### Asteroid Mining NC

#### My value is life and my criteria is utilitarianism. Saving lives is the most important function of a government who must represent all of its people, and evaluating costs and benefits emphasizes critical comparative decision making skills

#### Contention One: Harms

#### 1. Supply disruptions for critical minerals are coming – shortages, or perceived shortages, can disrupt militaries and economies, and create the risk of conflict and instability over minerals.

Parthemore, 2011 - Fellow at Center for a New American Security [Christine “Elements of Security: Mitigating the Risks of U.S. Dependence on Critical Minerals,” June [http://www.cnas.org/files/documents/publications/CNAS\_Minerals\_Parthemore.pdf](http://www.cnas.org/files/documents/publications/CNAS_Minerals_Parthemore.pdf//edlee)]

Assessing U.S. Vulnerability - Analysts vary widely in assessing the implications of U.S. dependence on critical minerals, despite broad acceptance of the physical reality that mineral resources are finite and the economic realities that requirements are ubiquitous and demand is growing. On one extreme, some analysts believe the 2010 incident between China and Japan suggests an approaching Hobbesian world in which resource demands outstrip supplies for minerals, nonrenewable energy sources and even food supplies. History indicates that conflict over absolute scarcities is unlikely. At the other end of the spectrum, many still believe that an open market and its invisible hand will continue to determine winners and losers with no serious repercussions for the United States given its purchasing power. In between these extremes, even staunch pragmatists will point to the 2010 China rare earths episode as proof of one basic tenet: The United States and other market-based economies no longer determine all the rules of global trade. Central to this narrative is a conundrum for policymakers. Reserve estimates show that global supplies of almost all minerals are adequate to meet expected global demands over the long term, and for decades into the future for most minerals. The U.S. Geological Survey (USGS) indicates, for example, that world supplies of rare earths will be adequate for more than 100 years.13 These estimates, however, can be meaningless in the near term if supplies are insufficient, or if suppliers reduce exports or otherwise manipulate trade. For example, most experts project that global production of rare earths will likely be insufficient to meet the world’s demand over the next two to three years. The long-term sufficiency of supplies has no practical effect because it takes years and high capital costs to start up new mining and processing businesses for rare earths. Thus, the risks of inaction are high. A range of political, economic and geographic factors can disrupt supplies and cause price spikes that can create rifts in bilateral relations, trade disputes, accusations of economic sabotage and instability in countries that possess rare reserves of prized minerals. They can also give supplier countries extraordinary leverage that can alter geopolitical calculations, especially when single countries control most world supplies. For U.S. policymakers, the risks fall into two rough categories: Disruptions, delivery lags and price spikes that affect military assets and place unanticipated strains on defense procurement budgets; and lack of affordable access to minerals and raw materials preventing important national economic growth goals. The defense industrial base in the modern era differs greatly from any previous time. Often, actual scarcity is not required for problems to arise, as concerns about future scarcities often drive countries to behave as if shortages are occurring. The National Academies recently reported, “The risk of supply interruption arguably has increased or, at the very least, has become different from the more traditional threats associated with the more familiar ideas of war and conflict.”14 During World War I and World War II, for example, governments counted on domestic steel production – and even civilian willingness to contribute scrap materials for reuse and recycling – for tanks and other equipment. In contrast, modern warfare relies on globalized and privatized supply chains rather than a primarily domestic (and often government-run) network. Vulnerability to mineral supply disruptions is likewise far broader and more complicated than it was in previous eras. Policymakers should also consider minerals that play uniquely important roles in the American economy. Rare earths, for example, are important in petroleum refining, which today enables the smooth functioning of the economy. Looking to the longer term, much concern is turning toward minerals that may see booming demand as the economy develops a greater reliance on energy efficiency and renewable energy technologies, such as the lithium used in advanced batteries and hybrid and electric vehicles. These minerals will directly affect U.S. economic competitiveness, and plans for improving economic growth and job development. Pg. 11

