

DOCKETED

Docket Number:	21-TRAN-05
Project Title:	Zero Emission Vehicle-Related Manufacturing
TN #:	241500
Document Title:	MP Materials Comment - Neodymium Magnets & Rare Earths
Description:	N/A
Filer:	System
Organization:	MP Materials
Submitter Role:	Public
Submission Date:	2/9/2022 2:42:00 PM
Docketed Date:	2/9/2022

*Comment Received From: MP Materials
Submitted On: 2/9/2022
Docket Number: 21-TRAN-05*

MP Materials Comment - Neodymium Magnets & Rare Earths

MP Materials is pleased to respond to DOCKET #21-TRAN-05 with the attached information on neodymium magnets and the rare earth element supply chain. As the owner and operator of America's™ only scaled and operational rare earth mine and processing facility in Mountain Pass, Calif., MP Materials looks forward to working with the California Energy Commission to strengthen America's™ supply chains and the U.S. energy sector in support of vehicle electrification.

Additional submitted attachment is included below.

Submitted via energy.ca.gov

February 9, 2022

Mr. Christopher Jenks, PhD
Air Pollution Specialist
Manufacturing and Production Unit
Fuels and Transportation Division
California Energy Commission

Re: Comment responding to Docket #: 21-TRAN-05 “Zero Emission Vehicle-Related Manufacturing”

Dear Dr. Jenks,

MP Materials Corp. (NYSE:MP) (“MP Materials” or “MP”) is pleased to respond to DOCKET #21-TRAN-05 with information on neodymium magnets and the rare earth element supply chain. As the owner and operator of America’s only scaled and operational rare earth mine and processing facility in Mountain Pass, Calif., MP Materials looks forward to working with the California Energy Commission (“CEC”) to strengthen America’s supply chains and the U.S. energy sector in support of vehicle electrification.

Thank you for your review of the attached comment. Please do not hesitate to contact me for any further information.

Respectfully submitted,

Matt Sloustcher

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Executive Summary

MP Materials is the largest rare earth materials producer in the Western Hemisphere. MP owns and operates the Mountain Pass Rare Earth Mine and Processing Facility (“Mountain Pass”) in San Bernardino County, Calif., the only active and scaled rare earth element (“REE”) resource in the United States.

MP acquired Mountain Pass in July 2017 after operational and financial challenges forced the site’s previous owner into bankruptcy. Since restarting operations from cold-idle status, MP has scaled production at Mountain Pass dramatically. In 2020, MP produced more than 38,500 metric tons (“mt”) of rare earths contained in concentrate, representing more than 15 percent of global production according to the U.S. Geological Survey.¹ Over the trailing 12 months for the period ended September 30, 2021, MP further increased production to approximately 41,500mt. Today, we employ nearly 400.

MP’s mission is to restore the *full* rare earth supply chain to the United States. Today, MP mines high-grade rare earth-bearing bastnaesite ore at Mountain Pass and produces commercial-grade mineral concentrate that is exported. No separation facilities of sufficient scale exist in the United States to further process this concentrate today. Supported by the U.S. Department of Defense (“DoD”), MP is addressing this void in the U.S. supply chain by developing separation capabilities at Mountain Pass.

MP is simultaneously developing downstream capabilities, including neodymium magnet-making and rare earth material and magnet recycling. In December 2021, MP announced an initial rare earth metal, alloy and sintered neodymium-iron-boron (“NdFeB” or “neodymium”) magnet manufacturing facility in Fort Worth, Texas. This facility will produce approximately 1,000 tonnes of finished NdFeB magnets per year with the potential to power approximately 500,000 EV motors annually.² MP has entered into a long-term agreement with General Motors (“GM”) to supply rare earth alloy and magnets from this facility to more than a dozen EV models that utilize GM’s Ultium platform, with a gradual production ramp that begins in late 2023.

MP Materials’ initial magnetics facility will consume less than 10% of the 6,075 tonnes of NdPr oxide MP Materials expects to produce annually at Mountain Pass. The company

¹ See 2021 USGS Rare Earths Statistics and Information, Published January 2021.

<https://pubs.usgs.gov/periodicals/mcs2021/mcs2021-rare-earths.pdf>.

² See General Motors and MP Materials Enter Long-Term Supply Agreement, Published December 9, 2021.

<https://mpmaterials.com/articles/general-motors-and-mp-materials-enter-long-term-supply-agreement-to-scale-rare-earth-magnet-sourcing-and-production-in-the-us/>.

envisions building additional alloy and magnet manufacturing capacity to consume a greater percentage of its primary production and supply growing U.S. demand.

Environmental Sustainability & Recycling

We believe Mountain Pass is the world's cleanest, most environmentally conscious rare earth production facility. Fundamentally, we believe that REE extraction, separations and metallurgy can and must be performed with no sacrifice to American environmental values.

