

ASX Release

16 September 2025

Metallium and Ucore Forge Binding Collaboration to Unlock U.S. Rare Earth Element (REE) Supply Chain Independence

Metallium Limited (“Metallium” or the “Company”) (ASX: **MTM**; OTCQX: **MTMCF**) announces it has entered into a binding Technology Collaboration Agreement with **Ucore Rare Metals Inc.** (“Ucore”) (TSXV: UCU), a leading North American rare earth element (REE) separation company backed by the U.S. Department of War (DoW)¹.

KEY HIGHLIGHTS

- **Binding 12-month agreement:** Each party will process the other’s feedstocks, integrating Metallium’s FJH with Ucore’s RapidSX™ to **create the first U.S. pathway for taking a diverse range of REE feedstocks all the way to separated oxide products** – a capability that, until now, has been largely confined to China.
- **Economics to follow test work:** Results will underpin commercial discussions, incl. licensing, tolling, or JV models
- **Minimal cost:** Each party uses its own existing facilities; incremental costs are immaterial
- **Natural flowsheet fit:** Metallium’s FJH rapidly upgrades complex feedstocks into clean chloride intermediates, **cutting out many of the conventional processing steps incl. acid roasting and leaching**². These intermediates are directly compatible with Ucore’s RapidSX™, potentially reducing refining complexity and costs, and widening acceptable REE feedstocks, including third-party materials that would otherwise go to Chinese refiners
- **Grant & funding upside:** Both parties will also explore **joint submissions for U.S. government grants and strategic funding opportunities** to support scale-up & commercial deployment, including for the treatment of **mine tailings**
- **Magnet recycling entry:** Agreement provides Metallium with entry into the U.S. magnet recycling market, a rapidly growing downstream sector, through a magnet-scrap-to-separated REE pathway
- **Heavy REE focus on dysprosium (Dy) and terbium (Tb), among the most supply-constrained & strategic REEs**
- **Strategic upside:** Success could enable Ucore to process a broader range of feedstocks, including mine tailings, and position Metallium as a supplier of upgraded intermediates, while also unlocking new pathways for REE developers currently reliant on non-U.S. refiners
- **Texas demonstration plant:** Metallium’s 1-tonne-per-day e-waste commercial demonstration facility remains the Company’s core focus and is on track for commissioning by December this year
- **Parallel initiatives:** Metallium continues collaborations with Meteoric Resources (ASX: MEI) on Brazilian MREC and with Rice University on a parallel direct REE separation route using FJH
- **Aligned with growing U.S. Federal Government backing for domestic REE supply chain independence, including the DoW’s US\$400m equity and 10-year NdPr floor price deal with MP Materials**³ and growing number of grants

The Agreement commits each party to process feedstocks supplied by the other at its existing facilities, Metallium’s FJH platform in Houston and Ucore’s RapidSX™ facility in Louisiana, with results shared to inform downstream economics. Costs will be borne individually and are immaterial. Metallium’s FJH provides the upstream upgrading step, converting diverse feedstocks into high-purity chlorides in a single rapid process, significantly reducing the complexity of conventional REE metallurgy. Ucore’s RapidSX™ delivers downstream separation into individual rare earth oxides. Together, they create a potential end-to-end U.S. refining pathway for REEs, with commercial terms to be determined following test work.

Metallium Managing Director & CEO, Michael Walshe, commented: “Ucore is constructing the most advanced REE separation facility in North America, and this Agreement positions Metallium at the front end of that supply chain. Our FJH platform can unlock feedstocks that are currently stranded or heavily discounted, particularly those rich in heavy REEs. FJH

¹ <https://ucore.com/>; <https://ucore.com/ucore-executes-us18-4m-award-with-u-s-dod-for-rare-earth-processing/>.

² See ASX:MTM announcement dated 08/01/2025, ‘Further Breakthrough Efficiency Gains in REE Processing’

³ MP Materials 2025, [LINK](#)

also removes much of the traditional separation burden upfront, simplifying the flowsheet before RapidSX™ takes over. By combining technologies, we are jointly building the foundations of a sovereign, U.S.-based refining pathway.

