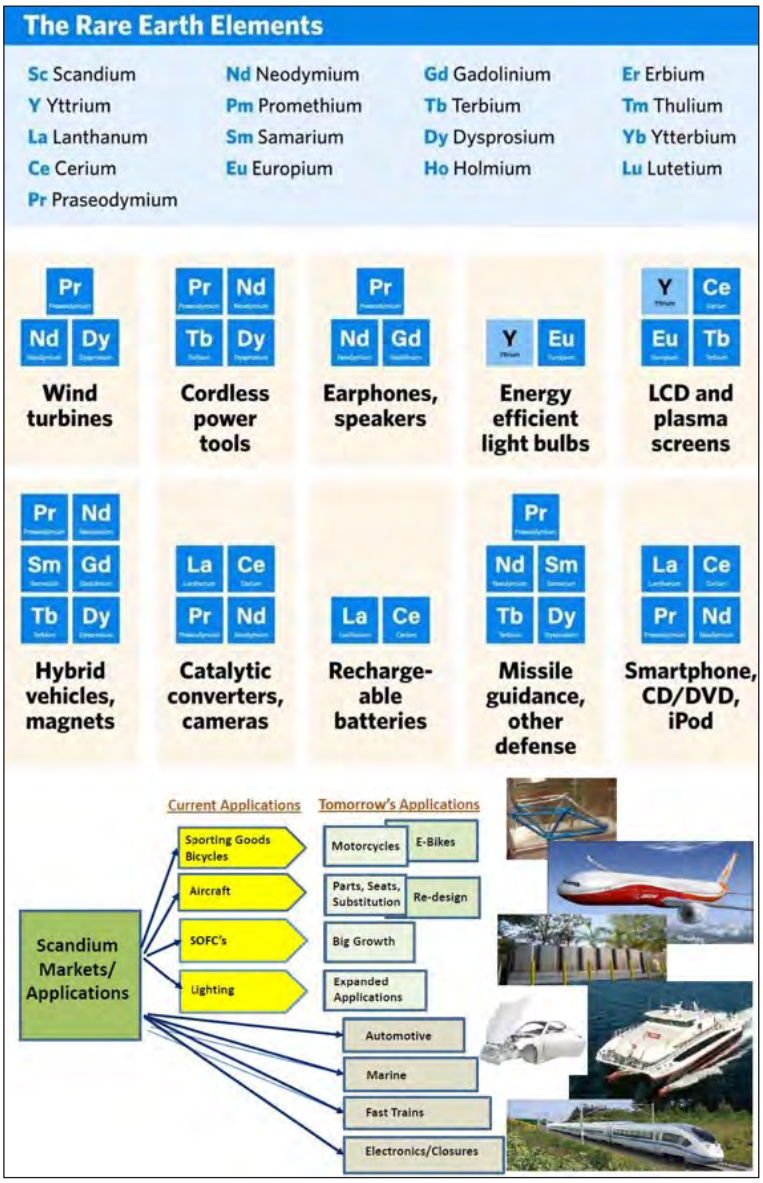
# APPENDIX – RARE EARTHS AND MARKETS

## RARE EARTHS AND USES

- Rare earths are a group of elements, including lanthanides that have atomic numbers ranging from 57 to 71, but also including the non-lanthanides yttrium and scandium as shown in Figure A1. Despite their name they are not particularly rare, and are found in several minerals, however it is rare to find them in accumulations that are economically viable to exploit.
- Traditionally they have been classified into two groups – the LREEs and HREEs – in the past it has been a rule of thumb that the HREE's are more valuable than the LREEs, largely due to supply factors.
- They are also referred to as light rare earth oxides ("LREO") and heavy rare earth oxides ("HREO"), with the conversion factor from elements to oxides ranging from 1.137 to 1.173 for the lanthanides, 1.269 for yttrium and 1.534 for scandium (Table 2). The distinction between REEs and REOs is important when considering data – most data, including grades and tonnages is presented in the terms of oxides, although some is reported in the terms of the element, as is the case with ARR's MRE.
- The economically largest and fastest growing market is for magnets, used both in power generation and electric motors, which mainly use neodymium and praseodymium, along with dysprosium. The addition of rare earths to permanent magnets makes the magnets extremely strong and allows them to operate at higher temperatures – the advent of new technology is driving the demand for such magnets, including those used in wind turbines and electric vehicles. It is estimated that each EV uses 2 kg to 2.5 kg of rare earths, including in the main motors, as well as in magnets/motors associated with ancillary equipment.