At a geological level, the bastnaesite ore body at Mountain Pass is blessed with unusually low levels of thorium and uranium relative to other rare earth deposit types around the world. The concentrate produced at Mountain Pass has no radioactive byproduct and contains only low levels of thorium and uranium itself.

To virtually eliminate seepage risk, Mountain Pass employs a dry-stacked tailings process. We believe just 13 dry-stacked tailings facilities of any mineral resource have been placed into operation in the past decade worldwide, and only 3% to 6% of global tailings facilities in operation today are dry stacked, with MP Materials operating the only one of its kind in the rare earth industry.

At Mountain Pass, paste tailings are retired in lined impoundments. Put simply, we believe that the material is returned to ground with nearly as little risk to the environment as the hard rock from which it is extracted.

To conserve water and further minimize our environmental footprint in an operation located in the Mojave Desert, approximately 95% of the water used throughout our mining and beneficiation process is recycled – more than 1.5 billion liters per year. Mountain Pass is a zero-discharge facility with no process water disposed offsite or to the ground.

The vertically integrated nature of MP's operation provides flexibility to optimize recycling pathways using a first principles approach. Waste generated during our alloy and magnet production process will be recycled. End-of-life magnets can also be re-processed into high purity separated rare earth oxides at Mountain Pass. The recycled oxides can then be refined into metal and, once again, produced into high performance magnets.

MP's vertically integrated operation also allows for the development of more novel recycling pathways that shortcut these traditional approaches. The company is currently developing these concepts with significant commercial entities.

EV and EV Component Manufacturing

The U.S. faces numerous supply chain vulnerabilities related to EV manufacturing and appreciates CEC's attention to this matter. Rare earth materials and permanent magnets are an acute challenge within the EV supply chain. As a result, the rare earth supply chain is an area of intense Federal attention, one that California and Mountain Pass are uniquely positioned to address.

Rare earth materials, and the neodymium magnets from which they are derived, are key inputs to the motors and generators in EVs, wind turbines, and various other advanced technologies. Of the approximately five million traction motors and generators deployed in new HEVs, PHEVs, and BEVs in the first half of 2021, 92.1% were powered by neodymium permanent magnet synchronous motors.³

Concerningly, as the U.S. auto industry races to electrify, it requires a sustainable supply base for rare earths and neodymium magnets, and domestic alternatives to imports simply do not exist today. The most consequential gaps in the supply chain are the lack of processing (to oxide), reduction (to metal and alloy), and recycling.

MP Materials is addressing the lack of separation facilities in the United States by investing more than \$220 million to restore REE separations capability to Mountain Pass. The Company's work to restore processing capabilities has been supported by the Department of Defense through the Defense Production Act and Industrial Base Analysis and Sustainment programs. One area of particular importance to the EV supply chain is restoring the capacity to produce separated heavy rare earth elements domestically. Separated heavy rare earths, namely terbium and dysprosium, are applied in small quantities to high performance neodymium magnets, such as those found in EV motors, to increase temperature resilience.

Like rare earth processing, domestic production of sintered neodymium magnets is virtually non-existent. The last major vertically integrated U.S. magnet producer ceased operations in 2003 and relocated to China. Approximately 90 percent of world's neodymium magnets are today made in China. As previously noted, MP Materials envisions building additional alloy and magnet manufacturing capacity beyond the initial

³ See 2021 Adamas Intelligence Global PMSM Market Share Continues to Rise Despite Soaring Rare Earth Prices. <https://www.adamasintel.com/pmsm-market-share-rising-in-face-of-higher-ree-prices/>

facility we are constructing in Texas to consume a greater percentage of our primary production and supply growing U.S. demand driven largely by EVs.

In addition to processing and neodymium magnet production, recycling of rare earth products must be prioritized to preserve natural resources and enhance the economics of primary magnetic production. When neodymium magnets reach end-of-life today, they are generally discarded without recovery. There are currently some large-scale recovery efforts in Asia, but none currently in the United States.

In the 2030s, an increased volume of larger magnets from end-of-life wind turbines and EVs may come to market. However, in advance of that date, most magnets available for recycling will be from hard disk drives and consumer electronics. The process of recycling neodymium manufacturing waste and end-of-life magnets is not unlike the process employed to refine virgin rare earth-bearing ore. Like many forms of recycling, we believe the primary challenge is one of economics. MP Materials submits that developing scaled recycling facilities collocated with facilities designed to process virgin ore would yield favorable economics. We consider this work vital to resource preservation and long-term resiliency. Support for the commercialization of such a facility would be welcomed.

Conclusion

MP Materials appreciates the commitment that the California Energy Commission has made to EV manufacturing. California has a tremendous resource in Mountain Pass that can help address one of the most challenging sections of the EV supply chain. Mountain Pass is located across the high desert from Lithium Valley in a similarly economically challenged part of the state. We believe that leveraging California resources from both places to sustainably produce EV materials and components amidst a once-in-a-generation transformation of the automotive industry is a fitting way for California to complement its longstanding efforts to catalyze EV deployment.