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## BEYOND EARTH INSTITUTE

### GLOBAL CASE STUDY

### MINING THE MOON

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#### UNDERLYING FACTS<sup>1</sup>:

On January 1, 2025, Koala II<sup>2</sup> landed on lunar surface in the vicinity of the Shackleton Crater<sup>3</sup> without incident. Koala II was delivered into lunar orbit by the WASP<sup>4</sup> insertion vehicle. Koala II's mission was to deliver payloads for two commercial customers, Sutter' Mill Lunar Industries, Pty<sup>5</sup>, and LunarComms Systems, Ltd<sup>6</sup>. Koala II was also carrying civil science payloads for the Australian Space Agency<sup>7</sup>.

Between January 1 – 9, 2025, Sutter' Mill payloads were deployed from Koala II via TT&C<sup>8</sup> instructions from the Sutter' Mill SOC situated in Adelaide. Each payload was a surface drone (rover) of 10KG in weight, respectively, released by Koala II to move across the lunar surface to four distinct, pre-determined positions from the lander at a Line of Sight (LOS) distance of 100 meters, each. Each surface drone was equipped with a remote power umbilical<sup>9</sup> permitting them to rely on the lander power source. Each drone had remote drill and mix compartments onboard capable of mineral extraction and evaluation down to a minimum depth of 60 cm (24 inches). Each drone had an extendable communications mast with an omni-directional radio frequency antenna capable of achieving a height of thirty (20) feet. This RF communications system – an Open-Radio Area Network<sup>9</sup> - was owned/operated by LunarComms-1<sup>10</sup>, which transferred/relayed Sutter Mill's mineral data to Koala II connecting to

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<sup>1</sup> All names, characters, and incidents portrayed in this case study are fictitious. No identification with actual persons (living or deceased), places, buildings, institutions, companies, and products is intended or should be inferred.

<sup>2</sup> Koala II is a lunar lander designed, owned, and operated by Bunyip Space Industries, Plc of Adelaide ("Bunyip"); and registered as a satellite with the International Telecommunications Union through its national regulatory authority, Australian Communications and Media Authority, "ACMA" in July 2023.

<sup>3</sup> Shackleton Crater is located at the lunar South Pole 89.9' S; 89.9' E.

<sup>4</sup> WASP is a lunar insertion vehicle registered in January 2023, as a satellite (spacecraft) with the International Telecommunications Union (ITU) through its national regulatory authority, the Federal Communications Commission, "FCC". WASP relies on and is compatible with multiple international launch systems providing transfer and command & control services for spacecraft, e.g., landers, orbiters in and around the Moon.

<sup>5</sup> Sutter' Mill Lunar Industries, Pty, is a privately-owned, limited liability Australian company registered in 2021, and in good standing in 2025, specializing in prospecting, development, and exploitation of mineral rights on and beneath the lunar surface.

<sup>6</sup> LunarComms Systems, Ltd is a registered UK limited liability company, registered and in good standing with Companies House in January 2023.

<sup>7</sup> Australia Space Agency ("ASA") and Bunyip entered into a Public-Private Partnership for the Koala II mission in July 2022, selecting the Shackleton Carter as its proposed landing site in November 2023. Bunyip informed the ITU of its proposed landing site and coordinates in July 2023 through its national regulatory authority, ACMA.

<sup>8</sup> Telemetry, Tracking & Command (Control) is the primary communications platform giving details of a satellite's status, location, and actions as provided to it by its command/control center, i.e., Satellite Operating Center.

<sup>9</sup> LunarComms has since branded its O-RAN network at Shackleton Crater as "WOLF".

<sup>10</sup> LunarComms leased space on the Sutter' Mill drone (rovers) for its antennae in order to evaluate its proprietary operating architecture for WOLF on the lunar surface. In October 2023 LunarComms filed its intention to broadcast on specific radio frequency bands with the International Telecommunications Union via its national regulatory authority, OfCom.

LunarComms' backhaul payload which transferred/relayed the data Direct to Earth (DTE) to both the Sutter' Mill and the LunarComms SOC'.