"In parallel, we continue to progress our Meteoric and Rice University collaborations, and our Texas demonstration plant remains firmly on track for processing e-waste next year⁴."

Ucore Chairman & CEO, Pat Ryan, commented: *"We are excited to explore the integration of Metallium's metal recovery platform with our RapidSX™. This collaboration directly supports the U.S. Government's strategic objective of developing Western-aligned separation capabilities that are scalable, flexible, and feedstock-agnostic. Our goal is to deliver consistent, high-purity rare earth outputs suitable for critical defense and commercial applications. The combination of Metallium's chloride-based upgrading and our DoW-backed RapidSX™ platform positions both companies at the centre of a resilient U.S. supply chain".*



Figure 1: Ucore Chief Operating Officer Michael Schrider & Flash Metals USA (FMU) President Steve Ragiel at FMU's lab in Texas



Figure 2: Metallium non-executive director Tony Hadley & FMU President Steve Ragiel inside Ucore's SMC facility in Louisiana.

⁴ See ASX: MTM announcement dated 17/06/2025, 'MTM and Meteoric Sign MOU Following Breakthrough Testwork on MREC Feedstock'

THE OPPORTUNITY

Rare earths are not rare, but refining them into usable form is one of the most complex supply chain challenges in the world. **China currently controls ~85% of global refining and >95% of heavy REE separation.** This has left the majority of Western mines and recycling streams stranded with no path to final refined products without sending material to China.

Rare earth metallurgy is especially complex. The elements occur together in nature with uranium, thorium and other impurities, and because their chemical properties are so similar they are extremely difficult to separate. Conventional refining typically requires thousands of solvent extraction stages, generating radioactive tailings and high costs. The commercial focus is on the “magnet” REEs, neodymium, praseodymium, dysprosium and terbium, which must be separated to 99.99% purity for end-use in EV motors, wind turbines and defence systems.

Metallium’s FJH is designed to address these challenges by upgrading complex mixtures into chloride intermediates in a single step, avoiding the thousands of solvent extraction stages normally required and providing a clean input stream for Ucore’s RapidSX™ separation.

The Metallium–Ucore partnership seeks to address this bottleneck:

- **Feedstock-agnostic:** mine concentrates, mixed rare earth carbonate (MREC), tailings, magnet scrap, and e-waste.
- **Sovereign pathway:** enables U.S.-based refining without reliance on Chinese infrastructure.
- **Heavy REE focus:** delivers, amongst others, terbium & dysprosium, critical for EV motors and defence systems.

FJH produces chloride intermediates that plug directly into Ucore’s RapidSX™ platform, a natural fit that could shorten refining steps, improve economics, and provide Ucore with greater feedstock flexibility, while creating new pathways for third-party REE developers to access U.S. refining capacity.

RapidSX™ overview

RapidSX™ is Ucore’s proprietary rare earth separation technology, designed as a next-generation alternative to traditional solvent extraction (SX) which is the industry-standard technology employed for REE separation currently. Unlike conventional SX circuits, which can require several hundred mixer-settler stages, RapidSX™ delivers the same chemical separation principles through a shortened, more efficient column-based system and has been demonstrated to separate mixed REE feedstocks up to [three times faster than a similar conventional SX plant](#). This reduces the number of processing steps, lowers capital and operating costs, and improves environmental performance.

The technology is chloride-compatible, making it a natural fit with Metallium’s FJH-upgraded feedstocks, and is being scaled at Ucore’s SMC facility in Louisiana with direct funding support from the U.S. Department of War.



Figure 3: RapidSX™ 80 tpa Commercialization and Demonstration Facility (CDF) Kingston, Ontario

ILLUSTRATIVE FLOWSHEET: INTEGRATED RARE EARTH REFINING PATHWAY (FJH → RAPIDSX™)

Metallium's FJH technology acts as an upstream upgrading step, producing chloride intermediates that are then refined into individual REEs using Ucore's RapidSX™ separation platform. The diagram below presents a modular rare earth element (REE) refining pathway capable of processing a wide range of REE-bearing feedstocks. These include primary mineral concentrates, mid-stream MREC from ionic clays, recycled materials (e.g. rare earth magnet scrap), and industrial residues (e.g. red mud, coal fly ash).

