THE 2011 MANFRED LACHS SPACE LAW MOOT COURT COMPETITION

CASE CONCERNING ENVIRONMENTAL CONTAMINATION
AND HARMFUL INTERFERENCE IN SPACE ACTIVITIES

ZURIS V NOVA FREEDONIA

PART A: INTRODUCTION

In October 2011, the Manfred Lachs Competition celebrated its 20th edition in the City of Cape Town, South Africa, in conjunction with the IISL Colloquium on Space Law. The Problem of this year was *Case concerning Environmental Contamination and Harmful Interference in Space Activities (Zuris v. Nova Freedonia)*. The authors of the Problem were Dr. Patricia Sterns (US) and Dr. Leslie Tennen (US).

Teams participated in the World Finals from the Asian Pacific, European and North American regions. For the North American Round, a South American team from Colombia, was invited to participate in the regional round.

Judges Koroma, Tomka and (Mme.) Xue, from the International Court of Justice, honored the IISL by sitting as the judging panel in the World Final that took place in the High Court of Cape Town.

As the IAC was going to take place for the first time in Africa, the IISL decided to organize an *African Introductory Round* in order to bring the space law competition to this continent. Three teams from Kenya, Nigeria and South Africa participated in this event. Ms. Angeline Asangire Oprong (Kenya) and Ms. Timiebi Aganaba (Nigeria) assisted in the preparation of the competition. Being an introductory round, the winner of this round did not join the World Finals. However the positive outcome of this event prompted the creation of an African regional for the 2012 competition and onwards.

The IISL's Moot Court Committee received the strong support of Ms. Carla Sharpe and Dr. Peter Martínez, member and Chair, respectively, of the Local Organizing Committee.

Sponsors

The following organizations kindly supported/ sponsored the World Finals, the African Introductory Round and IISL Dinner:

- IAF and IISL
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- ENS Law firm (Cape Town)
- Book awards: Martinus Nijhoff Publishers

The IISL is most grateful to all these generous sponsors.

WORLD FINALS

Winner of World Finals / Lee Love Award:
Florida State University College of Law (USA)
Ms. Tanya Cronau, Ms. Lynn Guery and Ms. Anne Marie Rossi.
Faculty Advisor: Prof. Nat Stern.

Runner up:
National University of Singapore (Singapore)
Ms. Navleen Kaur, Ms. Mrinalini Singh and Mr. Firas Mohamed A.M. Alsuwaigh.
Faculty Advisor: Prof. Lim Lei Theng

2nd runner-up:
Saint Petersburg State University, Russian Federation
Ms. Maria Kiskachi and Mr. Maxim Usynin
Faculty Advisor: Ms. Ksenia Shestakova.

Best memorials/ Eilene M. Galloway Award:
National University of Singapore.

Best oralist / Sterns and Tennen Award:
Ms. Navleen Kaur, National University of Singapore.

Judges for Finals
H.E. Judge Abdul Koroma, International Court of Justice.
H.E. Judge Peter Tomka, International Court of Justice.
H.E. Mme. Judge Hanqin Xue, International Court of Justice.

Judges for Semi-finals
Prof. Dr. Maureen Williams, (Argentina/United Kingdom).
Prof. Toshio Kosuge (Japan).
Prof. Dr. Frans von der Dunk (The Netherlands).

Judges for Memorials
Prof. Dr. Elisabeth Back Impallomeni (Italy).
Ms. Marcia Smith (USA).
Dr. Sylvia Ospina (Colombia).
Dr. Gérardine Goh Escolar (Singapore).
Dr. Ranjana Kaul (India).
Dr. Peter van Fenema (The Netherlands).

AFRICAN INTRODUCTORY ROUND

Winner
Obafemi Awolowo University (Nigeria).
Ms. Ojo Victoria, Mr. Akintunde Iseoluwa Christopher, Mr. Tobi Adebowale.
Faculty Advisor: Dr. O. A. Orifowomo.

Runner-Up
University of Pretoria, Faculty of Law (South Africa).
Ms. Serena Joy Kalbskopf and Ms. Petronell Kruger.
Faculty Advisor: Mr. Lourens Grové.

Semi-Finalist
Mount Kenya University, School of Law (Kenya).
Ms. Vivianne Muthoni, Mr. Michael Mathini and Mr. Claudius Mogunde,
Faculty Advisor: Ms. Millicent Ligare.

Best Memorials
Obafemi Awolowo University (Nigeria).

Best Oralist
Ms. Serena Joy Kalbskopf, University of Pretoria.

Finals Judges
H.E. Judge Abdul Koroma (Sierra Leone), International Court of Justice.
Prof. Dr. Vladimír Kopal (Czech Republic).
Prof. Francis Lyall (United Kingdom).