#### 2. Short-term disruption in mineral access can spark war – Minerals are indispensable to our economies and society.

Hinten-Nooijen 10 – Project manager Centre for Science and Values at Tilburg University [Annemarie “Rare minerals - The treasures of a sustainable economy,” Asset Magazine, 25-03-10, http://www.tilburguniversity.edu/nl/over-tilburg-university/cultuur-en-sport/cwl/publicaties/beschouwingen/minerals/]

Driving a hybrid car, using energy from wind turbines or solar panels. That are choices to contribute to the transition to a sustainable economy. Sustainability is the spearhead of many western policy plans. It is regarded as the solution to get out of the crisis. But ironically, the raw materials that are needed for hybrid cars and wind turbines, for our technological industry as a whole, are not that sustainable. Necessarily required minerals like neodymium and indium are rare. And they are not available in the west, China has almost all of them. And having this position of power, China wants to use it. That is about strategy. The high-tech raw materials play a central part in the highly industrialised high-wage countries to survive the global competition by technological excellence. Will future wars be about minerals instead of oil, territories or water? THE BONE MARROW OF MODERN ECONOMY Minerals are an indispensable material pillar of our current economies and societies. They are the natural product of geological processes and occur in the crust of the planet. Only a fraction of the known minerals exists in greater quantities. Some of these are mined, refined and processed; are broken up into their elemental components, which are recombined into different types of materials. These materials are used to manufacture products that form the backbone of our modern economies: from LCD displays to fighter jets, from smart phones to electric cars. Without minerals, industrial society and modern technology would be inconceivable. That seems unbelievable, because we hardly hear or read about them in the media - whereas several research reports have been published recently. But imagine that by reading this article on printed paper or at your computer screen, minerals like nickel, chromium, molybdenum, gallium, selenium, aluminium, silicon and manganese were needed! And all these elements have to be first extracted from minerals, which in turn need to be mined from the earth's crust. CHINA'S GREEN DEAL In recent years, the world economy has grown enormously, and many new high-tech applications have been made. Moreover, the demand for minerals has exploded. Mining tried to meet the demand. A global competition between countries and companies over rare mineral resources started. Prices have shot up, countries have created strategic stockpiles or imposed export restrictions in order to secure supplies of these valuable resources. Mineral scarcity concerning the industry seems to be more of an economic issue than an issue set by limited resources. Minerals are getting evermore difficult to find and costly to extract - while they are the key to advanced sustainable technologies. Talking about sustainability seems not talking about China, because China is still building many polluting coal-fired power plants, and the social circumstances there are poor. However, recent developments also show progress concerning sustainability. And in a country like China these developments go faster than in many western democracies. Where we in the west talk and dawdle, they think and act strategically. In the United States, president Obama has to explain the Americans that forms of the New Green Deal are inevitable - like the situation in the thirties of the last century, when President Roosevelt made the so-called New Deal to reform the economy. Many Americans do not want the government to influence the market. They radically believe in the free market. In China, by contrast, the ideological separation between market and government does not exist. There is no Wall Street with greedy bankers, no neoconservative Grand Old Party that dreams of the cowboy economy. Decisions are taken quickly. And besides, they have to feed one billion people and develop a country that lived in Mao-ist poverty before. The Chinese are successful, after all, also in creating a sustainable economy: China does not only build old polluting power stations but uses the latest technology, with CO2- catch and -storage. And they are working on alternatives: windmills. In the next five years, they will build 100,000 windmills in the Gobi desert. Did they hate the wind in that area before, now they consider it the new gold. In the north-west area of China, the province of Gansu, the Qilian-mountains pass into the Gobi desert. There China is building the biggest windmill and solar panel park in the world. Six windmill parks with a capacity of ten gigawatts each are built, making China the biggest market of technology of wind energy, defeating the United States. "Red China becomes green China", party officials are saying. China has to grow, and so has the contribution of wind, water and sun at the energy market. This market would be interesting for foreign investments. According to Chinese officials they are welcome and can get subsidies. But, Beijing has decided that 70 percent of the windmills have to be made and designed in China. So it can be questioned if European and American companies have a fair chance in tendering for a contract. China considers itself a developing country and thinks that the western countries should contribute money to China to reduce the CO2 discharge. While America thought that energy saving is not worthwhile, China has taken an enormous energy-technological lead. The authoritarian and undemocratic but intelligent China exposes a variant of the New Deal. THE OPEC OF THE RARE MINERALS The example of China shows us that sustainable economy has everything to do with strategy and