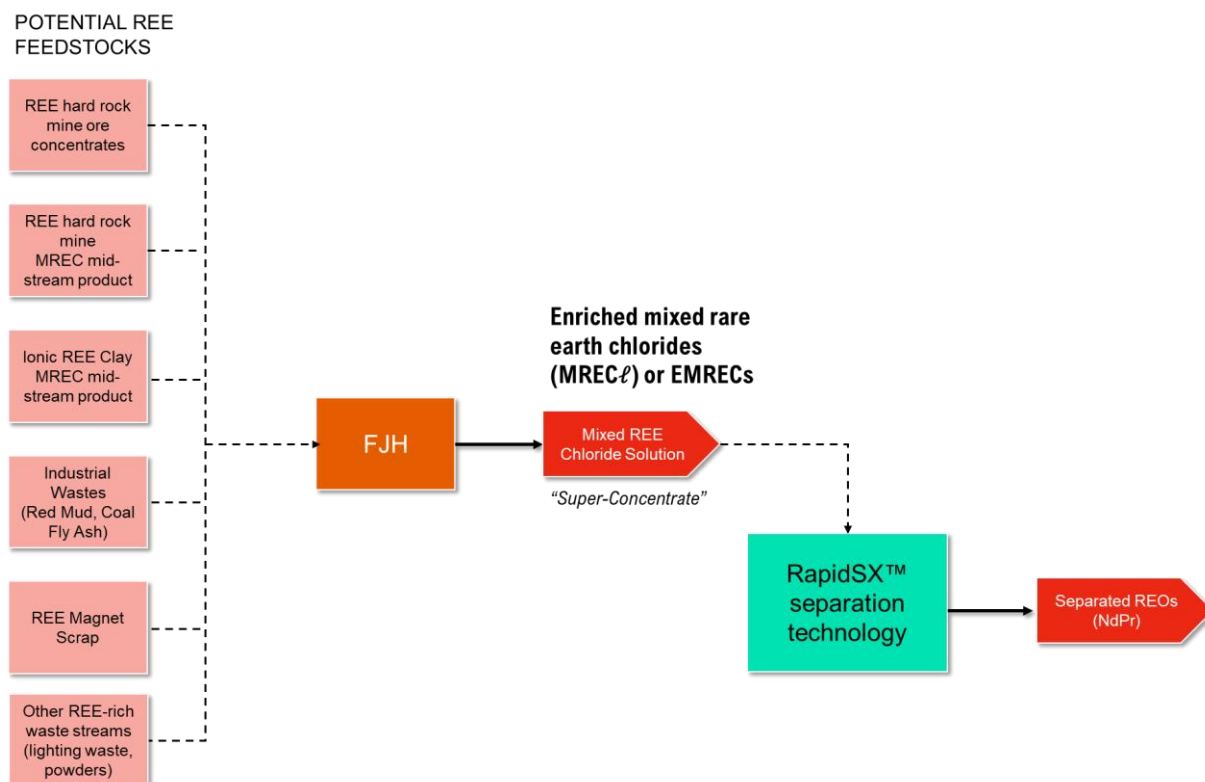


Figure 4: Integrated FJH–RapidSX™ Flowsheet for Multi-Feedstock Rare Earth Refining

Using Metallium's proprietary FJH process, these inputs are upgraded into high-purity mixed REE chloride intermediates. The resulting solution is then conditioned and processed via Ucore's RapidSX™ separation platform to produce individual rare earth oxides (REOs), such as neodymium-praseodymium (NdPr). This integrated flowsheet represents a scalable, non-Chinese alternative to traditional sulphate-leach and solvent extraction processes, suitable for both conventional and unconventional REE sources.

