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Committee on the Peaceful Uses of Outer Space
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Status and application of the five United Nations treaties on outer space

Activities being carried out or to be carried out on the Moon and other celestial bodies, international and national rules governing those activities and information received from States parties to the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies about the benefits of adherence to that Agreement

Note by the Secretariat

Addendum

I. Introduction

1. During the forty-seventh session of the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space, in 2008, the Working Group on the Status and Application of the Five United Nations Treaties on Outer Space considered the background paper prepared by the Secretariat on activities being carried out or to be carried out on the Moon and other celestial bodies, international and national rules governing those activities and information from States parties to the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies about the benefits of adherence to that agreement (A/AC.105/C.2/L.271).

2. At its sixth meeting, on 7 April 2008, the Working Group agreed that the Secretariat should prepare a supplement to document A/AC.105/C.2/L.271, for submission to the Subcommittee at its forty-eighth session, in 2009, which would provide supplementary information on activities on the Moon that member States

* A/AC.105/C.2/L.274.

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were undertaking or planned to undertake and would be based on information already submitted to the Working Group and information in the *Highlights in Space* publication. The decision of the Working Group was endorsed by the Legal Subcommittee (A/AC.105/917, para. 43 and annex I, para. 12).

3. The present document contains the supplementary information requested by the Legal Subcommittee.

II. Activities

4. The United States Space Exploration Policy calls for the National Aeronautics and Space Administration (NASA) to return humans to the Moon by 2020, paving the way for eventual journeys to Mars and beyond. NASA is designing, developing and testing the Ares I and Ares V launch vehicles to launch the Orion Crew Capsule, the Altair Lunar Lander and related supporting space systems. The robotic Lunar Reconnaissance Orbiter mission, to be launched in 2009, is the first step in the return of the United States to the Moon.

5. As the first step in the United States "Vision for Space Exploration", NASA has laid out its plan for establishing an outpost on the Moon, which it intends to be an "enduring, sustainable human and robotic presence that will open up vastly greater opportunities for science, research and technological development". The NASA plan is to establish the lunar base at the Shackleton crater at the south pole of the Moon, which would enable six-month stays within five years of the first landing and the building of the lunar base by deploying pieces of the critical infrastructure on the Moon on each landing. The plan envisages an open lunar architecture, to which other nations and commercial entities could contribute elements. Experience gained on the Moon is considered to be essential for voyages to Mars and other destinations. NASA also sees opportunities for international and commercial partners in spectrum management, establishing common hardware interfaces, communications gear, robotics, habitation development, surface mobility technology and systems, and resource utilization.

6. NASA has selected four Moon-based experiments for further study. Two proposals would place, at various locations on the Moon, suitcase-sized instruments containing laser ranging arrays capable of measuring the Earth-Moon distance to submillimeter accuracy. The goal is to permit precise tests of Einstein's general theory of relativity, as well as to improve the understanding of the structure of the Moon and Earth-Moon interactions. A third proposal would measure X-ray emissions caused by the solar wind and its interactions with the Earth's magnetosphere. The final proposal would place a small radio telescope on the Moon to study particle acceleration in the solar corona and celestial objects such as supernovas and quasars, and to serve as a pathfinder for a large radio astronomy telescope to be placed on the far side of the Moon.

7. The Phoenix Mars Lander of NASA landed on Mars on 25 May 2008 to retrieve soil and ice samples in the north polar region of Mars. The main objectives of Phoenix are to search the Martian soil for organics, which have yet to be discovered on Mars, and to test ice and water samples for acidity and the potential to hold food sources for life.

8. In addition to the Phoenix Mars Lander, a number of other NASA Mars activities are ongoing and planned, including the Mars Exploration Rovers Spirit and Opportunity, the Mars Orbiters 2001 Mars Odyssey and Mars Reconnaissance, and the Mars Science Laboratory, scheduled for launch in September 2009.

9. Extreme Environment Mission Operations 12 (NEEMO 12) of NASA has had its first exercise in refining and demonstrating telerobotic surgery procedures that counter the time delay issues on future trips to Mars. Procedures planned for use in Moonwalking and geological sampling during upcoming manned lunar missions were also practised. The NEEMO-13 crew simulated Moonwalks, erected a communications tower, practised sample collection and examined potential lunar spacesuit designs.

10. The Laplace project is co-sponsored by NASA and the Japan Aerospace Exploration Agency (JAXA) to deploy three orbiters to visit Jupiter and its moons, with a primary focus on Europa, and to conduct studies of the magnetosphere, atmosphere and interior of Jupiter. The Titan and Enceladus (TANDEM) mission is another collaborative project by NASA and JAXA to revisit the Saturnian moons Titan and Enceladus; it will consist of an orbiter and a carrier spacecraft that would deliver a balloon and three probes to Titan.