power. In a few decades China has been flooding the market of rare metals. The legend goes that president Deng Xiaoping had already predicted this in 1992, during a tour in the south of China: "They [the Mid East] have oil, but we in China have rare minerals". Nowadays, China indeed has 95 percent of the global supply of rare minerals. How did it do that? It was a result of good strategy: in the nineties, China flooded the world market with the rare minerals, although there was not that much demand. The west thought it okay because getting the minerals was a very expensive production process and the environmental legislation was very strict. The western competitors went bankrupt and they closed their mines. China became powerful. One of the centres of the rare mineral supply is around the city Baotou, an industrial city of two million people in Inner Mongolia. Here the states concern exploits almost half of the world storage of neodymium. DISRUPTION OF THE MARKET The lack of raw materials is not particularly a result of the geological availability but of disruptions in the market, because the developments of the world wide demand for rare minerals are not recognised in time - as part of the stormy development of the Chinese economy and the expansion of technical developments - and because the minerals occur in only a few countries. Experts have predicted that in the next few decades the demand of neodymium will increase by a factor 3.8. China uses 60 percent of its exploitation for its own economy. What's more, the Chinese export quota become stricter every year. What happens? Sudden peaks in the demand can lead to speculative price movements and a disruption of the market. "2010 will be the year of the raw materials", according to Trevor Greetham, Asset Allocation Director of Fidelity. Indium, a silver-white metal, which is not found directly in nature, but is a residual product of thin and zinc, is used in LCD displays for TVs, computers, mobile phones, and for led lights and the ultrathin and flexible solar panel. The price of this mineral multiplied tenfold between 2003 and 2006 from 100 to 980 Dollars per kilogram. The price of neodymium decreased from 11.7 dollar per kilogram in 1992 to 7.4 dollar in 1996. The market volume rose. In 2006 almost all of the world production of 137,000 tons came from China. By scaling back the export, prices rose, up to 60 dollar per kilogram in 2007. Imagine that for a hybrid car, like the Toyota Prius or the Mercedes S 400, you need at least 500 grams of neodymium for the magnetic power of the engine; and for the newest generation of wind turbines, the ones that are 16 meters high, you need about 1000 kilogram. That makes 60,000 dollars - for just a little bit of metal! Big business for China. At the same time, China makes further strategic investments: it took an interest in oil and gas fields. In August 2009, PetroChina paid 41 billion dollar to gain access to an enormous field of natural gas in front of the coast of Australia. And in September that year, it obtained a stake of 60 percent in the exploitation of fields of tar sand in Alberta, which might hold one of the biggest oil reserves in the world. And because China considers titanium a growing market, it took an interest of 70 percent in a titanium mine in Kenia - not only to build the Chinese 'Jumbojet', but also to provide Boeing with 2000 tons of titanium each year. By doing so, China might beat the competition in the battle for the market in green technologies. The 'free' market can be questioned. The mineral policies of China and the US both mention the usage of administrative barriers. These nontariff barriers involve regulations that seek to protect the national mineral extraction industry. As a result, it is much harder for foreign companies, if not impossible, to invest and gain a foothold in the national mineral extraction industry in these countries. The search for rare metals has become a global race: a mine in California has also been reopened, the mine of Mountain Pass. In 2008, it was bought by a group of investors, the partnership 'Molycorp Minerals'. The process of bringing the old mines into use costs much time and money. What does this mean for us? Do we get more dependent of China? The 'Innovation platform' in Rotterdam planned to build a unique windmill park in the sea, further from the coast and in the strongest sea wind than anywhere in the world. To build these windmills, we need rare minerals, the export of which is dominated by China. Part of the project is Darwind, which designed enormous windmills for at sea. But the umbrella company, of which Darwind is part, Econcern, was about to go bankrupt. Then, in mid-August 2009 it was saved by the, surprisingly, Chinese XEMC. THE THREAT OF GEOPOLITICAL INSTABILITY The transition to a sustainable economy involves underexposed elements like deficiency in minerals and shifting balances of power. They are the ideal receipt for geopolitical instability. The new world order will be a balance between countries that do have particular raw materials and ones that do not. The lack of indispensable minerals sharpens the relations in the world. The access to critical minerals is more and more an issue of national security, concluded the 'The Hague Centre for Strategic Studies' (HCSS) in its report about the scarcity of minerals (January 2010). The US, Japan and China are making a policy that tries to secure the supply of these raw materials. That will disturb the free market activity. HCSS thinks that large concerns will, with support of the government, compete more intensively with each other for access to these raw materials, e.g. by direct investments in areas rich in raw materials. Mineral scarcity will be an issue in the next decades, though it is uncertain when and to what extent. And we have to do something because a change in supply of rare minerals directly affects our current modern lives.

