UNDERSTANDING THE ECONOMIC WORTH OF PRECIOUS LUNAR METALS John C. Johnson[1,2,3], Peter A. Johnson[1,3], Austin A. Mardon[2,3], 1 Faculty of Engineering, University of Alberta (email: jcj2@ualberta.ca), 2 Faculty of Medicine and Dentistry, University of Alberta (email: paj1@ualberta.ca) 3 Antarctic Institute of Canada (103, 11919-82 Str. NW, Edmonton, Alberta CANADA T5B 2W4; email: aamardon@yahoo.ca

This abstract outlines the various precious metals that can be mined on the moon, their costs, and the impact they can have on our world economy. The Moon is equipped with a variety of metals which include: Olivine, Orthopyroxene, Clinopyroxene, Oxygen, Silicon, Magnesium, Iron, Calcium, Aluminum, Titanium, Uranium, Thorium, Potassium, and Hydrogen among others. An article in [3]"The Guardian" newspaper outlines that "Fledging space mining companies have set their sights on trillions of pounds worth of iron and precious metals locked in asteroids, along with valuable minerals and trillions of tons of water on the moon." The cost of transporting these precious metals to earth cannot be justified given that the value of the metals is smaller than the cost of the transportation. For example, an ounce of Platinum would cost about $969. Likewise, an ounce of Palladium would cost about $784, and an ounce of Rhodium about $875. However, even though there are many precious metals and minerals on the moon, the most valuable resource is Helium-3 since it is rare on earth, but is very common on the moon. The price of Helium-3 could be even as much as $2000 per Liter, or $59.15 per ounce respectively. Helium-3 is a gas that has the capacity to run nuclear fusion plants. It is essential to mention that 2.2 pounds, or 1 kilogram of Helium-3 mixed with 1.5 pounds, or 0.67 kilograms of deuterium can produce 19 years of megawatt energy—enough power to run the United States for a whole year. Because most of the metals have to be mined off asteroids, asteroids may have been the source of all the platinum that has been obtained from various land mines throughout history and could value in hundreds of billions of dollars. Even though the rare metals found on the moon cannot run an industry of their own, they can be used to help other industries to make gains, and improve the global economy. Also, the minerals can help provide rocket fuel, which humans can use for moon and space exploration. Many of those metals are used today in jewellery, smartphones, and even cancer treatments. While there are many economic benefits we could get from mining the moon for rare metals, it is essential to note the many drawbacks, the main issue being the cost of transporting the minerals from the moon to earth. Another setback is finding the right technology and equipment to transport large quantities of lunar rock back to earth. Some methods may be more efficient and safe than others if implemented. For example, building mining robots that can bring back the metals by their own may be a cost-friendly solution. Additionally, it would ensure the safety of astronauts, given that they would not be present on flights. Furthermore, technology must be introduced that can lift large amounts of weight and move between the moon and earth's orbit. The technology must also be able to increase its speed in a dangerous situation. The more we move into the future, the better technologies that will be introduced that will help us cope with the issue.

References:

[1]Mining the Moon. (n.d.). Retrieved from https://www.accountingschoolguide.com/mining-the-moon/ Mann, J. (2014, March 10). What's the Moon Worth? Retrieved from https://www.fool.com/investing/general/2014/03/10/whats-the-moon-worth.aspx(n.d.). Retrieved from https://www.explainingthefuture.com/helium3.html [2]Moon rich ground for mining: Experts. (2015, February 03). Retrieved from https://economictimes.indiatimes.com/news/science/moon-rich-ground-for-mining-experts/articleshow/46108007.cms [3]Mining in Space: What It Means for the Economy? (2019, January 02). Retrieved from https://interestingengineering.com/mining-in-space-what-it-means-for-the-economy Sample, I. (2019, May 12). Protect solar system from mining 'gold rush', say scientists. Retrieved from https://www.theguardian.com/science/2019/may/12/protect-solar-system-space-mining-gold-rush-say-scientists [4]Wainwright, P. (n.d.). Prospects for Inexpensive Space Transportation. Retrieved from http://www.spacefuture.com/archive/prospects_for_inexpensive_space_transportation.shtml [5] Beall, A. (2018, January 19). Space mining is going to seriously disrupt Earth's economy. And we're nowhere near ready for the shock. Retrieved from https://www.wired.co.uk/article/international-laws-are-not-ready-for-space-mining