At the end of Koala II's 10-day mission to Shackleton Crater<sup>11</sup>, Sutter' Mill and LunarComms deemed their respective missions a complete success. WASP inserted Koala II within meters of its preferred landing location in the vicinity of the Shackleton Crater. Koala II's deployment of Sutter' Mill drone (rover) systems performed per their design, moving to the designated locations without incident. Each drone (rover) operated for 70 hours, during Koala II's operating life of 10 days, extracting and examining a significant amount of lunar material. LunarComms' O-RAN design and operating equipment – hardware, software - without any outages or interference, permitting use of its spectrum for demonstration of cloud services, e.g., remote data management, in support of Sutter' Mill mineral prospecting efforts. Finally, prior to Koala II shutdown, Sutter' Mill and LunarComms' were able to run an "end to end" data management demonstration, i.e., compute, permitting mining experts on the Earth to manage extraction and evaluation of lunar material via a LunarComm's O-RAN ("WOLF") network Wi-Fi for the drone (rover) and relay DTE via LunarComm' hosted payload on Koala II with sufficient low latency to sustain continued service. In addition, Position, Navigation, and Timing (PNT) software provided data (longitude/latitude) sufficient for Australian surveyor certification of the physical boundaries.

#### RESULTING PROPERTY CLAIMS FROM THE KOALA II MISSION

##### Sutter' Mill

On February 16, 2025, after a detailed evaluation of its mineral data from the Koala II mission, Sutter' Mill filed a mining claim with a variety of public Australian entities. Sutter' Mills, as an Australian company, filed a notice with the Australian Space Agency, Australian Communications and Media Agency, with instructions for each to notify the appropriate international department and agencies pursuant to any international agreements these institutions feel applicable<sup>12</sup>. Sutter' Mill also filed, as an Australian company, registered in Adelaide, with the Department for Energy and Mining, Government of South Australia, pursuant to the Mining Act of 1972<sup>13</sup>. Sutter' Mill declared its intention in its mining claim to file for a mining lease or in the alternative, a retention lease, relative to the property Sutter' Mill surveyed and pegged on the lunar surface via payloads deployed from Koala II.<sup>14</sup>

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<sup>11</sup> On January 11, 2025, Koala II automatically ceased operations by design. Bunyip would continue to send TT&C to gather health of system data.

<sup>12</sup> Australia is a signatory to The Outer Space Treaty, a participant/member of the Moon Agreement.

<sup>13</sup> The Mining Act of 1972 sets forth a process in practice today for mining claims, leases, and ownership.

Applicants may register on-line.

[https://energymining.sa.gov.au/minerals/exploration/tenement\\_information/mining\\_register](https://energymining.sa.gov.au/minerals/exploration/tenement_information/mining_register).

<sup>14</sup> A mineral claim is pegged by placing posts in the ground to identify the area of the claim. With prior approval from the Mining Registrar, you can identify the claim by using a plan prepared by a licensed surveyor.

Any individual or registered business entity may peg a mineral claim.

[https://energymining.sa.gov.au/minerals/mining/claims\\_leases\\_licences\\_private\\_mines#mineral\\_claim](https://energymining.sa.gov.au/minerals/mining/claims_leases_licences_private_mines#mineral_claim).

The substance of Sutter' Mill' claim was based on its proprietary mineral prospecting and evaluation of material on the lunar surface. Sutter' Mill determined that over a test area<sup>15</sup> of approximately 26,000 square meters, a significant deposit of lunar ice was validated, with additional sonic test results indicating a depth of several hundred feet and a breadth of several thousand feet<sup>16</sup>. The potential scale and scope of this resource could exceed 10.5Billion gallons of water, which would be sufficient to support both significant human habitation and extensive industrial development, e.g., rocket fuel, hydro-mining, turbine fuel, Eco-Agra<sup>17</sup>. The claim value would be in the multi-trillions of AuDollars, with billions in investment to successfully exploit the resource. Consequently, Sutter' Mill claim was considered significant.

In furtherance of proof of its mining claim, it also noted in its filing that it had "pegged"<sup>18</sup> 4 distinct physical locations, as the parameters of its claim, these being the drone (rover) vehicles that extended out from Koala II. Finally, Sutter' Mill, in its application, set out that it had relied on a licensed surveyor, after its mission to Shackleton Crater to evaluate WASP and Koala II landing data to establish the Longitude and Latitude of its claim. Sutter' Mill also registered a geologic name for the ravine it prospected – Ravine Casores de la Luna or, "Casores."

In June 2025, Sutter' Mill entered into a development partnership with Canadian mining conglomerate, Canadian Responsible Resources, Ltd<sup>19</sup>, the purpose of which to co-finance, design, and build a water extraction facility on the lunar surface along the Casores Ravine in the vicinity of the Shackleton Crater.

#### LunarComm

Prior to its demonstration of the LunarComm O-RAN network performance, LunarComm' had notified the ITU via its national regulatory authority, OfCom, of its intention to broadcast on certain frequency bands in this specific location, in this specific period, for a specific purpose, on the lunar surface, as well as broadcasting DTE. In addition to its notice of intention to broadcast on any or all of these spectrum bands, it also advised the ITU of its intended use of this physical area for its service offerings, which

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<sup>15</sup> Sutter' Mill made a preliminary mining decision to focus on the unnamed ravine on or about the area known as the Shackleton Crater determination, supported by the data provided by the University of South Australia and from previous NASA, ESA lander missions.