#### Contention Two – Solvency

#### 1. Mining Asteroids solves mineral shortages – there is Enormous potential on asteroids.

Forgan and Elvis, 2011 - Institute for Astronomy, University of Edinburgh & Harvard Smithsonian Center for Astrophysics[Duncan and Martin, 3-29-11 “Extrasolar Asteroid Mining as Forensic Evidence for Extraterrestrial Intelligence,” <http://arxiv.org/PS_cache/arxiv/pdf/1103/1103.5369v1.pdf>]

Planets have ﬁnite natural resources. This truism has become painfully apparent to mankind in recent decades, through examples such as shrinking biodiversity and the increasing challenges facing engineers and geoscientists attempting to extract fossil fuels from the Earth. All life acts as consumers at some level, but the level of consumption is typically regulated through population control and other pressures introduced by the ecosystem . Advances in technology have allowed humans to circumvent these controls, with the effect that humans have vastly increased their population, placing strains on local resources. There has also been a continued increase per capita in consumption of precious metals for technologies such as computers, mobile phones and the infrastructures which enable them to function. The proposed green technologies of the future, such as hydrogen fuel cells and CO2 scrubbers, will only enhance this need for already rare resources (Elshkaki & Van Der Voet, 2006; Schuiling & Krijgsman, 2006). Such resources can be found in the asteroids. Meteoritic analysis (Kargel, 1994), suggests that large quantities of gold, platinum and other precious metals exist in the asteroids of the Solar System, as well as large amounts of other elements such as iron, nickel, magnesium and silicon. He concludes that successful operations at modest mining rates could increase the total production rate of some materials by a factor of 10. By applying simple empirical models (where market value scales as the square root of production rate), approximate threefold decreases in price can also be expected, over timescales of a few decades. Indeed, if the supply of precious metals such as platinum is to continue to meet technological demands, asteroid mining may become essential within the coming century (Elshkaki & Van Der Voet, 2006). Besides these industrially driven arguments, SETI scientists are driven by the possibility of detecting extraterrestrial intelligence by evidence of their activities in the Outer Solar System and the asteroids (Papagiannis, 1978, 1995).