Semi-Finals Judges
Prof. Joanne I. Gabrynowicz (USA).
Prof. Dr. Lesley Jane Smith (United Kingdom).
Dr. Marco Ferrazzani (Italy).
Prof. Dr. Paul Dempsey (USA).
Dr. Bernhard Schmidt-Tedd (Germany).

Judges for Memorials
Dr. Ernst Fasan (Austria).
Dr. Stephen E. Doyle (United States).
Dr. Tare Brisibe (Nigeria).
Prof. Vernon Nase (Australia).

Participants in the regional rounds
In Asia Pacific
1. Amity University Law School Noida, India.
2. Atma Jaya Catholic University Jakarta, Indonesia.
3. Beijing Institute of Technology Beijing, China.
4. China University of Political Science and Law Beijing, China.
5. City University of Hong Kong Hong Kong, China.
6. Dr. Ram Manohar Lohiya National Law University Lucknow, India.
7. Government Law College Mumbai, India.
8. Gujarat National Law University Gandhinagar, India.
9. Hidayatullah National Law University Raipur, India.

10. Indian Law Society Law College Pune, India.
11. Kalinga Institute of Industrial Technology (KIIT), University School of Law Bhubaneswar, India.
12. Kyoto University Kyoto, Japan.
13. NALSAR University of Law Hyderabad, India.
14. National Law Institute University Bhopal, India.
15. National Law School of India University Bangalore, India.
16. National Law University Delhi, India.
17. National Law University Jodhpur, India.
18. National University of Singapore, Singapore.
19. Padjadjaran University Bandung, Indonesia.
20. Rajiv Gandhi National University of Law Patala, India.
21. San Beda College, Manila, Philippines.
22. School of Excellence in Law, Dr. Ambedkar Law University, Chennai, India.
23. Universitas Indonesia, Jakarta, Indonesia.
24. West Bengal National University of Juridical Sciences Kolkata, India.

In Europe

1. John Paul II Catholic University of Lublin, Poland.
2. Leiden University, The Netherlands.
3. National & Kapodistrian University of Athens, Greece
4. University of Cologne, Germany.
5. University of Genova, Italy
6. University of Lüneburg, Germany.
7. University of Silesia, Poland
8. Saint Petersburg State University, Russian Federation

In North America

1. Catholic University Columbus School of Law, Washington D.C., USA.
2. Florida State University College of Law, USA.
3. Georgetown University Law Center, Washington D.C., USA.
4. George Washington University, Washington D.C., USA.
5. McGill University, Institute of Air and Space Law, Canada.
6. Rutgers School of Law, Newark, USA.
7. University of Mississippi, School of Law, USA.
8. University of Nebraska College of Law, USA.
9. University of Virginia School of Law, USA.
10. Universidad Sergio Arboleda, Colombia.

Regional organizers of the 2011 competition:

• *North America:* Dr. Milton (Skip) Smith.
• *Europe:* ECSL, contact Mr. Raphael Milchberg
• *Asia Pacific:* Mr. Jason Bonin.

Contact details of present regional organizers:

• *North America:* Dr. Milton (Skip) Smith <lachsmoot-northamerica@iislweb.org>
• *Europe:* ECSL, attn. Dr. Philippe Achilleas <lachsmoot-europe@iislweb.org>
• *Asia Pacific:* Dr. (Ms.) Yuri Takaya <lachsmoot-asiapacific@iislweb.org>

