

Anthony Marchese
Chairman
Texas Mineral Resources Corp

The story of China's dominance of the rare earth sector begins in 1995, when an investment group fronting for the Chinese and led by the son of the Watergate prosecutor Archibald Cox purchased the Magnaquench magnet making division of General Motors. In spite of the deal requiring the continuance of operations in the United States for five years, the group closed the plant immediately upon deal consummation and moved all operations to China. Thus began China's plan to dominate an industry whose raw materials are imbedded in virtually every consumer and industrial product produced around the world. We tend to think about China's dominance in terms of raw material production but sadly it doesn't stop there. Although China controls over 99% of the world's production of heavy rare earth minerals and over 80% of the world's production of light rare earth minerals, it also has a stranglehold over the processing of such minerals as they are transformed into the actual metals that go into the final product. Even if magically the United States today could produce all the rare earth minerals it needs, downstream processing would need to be done overseas in Asia. Thus solving the rare earth supply chain issue domestically requires us to address not only the production of such minerals but the requirement to establish domestic downstream processing as well. The national security implications speak for themselves. While it is easy to dismiss

such concerns as not being in China's best interests given they benefit economically from their dominance of the rare earth supply chain, let us not forget that China is run by a military government and not by economists.

The United States has long recognized the utility of rare earth minerals in the national defense industries. The Congressional Research Service, the non-partisan consulting arm of the United States, in 2013 published an exhaustive review of the ubiquitous nature of rare earth minerals in virtually every aspect of our national defense. A few of such applications include weapon guidance and control systems, electronic warfare defenses, communications equipment and electric motors. In spite of the dire warnings expressed in 2013, we have barely made a dent in domestically weaning ourselves off of China. To make matters worse, the rise of the electric vehicle industry has increased domestic rare earth requirements and not just in the production of batteries, which currently require massive amounts of lithium. EVs require rare earth minerals to produce their electronics, glass, tires and even the shell of the vehicle.

Unfortunately politicians and policy makers have “kicked the can down the road” repeatedly since 1995 when it comes to establishing a domestic rare earth supply chain. In spite of having among the most stringent environmental mining regulations in the world, environmental groups turn a blind eye when it comes to rare earth mining and given their outsized influence with respect to political donations have had the ability to dissuade politicians from taking a more aggressive stance on the establishment of a domestic supply chain. Furthermore, most politicians do not represent districts with mining so there is no urgency to promote a domestic supply chain solution. Finally, the general public does not recognize the domestic threat that exists and there is no public outcry. Pennsylvania is a state with a large industrial base so that any type of rare earth supply chain disruption will have a significant effect on production. Domestic production of rare earth elements will only occur with private industry cooperation and investment. There is no political will in the United States to fund sources of rare earth minerals. Rather, any type of financial incentives have been focused on rare earth processing, ignoring the fact there is only currently one domestic miner of rare earth minerals and that entity only mines light rare earths in California.

Private investment in Pennsylvania will only occur when the financial markets see evidence of success beyond results in the lab. Specifically, it will take the establishment of a pilot plant operating on an economic basis in order to attract larger amounts of capital. Pilot plants cost anywhere from \$25-\$35 million no matter the source of material to be processed. Federal government grants from the Department of Energy typically do not typically cover expenditures of this magnitude and when they do, require a 20% copay from the organizer.

Furthermore, it is imperative that funds be provided in order to identify and characterize sources of rare earth minerals within the state. Extensive testing is expensive and most entities which claim to have rich sources of rare earth minerals simply do not do enough testing to validate their claims. Fortunately for Pennsylvania, there are potentially large sources of rare earth minerals from various coal industry components and acid mine drainage such that the state can play a large role in securing a domestic source of rare earth minerals.