#### 2. Current ambiguous private property rights inhibits asteroid mining – it undermines financing.

del Campo, 2021 – JD Candidate at Univ of Texas [Jose A. Martin “Finders Keepers: Who Has Say Over Private Property in Space,” 7 Tex. A&M J. Prop. L. 199 https://doi.org/10.37419/JPL.V7.I2.3]

The push for unlocking low-cost space travel and space industrialization by entrepreneurs, like Elon Musk and Jeff Bezos, propels the search for extraterrestrial materials such as water and minerals.4 According to NASA, minerals found in the asteroid belt between Mars and Jupiter contain an estimated value of approximately $100 billion for every person on Earth.5 However, uncertainty lingers because private entities are unsure that they will possess property rights to their payload or the mined celestial body.6 Celestial bodies refer to naturally occurring objects in space. The United States Commercial Space Transportation Advisory Committee (“COMSTAC”), an advisory body to the Federal Aviation Administration’s (“FAA”) Office of Commercial Space Transportation (“FAA-AST”), has undertaken review regarding the granting of private property licenses.7 COMSTAC expressed a desire to confirm that private entity resource extractions may be owned and utilized as it deems appropriate.8 The current framework of space law is a combination of agreements with the foundation of space law consisting of the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (“Outer Space Treaty”).9 At the time of signing, the Outer Space Treaty hoped to foster cooperative and peaceful exploration of outer space without discrimination of any kind.10 However, Article II of the Outer Space Treaty contains the bane of private property rights in outer space, which forbids the national appropriation of the moon and other celestial bodies.11 While the Outer Space Treaty explicitly mentions the prohibition of public entities claiming celestial bodies, private enterprises risk failing to have their interest in property rights recognized by the global community. Private entities and investors grapple with the issues pertaining to their rights to mine and extract resources from outer space legally. Without further international recognition of their property rights, private entities may shy away from exploring the concept of celestial mining. The issue of not knowing what laws are applicable, or to whom private companies are accountable, impedes the progress private entities make in achieving their goal of harvesting extraterrestrial resources. Private entities fear that the non-appropriation clause of Article II of the Outer Space Treaty, the epicenter of the issue, will strip them of the right to transport their mined resources back to Earth. A new legal regime will likely need to be formed that facilitates the continuation of innovation and promotes the exploration of outer space. Whether or not past private and public international doctrines, i.e., the law of the sea, may provide guidance in creating a new doctrine of space law is yet to be determined.

#### 3. Recognizing private property rights in space is the best way to develop the transportation and infrastructure to support mining. This would provide enormous benefits to the economy.

Jobes, 2005 - president of the Space Settlement Institute[Douglas, “Lunar Land Claims Recognition: Designing the Ultimate Incentive for Space Infrastructure Development”, May/June Space Times <http://www.space-settlement-institute.org/Articles/LCRSpaceTimesMay2005.pdf>]

U.S. recognition of land claims would be an open proposition, equally, to consortia from any nation, and, in fact, it is very likely that some lunar bases would be established by multi-national consortia and launched from non-American spaceports. Without something like the land claims recognition law, it may be a very long time before the space infrastructure that space businesses will need is financed and constructed. On February 10, Congressman Ken Calvert, the newly appointed chairman of the Space and Aeronautics Subcommittee of the House Science Committee, spoke before the Federal Aviation Administration's annual commercial space transportation conference. Calvert stated, "In 2010, the shuttle will be retired, so there is right now a need to move people into space quickly, safely, and reliably, I believe that need could be met in large part by the private sector.... The job of Congress is to pass legislation and exercise its oversight functions in such a way that will enable this industry to succeed." In June 2004, the President's Commission on Implementation of United States Space Exploration Policy (also known as the Aldridge Commission) specifically recommended prizes, tax incentives, regulatory relief, and the assurance of "appropriate property rights for those who seek to develop space resources and infrastructure." It's hard to imagine a more effective way to help the private space industry succeed than by passing legislation creating a financial incentive worth billions of dollars to research, design, develop, and build vital components of the infrastructure in space. And what would motivate Congress to pass a lunar land claims recognition law? Unlocking billions of dollars in private investment for the development of the space industry and space infrastructure would create an economic boom for this country in the aerospace and technology sectors. Untold new technology jobs would be created. More young people in this country would become interested in pursuing science as a career, inspired by a private industry race to the Moon in which they could possibly participate, just as the young generation was inspired during the Apollo era. An intensive effort on the part of the private sector to develop space infrastructure will have many economic and societal benefits. A catalyst like that which a lunar land claims recognition law would provide is needed now to jumpstart the development of space infrastructure. As Anita Gale points out, "The effect of adding space infrastructure will be like building a freeway in Southern California. After the first elements of infrastructure are in place, gas stations and restaurants are built at the exits, then hotels, and finally entire towns. After the first big spaceport or settlement is established, there will be a space construction boom." We can only close our eyes and imagine - and then open them and get to work to make it happen. •