PART B: THE PROBLEM

STATEMENT OF FACTS

1. Zuris is a technologically advanced, space faring coastal state. Nova Freedonia is a space faring land-locked state which shares a border with Zuris. The two nations enjoy friendly relations even though they are economic rivals on the global stage. Zuris sells launch services on the international market, which include providing both the launch vehicle as well as the services of an offshore launch platform in international waters. Nova Freedonia possesses its own launch capability, but does not compete with Zuris in the international launch services market. Private industry within Nova Freedonia also has a launch capability, which is marketed internationally.
2. Zuris has extensive but mixed experience in interplanetary spaceflight. For example, Zuris has flown several successful missions to orbit Venus, and two to land on the surface of the planet, and also has successfully soft-landed on an asteroid. Zuris' experience with Mars has not been as successful, as three of the five missions to Mars ended in failure, resulting in the crash of the spacecraft on the Red Planet and loss of the mission. Zuris has an inconsistent record of notifying the United Nations of objects it launched into outer space.
3. Nova Freedonia has extensive experience in conducting space missions. The Commonwealth maintains a national register of objects launched into outer space, but on occasion has taken several years to enter an object into the register and to notify the United Nations. The country has enacted statutes which provide a procedure for the licensing of "launch activities" by nationals of Nova Freedonia or from locations under the jurisdiction of Nova Freedonia. As part of its lunar program, Nova Freedonia conducted a sample return mission from the lunar poles, which returned both regolith materials as well as samples of lunar ice deposits. Since the composition of the ice deposits was unknown, Nova Freedonia constructed a special state of the art research facility in a remote area which was 150 km from the nearest town. This special research facility was 200 km from Resort City, a popular tourist destination in Zuris on the shores of Cape Holiday. Cape Holiday is world famous for its lobsters, and the lobster exports constitute a significant part of the Zuris fishing industry.
4. Shortly after the 60th anniversary of the International Geophysical Year in 2017, the United Nations General Assembly adopted a Resolution declaring the International Mars Exploration Initiative [hereinafter referred to as "IMEI"] to promote missions to the Red Planet. At the next meeting of COSPAR, Nova Freedonia declared that it was going to send a landing craft named Ares 1 to Mars to examine a previously confirmed subsurface ice deposit. The mission was to conduct experiments to search for evidence of past or present life. A further purpose of the mission was to determine the extent of the ice deposit, and, as a precursor to a manned mission, to investigate the possibility that the ice could be used in support of future missions as a source of water, hydrogen, and oxygen. Nova Freedonia stated that the budget for the mission was 500 million Euros.
5. During the following IAF Congress, Zuris unveiled plans for a sample return mission to Mars and its two moons. The plan announced by Zuris envisioned six sample return probes, four of which were intended to land on different areas of Mars, including one in a polar region, by means of an air-bag type system. The two additional probes were intended to soft land, one on Deimos and one on Phobos. These latter two probes would utilize a rocket/thruster landing system.
6. All of the probes were to obtain samples of the planetary/moon surface and subsurface to a depth of five meters, and place the samples in a containment canister. The canisters were located within a small detachable portion of the landing craft, and were to launch from the surface and rendezvous with an orbiting module. The canisters would then be inserted into an Earth return module, which would detach from the orbiting module and transport the canisters back to Earth for scientific study. The mission was not designed with any *in situ* life detection experiments.
7. The announcement of the mission drew an immediate response from the international scientific community. While Zuris was

congratulated for embarking on such an ambitious, complicated and far-reaching mission, it also was criticized in the media and the blogosphere for its unsuccessful track record of missions to Mars, and its lack of experience and expertise with the return of extraterrestrial materials. Suggestions began to be made that Zuris consider conducting the mission as part of a bilateral or multilateral arrangement with countries such as Nova Freedonia.

8. International pressure from special interest groups and organizations mounted on Nova Freedonia to formally partner with Zuris in the mission. At a press conference, the director of the Nova Freedonia Space Agency, Dr. Ophelia St. Jacques, stated in response to a question that Nova Freedonia had looked at the possibility of joining with Zuris in the mission, but that it was committed to its own previously announced program. She further stated that her agency did not have the budget to join new missions, especially missions as complex and expensive as announced by Zuris. Dr. St. Jacques also was asked whether Nova Freedonia would be agreeable to other arrangements that did not include the financial investment of a partner, such as selling goods or services in support of the mission to Zuris, to which she responded that it would depend on the specifics, but she would not categorically exclude that as a possibility.

9. Following the press conference, representatives of the two countries entered into negotiations for the use of Nova Freedonia's lunar sample return facility to study the Mars return samples. Six months later, the director of the Nova Freedonia Space Agency and the Zuris Minister for Space Affairs signed a Memorandum of Understanding [hereinafter referred to as "MOU"] pursuant to which Zuris agreed to purchase services from Nova Freedonia for the use of the sample return facility on a cost only basis for the "retrieval of the sample return module and the canisters contained therein, the containment and storage thereof, and the use of the research facilities."

10. The MOU further provided that Zuris had the authority to determine the schedule for scientific access to the contents of the canisters, in consultation with Nova Freedonia, and that researchers from around the world would be permitted to conduct research at the facility "without discrimination." The MOU also provided that the parties were to perform the agreement in accordance with "international standards."

11. Two months after the signing of the MOU, Zuris held a series of press conferences to announce agreements with other states and research organizations for the inclusion of experiments, sensors, and other forms of participation in the mission by third parties and countries. One of the press conferences announced that the Mars Exploration Supporters International [hereinafter known as "MESI"] would be participating in the mission.