<sup>16</sup> Sutter' Mill prospecting area was over a known topographical point, similar to a ravine on the Earth with dimensions: 200 feet deep; 3000 feet length; 2000 feet wide = yields +20B KG of Ice by Volume, or +40B liters of liquid water.

<sup>17</sup> Estimates of the value of liquid water baseline at \$500K per metric ton, which is the launch cost estimate of water delivery from the Earth to the Moon. If the Sutter' Mill ravine contains 50Bn gallons of water which would weigh 6Tn pounds or 3B tons. These figures establish a resource gross value on the lunar surface as \$1500Tn, a significant resource find for industry to exploit.

<sup>18</sup> "Pegged" is a term of art under the Mining Act 1972, meaning anything physical from a pile of stones set one atop of the other, or some other unique feature altered by the applicant for this purpose, such as drone (rovers) secured at a specific location.

<sup>19</sup> Canadian Responsible Resources, Ltd. ("CRR"), is a multi-billion-dollar leading resource development conglomerate across mining, forestry, and fisheries. It has global operations, with its headquarters in Ottawa, Canada.

would include the general area near the Shackleton Crater<sup>20</sup>, and the specific area of its O-RAN infrastructure, e.g., Sutter' Mill drone (rovers).

The ITU accepted LunarComm' filing with a "bring into use" date of 2029. LunarComm' filing went on public notice as to its intended spectrum use and specific bands. To date, not request for coordination to avoid interference has been received by OfCom on LunarComm' behalf.

In October 2025 LunarComm entered into an agreement with a variety of telecom equipment manufacturers and software companies to design, build, and deploy its lunar O-RAN infrastructure for WOLF across the service area encompassing the Casores Ravine and lunar landing sites required to support its buildout. In addition, it closed its program financing based, in part, on its status at the ITU as being "first to bring into use," thus requiring all others seek to use the designated spectrum bands to coordinate with LunarComm and ensure no interference<sup>21</sup>.

#### INTERNATIONAL AND PRIVATE CONCERNS

International institutional and government agency inquiries forecast potential opposition to both the commercial/private activities of Sutter' Mill and LunarComm. Concerns were forthcoming mostly from space agencies, particularly NASA, ESA about the apparent industrial development so close to the Artemis landing site<sup>22</sup>. NASA informed ASA, and the Canadian Space Agency that such development within this area may be counter to the Artemis Accords.

Commercial and investment interest begin in earnest upon the publication of Sutter Mill's mining data and subsequent claim; and the demonstration by LunarComms that a WiFi area – WOLF - could be established, facilitating advanced cloud management services in support of industrial development on the lunar surface, e.g., robotics, cache, compute, data storage. These services will support the pending development activities of Sutter' Mill, its licensee, CRR, as well as supporting supplies for cloud service delivery.

Private industry openly opposed, directly and through their national entities, any government interference in lunar development, in general, and the Sutter' Mill mining claims, specifically<sup>23</sup>.

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<sup>20</sup> LunarComm' filed a notice of intent to use these physical areas, denoting it as a "Service Area" which it had brought into use prior to any others. Consequently, absent a clear licensing authority by the ITU for this Service Area, LunarComms claim "first to build" preference as a

<sup>21</sup> As with past wireless communications ventures, LunarComm' is using its spectrum "preferential" rights to finance its infrastructure and design costs. LunarComm intends to file for a spectrum license through OfCom for its spectrum bands, as soon as the ITU has Member State authority to do so. Until licensing, LunarComm will use "bring into use" as its preferential rights, similar to a *profit a prendre* in the common law.

<sup>22</sup> In October 2021, NASA announced its intention to deploy Artemis III to the area surrounding Shackleton Crater. It was also rumored that lunar lander firms were noting (registering with NASA) their intent to use multiple landing sites near Shackleton.

<sup>23</sup> The Mining Act of 1972 may restrict mining claims on certain lands, especially public. The question raised is whether the Moon, and more specifically the lunar surface is a "public" land in the meaning of the statute. Also, is Australia's participation as a member to the Moon Treaty of 1979, effective in 1984 provides any guidance to

## QUESTIONS RAISED BEFORE THE TRIBUNAL

1. Applicable & Enforceability of International Agreements
2. National Regulatory Authority and International Agency Actions
3. Private Property Rights, Claims, and Litigation
4. Intergovernmental Recommended Actions

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answering the question that these mineral deposits and the property they occupy are not public lands in the meaning of the statute.