### AT Mining is Infeasible

#### Privatization makes mining feasible – entrepreneurs will be able to afford losses as technology scales up

Dorminey, 2021 - former bureau chief for Aviation Week & Space Technology [Bruce Forbes Aug 31, 2021, “Does Commercial Asteroid Mining Still Have A Future?” https://www.forbes.com/sites/brucedorminey/2021/08/31/does-commercial-asteroid-mining-still-have-a-future/?sh=7fbe30d1a93f]

By some estimates a 100-meter diameter metallic asteroid might contain PGMs worth as much as $12 billion. And if PGMs are ever imported back to Earth, as Kargel told me in a Forbes post nearly a decade ago, “Metals used sparingly because of their high prices would suddenly become much more available for applications that we might not even dream of now.” Thus, Kargel says that commercial mining of PGM asteroids may still have a future but refuses to put a date on when he thinks it will finally happen. It’s going to take an Elon Musk-type figure to either kill the idea or proceed with the idea, he says. Kargel says not only will asteroid mining require additional new advances in both spacecraft technology and launch capability, it will need someone with deep pockets to fund serious space-mining development in a way that enables them to absorb losses of billions of dollars year after year until the technology and mining operations can be scaled up to be profitable.

#### Cubesats make asteroid mining possible.

Dorminey, 2021 - former bureau chief for Aviation Week & Space Technology [Bruce Forbes Aug 31, 2021, “Does Commercial Asteroid Mining Still Have A Future?” https://www.forbes.com/sites/brucedorminey/2021/08/31/does-commercial-asteroid-mining-still-have-a-future/?sh=7fbe30d1a93f]

The advent of small and very inexpensive cubesats are a potential major boon for the space mining industry, says Kargel. Most of these new-type spacecraft are spin-stabilized and don’t last long, he notes. But the basic idea of having very inexpensive spacecraft which can be mass produced are fortuitous for future asteroid mining efforts, he says.

#### We are on the brink of asteroid mining becoming reality – we have made many baby steps toward the technology

Gilbert, 2021 – PhD candidate in space resources at The Colorado School of Mines [Alex “Mining in Space Is Coming” Milken Institute Review https://www.milkenreview.org/articles/mining-in-space-is-coming April 26,]

Space exploration is back. after decades of disappointment, a combination of better technology, falling costs and a rush of competitive energy from the private sector has put space travel front and center. indeed, many analysts (even some with their feet on the ground) believe that commercial developments in the space industry may be on the cusp of starting the largest resource rush in history: mining on the Moon, Mars and asteroids. While this may sound fantastical, some baby steps toward the goal have already been taken. Last year, NASA awarded contracts to four companies to extract small amounts of lunar regolith by 2024, effectively beginning the era of commercial space mining. Whether this proves to be the dawn of a gigantic adjunct to mining on earth — and more immediately, a key to unlocking cost-effective space travel — will turn on the answers to a host of questions ranging from what resources can be efficiently.