COLLABORATION SCOPE

Under the **binding agreement**, Metallium and Ucore will:

- Collaborate on integrating Metallium's FJH-based chloride upgrading technology with Ucore's RapidSX™ separation platform across a wide range of feedstocks. The collaboration will explore opportunities to bypass conventional acid-leach circuits by converting REE-bearing feedstocks into **enriched mixed rare earth chlorides (MRECℓ) or 'EMRECs'**, selectively remove deleterious elements, and apply FJH as a pre-treatment for high-Fe/Al feedstocks to enable their acceptance in downstream systems.
- The parties will also investigate the recovery of the highly strategic **heavy REE terbium (Tb)** and other high-value elements from lighting waste and phosphor powders.
- In parallel, Metallium is continuing research with Rice University on the potential application of FJH for REE separation, ensuring the Company maintains multiple technical pathways while aligning with Ucore on near-term commercial deployment⁵.

⁵ See ASX: MTM announcement dated 25/08/2025, 'REE Processing Strategy Expanded with Next-Gen Separation'

NEXT STEPS

- The 12-month collaboration will advance through a staged program of testwork and pilot operations. In the first stage, bench-scale testing will focus on processing Ucore's rare earth concentrate through Metallium's FJH system to produce mixed REE chlorides, the conversion of magnet scrap into chlorides containing neodymium, praseodymium, dysprosium and terbium, and the extraction of terbium from lighting waste.
- In the second stage, pilot-scale production will involve pilot campaigns to produce mixed REE chlorides (MRECℓ) for feed into Ucore's Kingston separation facility.
- The testwork program is expected to take approximately six to nine months, although actual duration may vary depending on feedstock campaigns and technical results.
- This second stage will also test the viability of applying Ucore's RapidSX™ to mixed metal chlorides derived from e-waste processed using FJH.
- This staged program combines Metallium's front-end upgrading capability with Ucore's downstream separation capacity, reflecting the complementary roles of each technology within the integrated flowsheet.
- The results of this staged program will underpin evaluation of commercial models, including licensing, tolling, and joint ventures.
- In parallel with this collaboration, Metallium is also continuing its research program with Rice University, focused on the **application of FJH technology directly to REE separation**. This work is complementary to the Ucore partnership and underscores Metallium's strategy of advancing multiple technical pathways for critical metal recovery.
- Furthermore, Metallium is also advancing its existing collaboration with Meteoric Resources (ASX: MEI) under a signed MOU to apply FJH to MREC feedstock from Meteoric's Caldeira project in Brazil⁶. That testwork has already demonstrated a step-change uplift in magnet and heavy REEs, providing further validation of Metallium's chloride-based upgrading pathway.

ADDRESSING CHINA'S REFINING DOMINANCE

China controls ~85% of global rare earth refining capacity, ~70% of mine production, and ~36% of reserves. Its grip is strongest in traditional solvent extraction (SX), a chemically intensive, multi-stage refining process⁷. Most non-Chinese developers remain reliant on this infrastructure, creating a critical bottleneck for Western REE projects. Without scalable allied refining options, U.S. and other western REE assets often remain commercially stranded. The Company's FJH technology upgrades complex feedstocks into chloride intermediates, which are directly compatible with Ucore's RapidSX™ system, creating a scalable, onshore rare earth element oxide (REO) supply pathway.

This **chloride-to-oxide** pathway offers a compelling alternative to traditional SX flowsheets:

- **Decouples from Chinese refining infrastructure**
- **Enables U.S.-based REE upgrading and separation**
- **Deployable across diverse mineral and recycled feedstocks.**

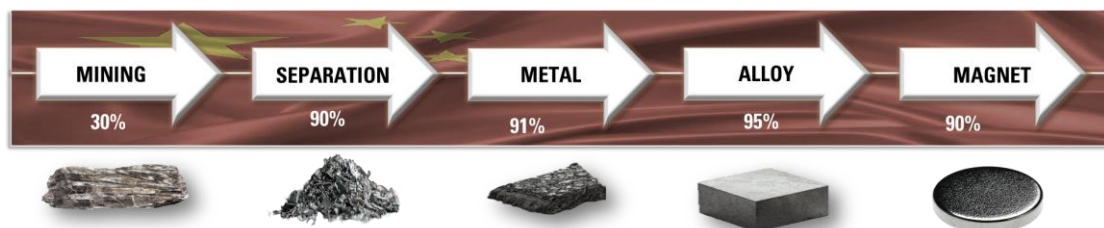


Fig 5: Chinese dominance of the REE value chain – approximate percentage of control at each part⁸