- The market for scandium is very small, estimated at between 10 and 20 t per annum, with the metal being produced as a by-product. Some analysts believe that the limited market is due to supply factors, and thus, if supply increased, so would the market.
- Scandium's main use is as an addition to aluminium to make strong, light weight alloys with a number of current and potential uses - the addition of a minor amount of scandium greatly increases the strength of aluminium, which can lead to significant weight savings in weight-critical applications.

**Figure A1: REE and scandium uses**




Source: IIR

## RARE EARTH GEOLOGY

- Two of the commonest rare earth bearing minerals are monazite (a phosphate, $((Ce,La,Nd,Th)PO_4)$ and bastnasite (a flouro-carbonate, with a generalised formula of $(Ce,La,Y)CO_3F$), however as mentioned above another mineral is allanite $((Ce,Ca,Y,La)_2(Al,Fe{+}3)_3(SiO_4)_3(OH))$.
- Monazite and bastnasite are commonly found in carbonatites and hydrothermal systems associated with carbonatite intrusive complexes – examples include Montveil (QUE(, Bayan Obo (China), Yangibana (WA), Mountain Pass (CA), Mt Weld (WA) and Ngualla (Tanzania) - these deposit styles are largely a source of LREE, and residual supergene enrichment is a common feature, upgrading primary mineralisation to economic levels.
- An issue with the carbonatite sourced mineralisation is the presence (although not ubiquitous) of radioactive elements including thorium and uranium, which need to be separated and then disposed of, adding costs and permitting requirements to operations. Lynas has had challenges at its Malaysian treatment plant, and as such is building a new

cracking and leaching plant at Kalgoorlie, so as product shipped to Malaysia will be free from the radioactive elements.

- In addition carbonatite deposits generally have relatively low values of the HREEs.
- Another Chinese rare earth source are laterites which are enriched in HREE, with the elements loosely bound to clay minerals – these deposits have been variously described as "ionic clays", "elution deposited" and "ion-adsorbed", and form the dominant source of global HREE production.

## RARE EARTH METALLURGY

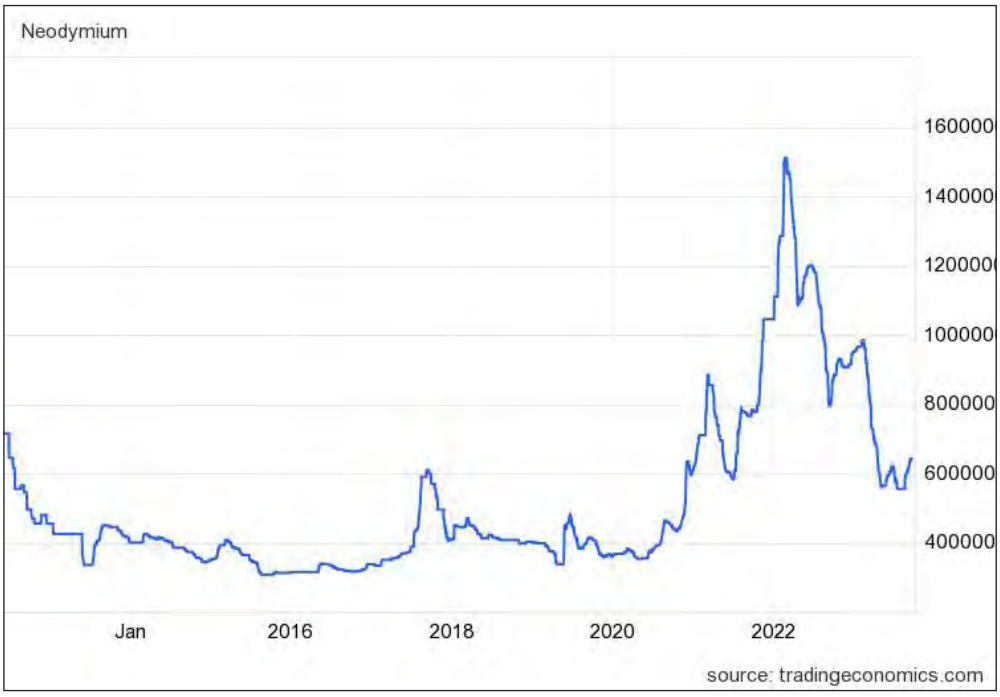
- Metallurgy is a key aspect of the rare earth industry, with this being complex, and each operation almost requiring a "bespoke" process route.
- As such, significant research and development is now going into this field, with this including pre-concentration, cracking and concentration, and finally separation.
- It is this complexity (and associated cost) that has made it hard to prove up a financially robust project, with metallurgy being expensive and generally requiring a very high grade/ in-ground ore value - a case in point is Lynas's Mt Weld operation, with, depending on prices, an in-ground value in the order of that of a 30 g/t gold deposit.
- The reserves at Mt Weld are also in weathered material, with nature doing some of the upgrading and metallurgy.
- This has come to the fore with the emergence of the clay hosted deposits in the west, partially driven by the desire for the west to develop sources outside of China (and with governments now providing significant funds towards R and D, including those under the US's so called Deficit Reduction Programme).
- However, not all clay (or as many are erroneously called ionic-clay) hosted deposits are the same.
- Those developed through the weathering of underlying bedrock will contain a range of bond types in one deposit, from REE species still associated with the primary mineral, through to areas where there has been true ion exchange.
- These will result in high variability in recoveries and reagent type/usage over a single deposit - the Company is aware of this at Pt Kidman, and is planning metallurgical testwork to ascertain the properties of the mineralisation.