11. JAXA launched the Selenological and Engineering Explorer (SELENE) mission to the Moon on 14 September 2007, carrying 14 instruments, a high-definition television camera and two sub-satellites named Very Long Baseline Interferometer Radio (VRAD) and Relay (Rstar). It is a year-long mission, in which the spacecraft will circle the Moon at an orbital altitude of about 100 kilometres (km), using its wide-area sensors to produce data to cue the finer-grain sensors of the NASA Lunar Reconnaissance Orbiter and using its gamma-ray spectrometer to detect hydrogen for further study by the Lunar Reconnaissance Orbiter. It will also map lunar gravity, the terrain (with a resolution of 5 metres), the remnants of the magnetic field of the Moon and charged and neutral particles in the lunar environment, and collect data on surface chemistry and mineralogy, and on surface and subsurface structure to a depth of 5 km. In line with JAXA established tradition and following its successful launch, the SELENE spacecraft was given a name: “Kaguya”.

12. Chandrayaan-1 is the first unmanned scientific mission of India to the Moon. The main objective is the investigation of the distribution of various minerals and chemical elements and high-resolution, three-dimensional mapping of the entire lunar surface. The Indian Space Research Organisation (ISRO) Polar Satellite Launch Vehicle launched Chandrayaan-1 into a 240 km x 24,000 km Earth orbit. Subsequently, the propulsion system of the spacecraft placed it in a 100 km polar orbit around the Moon. NASA is contributing two instruments to the Indian Chandrayaan-1 mission: the Moon Mineralogy Mapper, designed to look for lunar mineral resources, and the Miniature Synthetic Aperture Radar (Mini-SAR) which will look for ice deposits in the polar regions of the Moon.

13. ISRO has announced its intention to initiate a human space exploration programme, with its first flight planned for 2014 and the planned landing of an Indian astronaut on the Moon in 2020.

14. China launched its Chang’e-1 spacecraft on a mission to the Moon by a Long March rocket on 24 October 2007. The aim of the mission is to construct a

three-dimensional map of the lunar surface, measure the thickness of the lunar regolith, identify and map up to 14 chemical elements on the surface of the Moon and study the space environment between the Earth and the Moon. Further lunar projects will include a 1,300-kilogram lander on the Moon in 2015-2017, to serve as a test bed for a sample return mission in 2020. The lander will be equipped with a rover, robotic arms and a drill, and will serve as a test bed for the follow-on sample return mission.

15. The Russian Federation and India have signed a 10-year cooperation agreement to run from December 2007 for the development of a shared space vehicle for Moon exploration, which includes a lunar orbital module and a lunar lander with a mobile scientific laboratory. The agreement envisages the launch between 2011 and 2012, using an Indian missile launching vehicle, of a satellite composed of a lunar orbital module and a lander. The Russian Federal Space Agency announced that its first unmanned flight would include a lunar orbiter that would fire 12 penetrators across diverse regions of the Moon to create a seismic network, which would be used to study the origin of the Moon. After firing the penetrators, the mother ship would deliver to the surface a polar station, equipped with a mass spectrometer and a neutron spectrometer. The objective of the station is to detect water ice deposits in the polar zones of the Moon. The device, developed by Russian Federation scientists, will first be tested through the Lunar Reconnaissance Orbiter of NASA.

16. China and the Russian Federation have agreed that a Chinese microsatellite will be carried aboard the Russian Federation Phobos Explorer mission to Mars in 2009. The agreement calls for the Chinese microsatellite to be detached from the Phobos Explorer spacecraft after it begins to orbit Mars, before it proceeds to land and collect a sample for return to Earth.

17. Radar data from the European Space Agency Mars Express orbiter, released on 14 March 2007, indicated the presence of massive deposits of water ice under the south pole of Mars. The spacecraft's Mars Advanced Radar for Subsurface and Ionosphere Sounding (MARSIS) instrument, using a radar echo sounding technique that could penetrate down to about 4 km below the surface of the planet, revealed water ice deposits of sufficient magnitude that, if melted, would cover the entire planet with an ocean 11m deep.

18. The Space Exploration Working Group of the United Kingdom of Great Britain and Northern Ireland has made a recommendation to the British National Space Centre that participation in the human exploration of the Moon (and later of Mars) is a valid and important objective for the United Kingdom and that future United Kingdom exploration strategy should acknowledge that.