⁶ See ASX: MTM announcement dated 17/06/2025, 'MTM and Meteoric Sign MOU Following Breakthrough Testwork on MREC Feedstock'

⁷ Kawoosa, V.M. & Gu, J., 2025. JL Mag Rare-Earth says it obtained export licenses for rare earth products to U.S., Europe. Reuters. <https://www.reuters.com/world/china/jl-mag-rare-earth-says-it-obtained-export-licenses-rare-earth-products-us-europe-2025-06-11/>

⁸ Department of Defense (DoD) 2024, <https://www.defense.gov/News/News-Stories/Article/Article/3700059/dod-looks-to-establish-mine-to-magnet-supply-chain-for-rare-earth-materials/>

● China ● Rest of the world

Reserves (all rare earths) - 2024



Mine production (all rare earths) - 2024



Refined production (all rare earths) - 2022



Refined production (rare earth magnets) - 2024



Refined production (heavy rare earths) - 2023



Fig 6: China accounts for >99% of global refining for heavy REEs⁹

STRATEGIC TIMING

The collaboration comes amid accelerated U.S. government action to secure domestic supply chains:

- In July 2025, the U.S. Department of War entered into a multibillion-dollar strategic partnership with MP Materials to accelerate U.S. rare earth magnet independence.
 - The package includes a **US\$400 million equity investment** (positioning the DoW as MP's largest shareholder), a **10-year NdPr floor price commitment of US\$110/kg** (double the spot price), and a **10-year magnet offtake agreement**.
 - This marks a defining moment in the reshoring of REE magnet production and sends a strong signal of U.S. federal backing for vertically integrated rare earth supply chains.
- Ucore recently secured a **US\$18.4 million contract** from the U.S. Department of War to construct its commercial RapidSX™ module in Louisiana.

These developments signal a clear federal mandate to de-risk and scale **vertically integrated, onshore rare earth processing**, and Metallium's FJH technology is now aligned with that mission.

The binding agreement is for a term of 12 months. Each party will enter into good faith discussions to explore the potential of a future commercial arrangements and collaboration. Each party shall retain all rights to their technology and binding non disclosure agreements are in place between the parties. There are no commercial arrangements by way of fees or consideration associated with this collaboration agreement and each party is responsible for its own costs.

This collaboration complements Metallium's Texas commercial-scale demonstration plant, which remains a core focus and is on track for dry commissioning by December 2025.

This announcement has been authorised for release by the Board of Directors.

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⁹ Department of Defense (DoD) 2024, <https://www.defense.gov/News/News-Stories/Article/Article/3700059/dod-looks-to-establish-mine-to-magnet-supply-chain-for-rare-earth-materials/>

ABOUT METALLIUM LIMITED



Metallium Ltd (ABN 27 645 885 463), is pioneering a low-carbon, high-efficiency approach to recovering critical and precious metals from mineral concentrates and high-grade waste streams. The company's patented **Flash Joule Heating (FJH)** technology enables the extraction of high-value materials, including **gallium, germanium, antimony, rare earth elements, and gold**, from feedstocks such as refinery scrap, e-waste, and monazite.

Aligned with U.S. strategic supply chain objectives, Metallium has recently secured its first commercial site in Texas via its wholly owned subsidiary, **Flash Metals USA Inc.**, marking a major step toward near-term production and revenue generation.

To learn more, visit:

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ABOUT UCORE



Ucore Rare Metals Inc. (TSXV: UCU; OTCQX: UURAF) is a Canadian advanced technology company focused on establishing a secure and independent North American rare earth element (REE) supply chain. Ucore is developing its Strategic Metals Complex (SMC) in Alexandria, Louisiana, with support from the U.S. Department of War, which awarded the company a US\$18.4 million contract to construct its first commercial-scale RapidSX™ separation module.

RapidSX™ is a next-generation rare earth separation technology that delivers faster, more efficient and environmentally responsible separation compared with conventional solvent extraction methods. Ucore's mission is to provide scalable, flexible and feedstock-agnostic separation capacity in North America, enabling the production of high-purity rare earth oxides critical to electric vehicles, renewable energy and defence applications.

For further information, visit: www.ucore.com

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