RETURN TO THE MOON: ETHICAL, CULTURAL AND SOCIAL ASPECTS – INITIAL APPROACHES TO THESE COMPLEX THEMES WITH A GEOLOGICAL PERSPECTIVE. V.A. Fernandes[1,2], B.A. Cohen[3], J. Fritz[4], and E.K. Jessberger[5]; [1]Berkeley Geochronology Center, Berkeley,CA 94704,USA and [2] Centro de Geofísica, Univ. Coimbra, Coimbra, Portugal veraafernandes@yahoo.com; Institute of Meteoritics, Univ. New Mexico, Albuquerque NM 87131, USA; [4]Institute für Mineralogie, Universität Heidelberg, Germany; [5]Institute für Planetologie, Wilhems-Universität Münster, 48149 Münster, Germany.

Introduction: Exploration and search for the unknown are inherent characteristics of humankind, attributes that have allowed us to unify Planet Earth on the same map. The experience of reaching goals is fulfilling and important for human development. However, it is necessary to make conscious and responsible decisions, so that risks of unforeseen mistakes can be minimised if not avoided. The lunar exploration community gathers people from many different backgrounds and interests, thus it is an ideal meeting ground for discussion of the different aspects of the impacts that lunar exploration will bring.

As a group, the lunar community has the responsibility to put forward concerns, suggestions and comments relative to the return of Humans to the Moon. For this, lunar community members will need to be able to see beyond individual, corporate, and governmental needs and desires, and be able to expand and consider other aspects relative to this endeavour. The history of human exploration is long, and so it is a vast source of insight into the capabilities of humans to beneficially and destructively influence the conquered environment. We should learn from our impact on Earth's environment to improve in future missions to the Moon and other planets..

Approach: We have composed a partial list of questions that should be taken into consideration when planning the next human return to the Moon.This list could serve as a starting point for discussion by LEAG and other advisory groups:

1. Why do Humans want to return to the Moon and then colonise it? We need to understand the inherent human need to go to the unknown and make it known. We also need to reflect on how we have made the Earth our own and the beneficial and detrimental effects of terrestrial exploration.

2. What do we want from, of and on the Moon? Compeating desires of scientific, cultural, religious, economic, strategic and military ambition will certainly impart strong conflicts of interests, between various groups, companies, individuals, nations and alliances. The Moon is the only landscape deeply connected to all civilisations on the whole Earth in past, present and future, thus it may be considered as a World Heritage Site which has a value beyond science, economy and military ambition. Further more, the Moon presents a challenging opportunity for humans to be less egocentric and see the implications of returning to the Moon beyond each personal experience and desires on timescales exceeding a single generation.

3. What effects on the Moon will be caused by the robotic and/or human activity? Until the 1950's - 60's human (Soviet and U.S.) space race, the lunar surface had only been disturbed by cosmic and galactic material - part of the normal progression of things in space. With the advent of technological possibility to send spacecraft to lunar orbit and the surface, this cosmic environment was no longer unique, but had been disturbed. Humans left vehicles, lunar modules, satellites, scientific tools, etc. Presently, the Moon no longer is what it used to be from its birth ~4.5 Ga till the 1960's. We need to highlight environmental and conservation awareness of the Moon, for example, perturbation of the tenuous lunar atmosphere or irreparable disturbance of volatiles in the uppermost soils. Some experiments have already been done in this regard during the Apollo missions that may be used as guides.

4. How may we use previously acquired knowledgeto be wiser in making future decisions? As planetary scientists, we see how much research on samples and remote observations of the Moon have contributed for the understanding of the formation of the terrestrial planets. We need to unearth the existing data for information and context on which key decisions were based in previous exploration activities, and also data acquired on the lunar surface. We also need to adopt a step-by-step approach to reach the Moon, learning from experiences and mistakes. This approach would enable human kind to reach the Moon in a responsible and respectful manner.

5. What are the opinions of all the Nations of the World about the Return to the Moon, and how are their voices taken into consideration? This point refers to the taking into account of different philosophies and approaches to what science and exploration are. This will allow us all to look at the world situation presently and think how do we want it in the future, as well as how our actions will influence future human and non-human generations. We need to consider who will be included in the decision making processe and what their national agendas are. There may be people, animals, and plants that will not benefit from this endeavour; what consideration will they receive? The world is a vast place with many peoples, needs, wishes, and points of view. The next visit to the lunar

surface could perhaps be envisioned as a worldwide exercise, where actually the so called Developed and Developing countries are to be seen at the same level, and inputs considered and respected equally.

6. What are our obligations to the world: Moon Treaty? We should be knowledgeable of the already existing document and recommend immediate amendments wherever necessary to the outdated document. The revision of the current Moon Treaty can have as a basis the Antarctic Treaty as an example of positive practice. All countries, companies, associations, groups and individuals need to follow the Treaty even if they did not sign it .

When we do return to the Moon, we will continue being Humans and to go about challenging our physical and psychological selves, but we must do it carefully and humbly. The Moon is an important but fragile environment that needs to be understood and taken into consideration before we finally set sail and return to the celestial body closest to the Earth. Together, we hope to bring the best of humanity to the Moon, and to bring the benefits of the Moon to all people on Earth. It is important that, before the return to the Moon, Humans as a whole have carefully considered the initial questions of: Who are we, where did we come from and where are we going.

A panorama of the Hadley Rille area, taken by Apollo 15 astronaut James Irwin. Astronaut David Scott and the Lunar Rover are shown near the summit of Hadley Delta, while a portion of Hadley Rille occupies the central portion of the image. (Apollo 15 Crew, USGS, NASA)

Detail of area in the vicinity of Apollo 15 landing site: **delicate and complex**. (Apollo 15 Crew, USGS, NASA)