## RARE EARTH SUPPLY AND PRICING

- Rare earth supply comprises two main streams – the upstream mining and production of concentrates, and the downstream processing and separation into the various individual oxides or other compounds. In both cases China is the dominant producer, particularly with regards to HREEs.
- Total mine production in 2022 was estimated at 300,000 t (USGS, 2023), with 210,000 t (70%) of this from China, however with China effectively supplying close to 90% of separated oxides and products. – as mentioned earlier the only material non-Chinese producer of separated products is Lynas, which produced 19,737 t of the total estimated global finished product output of ~170,000 t TREO equivalent.
- Non-Chinese mine production in 2022 included the US (Mountain Pass, 43,000 t), Australia (Mt Weld, 18,000 t) and Myanmar (12,000 t).
- Until the late 1940's the main supply was from monazite bearing placer sands in Brazil and India, with rare earths being a by-product of mineral sands mining. This was followed by South Africa taking the mantle until around 1965, with production from vein-style monazite mineralisation – however global demand was low, with generally <10,000 tpa of global production in this period. The mid-1960's to mid-1980's saw Mountain Pass become the major global producer, with demand rising from ~10,000 tpa to 40,000 tpa in this period. The mid-1980's saw the commencement of significant Chinese production, with this continuing to the current day.
- As discussed earlier China has, and will continue in the future to use its stranglehold on supply as an economic and strategic weapon and to influence the market. This highlights the need for robust diversification of supply, both upstream and downstream.
- This has been demonstrated by recent strong fluctuations in the critical rare earth prices, with prices down to what may be considered by China to be the "goldilocks" zone, where their producers make an acceptable margin, but however which makes it hard to develop projects in the west.

- An example of the recent variability in pricing is shown for neodymium in Figure A2 - current prices for Nd (with Pr being similar) are in the order of US$90,000/tonne, after reaching double that in early 2022.

**Figure A2: Neodymium prices - CNY (one CNY = 0.14 USD)**




Source: tradingeconomics.com

## RARE EARTH DEMAND

- This will concentrate largely on the NdPr market, given this is are the largest sector by value (70% to 80% of the total rare earths market), although the lower value La and Ce dominate the market by volume with 60%, as compared to the ~25% in NdPr.
- Given their abundance, Ce and La are now largely produced as a by-product in operations concentrating on higher value elements, particularly NdPr, with substantial amounts of Ce/La not being separated.
- China consumes some 65% of rare earths produced, and thus is a net exporter, although this situation is now changing - other significant consumers include Japan, the US and the EU, all of whom are 100% importers of separated materials.
- Given the different applications, market metrics for different REE's vary.
- The strongest demand growth over coming years is expected to be for magnet applications, and as such is forecast to drive the demand for NdPr Dy and Tb more than for the other rare earths.
- Magnet applications include those for motors in electric vehicles and for wind generators.
- Some see the demand for NdPr oxide growing to up to 125,000 t by 2032 up 61,000 t from ~65,000 now, a 7% CAGR growth - as such an additional ten Lynas Mount Weld operations would need to progressively come online by that time to meet demand.
- In FY23 Lynas produced 6,142 t of NdPr, compared with 5,880 t in FY22.

## BOARD AND MANAGEMENT

- **Mr John Hannaford – BCom, FFin., Non-Executive Chairman:** John is an experienced corporate executive with extensive experience in the ASX Resources sector as Corporate Advisor, Executive, Chairman, Company promoter and investor.

  A qualified Chartered Accountant and Fellow of the Securities Institute of Australia, he is a founder and director of Rockford Partners, a boutique financial services company located in Perth, Western Australia.

- **Mr Lachlan Reynolds - BSc Hons (Geology) , MAusIMM, MAIG, Managing Director:** Mr Reynolds has a strong geological background with more than 30 years involvement in mineral exploration, project development and mining.

Mr Reynolds has worked with major mining groups including WMC in gold, nickel, copper and uranium projects covering a number of different regions. Over the last 10 years Mr Reynolds has served as an executive and senior manager for a number of ASX listed companies, including as MD.

- **Mr David Izzard – BBus, CPA, MBA, MSc, GAICD, Non-Executive Director:** David is a highly experienced Executive and Non-Executive Director with extensive skills in all aspects of financial and commercial management at a senior executive level in both listed and unlisted companies.

  He has a strong knowledge and experience of mining operations, instrumental in the formulation of a number of junior exploration companies, joint ventures and distribution agreements, and steering companies through successful capital raising, IPOs and trade sale.

  David is a qualified accountant and has an MBA and a Master of Mineral Economics.

  Current Directorships include Forrestania Resources and Voltaic Strategic Resources

- **Mr Anthony Hadley – Non-Executive Director:** Mr Hadley is a metallurgist, a rare earth element (REE) technical expert and a senior manager with more than 30 years of experience in the mining industry in operations, technical development of complex metallurgical flowsheets, project design and management, engineering and process plant commissioning.

  Mr Hadley has worked extensively in the REE sector, having previously held the roles of General Manager with both Lynas Corporation (ASX:LYC) at the world-class Mt Weld light REE mine and subsequently with Northern Minerals Limited (ASX:NTU) at Australia's first heavy REE mine at Browns Range.

  Most recently, Mr Hadley was appointed as the Chief Operating Officer by Cheetah Resources Corporation (a subsidiary of Vital Metals Limited, ASX:VML), accountable for all operational activities at the Nechalacho REE Project in Canada. Under his management, Cheetah Resources commenced rare earth oxide mining and ore sorting at Nechalacho, which is Canada's first and North America's second REE miner.

- **Mr Simon Adams – BBus, MBA, CFO and Company Secretary:** Mr Adams is an experienced CFO with background in a range of industries including the upstream energy sector, aquaculture (pearl production and distribution), hybrid power systems (design and manufacture) and mining (gold exploration and mining). Skilled in business analysis, negotiation, team building and risk management. Strong finance, accounting and administrative skills.

  Mr Adams gained a wide range of experience as a senior member of the executive team in organisations that have had operations globally including USA, Indonesia and Australia.

- **Mr Antony Zebisch - BSc, MBA, Exploration Manager:** Mr Zebisch has been a qualified geologist for 23 years. He has had a broad and varied range of experience both in Australia and around the world managing exploration programs. He has worked across a variety of commodities, including nickel, iron, gold, REE's, lithium, copper, and manganese.

  Mr Zebisch holds on unrestricted quarry managers certificate and a range of other qualifications, including a B.Sc., Grad. Dip (mining), an MBA and is a member of AusIMM.

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