12. MESI is a non-profit corporation incorporated in Nova Freedonia several years ago for the purpose of public advocacy of missions to Mars. It has members who pay dues in more than fifty countries, and has its headquarters in the capital city of Zuris. The majority of members of MESI are from Nova Freedonia, and approximately twenty per cent of members are from Zuris. The participation of MESI in the mission would be to provide two small, self-contained canisters containing samples of the three domains of life on Earth (bacteria, archaea, and eukaryotea) to be transported on the mission and returned to Earth for study of what changes, if any, occurred to the life forms from exposure to the space environment during the lengthy trip to and from Mars. The MESI canisters would be incorporated into the probes for Deimos and Phobos.

13. MESI prepared the canisters for integration into the probes. The canisters held six sealed vials, each containing a small sample of a form of terran life, which represented the most simple to more advanced microscopic forms. One such sample was a form of blue halophilic bacteria, a relatively simple life form. The particular sample utilized was taken from a source which is believed to have been dormant for thousands of years.

14. The MESI canisters were prepared, sealed and tested by MESI at offices it maintains in Nova Freedonia, and sent to the Zuris Ministry of Space Affairs. MESI neither sought nor was granted any licence or other form of authorization for the canister experiment from Nova Freedonia, although MESI did apply for

and received an export licence from the Nova Freedonia Foreign Office, which certified that the MESI payload did not constitute a "munition" prohibited from export. MESI neither sought nor obtained any insurance coverage for its participation in the mission.

15. The sample return spacecraft was much larger and heavier than Zuris' earlier interplanetary spacecraft, and Zuris did not have a rocket capable of launching the craft to Mars. Zuris contracted with the Dor-Godol Rocket Company, a licensed private launch services company from Nova Freedonia, which launched the Mars sample return mission from the Zuris offshore launch platform. Six months later, Ares 1 was launched by Nova Freedonia from its own launch complex. Approximately nine months later, Nova Freedonia notified the United Nations of the launch of the Ares 1 spacecraft, and, as was its normal practice, also separately listed notification of the launch vehicle. Several months later Nova Freedonia also notified the United Nations of the launch of the Dor-Godol rocket. The specific information provided related solely to the launch vehicle, and the sample return spacecraft was listed only as the payload.

16. As the Zuris spacecraft approached Mars, the probes separated from the orbiter, and began their descent to their target locations. The probe to Phobos, and all four of the probes intended for Mars, achieved touchdown as planned. The probe to Deimos, however, developed electrical problems upon separation from the orbiter, and all communications with the probe were lost. Unbeknownst to mission controllers, the probe fired its thrusters erroneously, which sent the probe into a trajectory not to Deimos, but to Mars, and the probe crashed into the northern end of the ice deposit that Ares 1 was sent to explore. The Ares 1 craft arrived at Mars on schedule about seven months later, and successfully landed at the southern end of the confirmed ice deposit. At the time of Ares 1's arrival and landing, the fate of the Deimos probe was unknown.

17. Ares 1 confirmed the presence of water ice, and also determined that the ice deposit was sufficiently large that it could support a future manned mission by providing water, hydrogen and oxygen. However, the Ares craft also discovered that the ice contained traces of a bacteria virtually identical to blue halophilic bacteria, except that it was a purple colour, which did not match any known strain of halophilic bacteria. Ares 1 was unable to determine whether the bacteria was of terrestrial or Martian origin.

18. Ares 1 was able to determine that purple halophilic bacteria was in a very low concentration in the Martian ice, but was present in sufficient quantities that it would need to be removed in order for the ice to be usable for future manned missions. Unfortunately, there is no known process by which the bacteria could be removed from the ice, thereby rendering the entire ice deposit unusable as a resource for Nova Freedonia's planned manned mission. In addition, within four months of the landing, each of the several extremely small fans within the spacecraft systems failed as if, in the words of the ground controllers, they were "clogged up," and in a manner not possible by just Martian dust. As each fan failed, the system associated with that fan also failed, and Ares 1 eventually shut down. The ground controllers were not able to revive the spacecraft. Nova Freedonia announced that it was not able to afford funding to either continue to try to revive the lander, or to seek a substitute source of materials for the follow-on manned mission, and cancelled its program.

19. The five other Zuris probes performed as planned. Samples of the Martian and Phobos materials were collected and placed into their respective containers. The probes lifted off, rendezvoused with the orbiter, and deposited the sample containers in the return module, which left Martian orbit for the thirteen month return flight to Earth. Seven months into the return trip, images and scans taken by instruments onboard spacecraft from India and Brazil orbiting Mars revealed traces of metal debris in a small area north of the Ares I spacecraft landing site, which matched the composition of the metal used for the Zuris probe intended for Deimos.

20. Six months later, the Zuris return module arrived at Earth. Pursuant to the MOU between Zuris and Nova Freedonia, the return module was deorbited and brought down in the territory of Nova Freedonia, where it was retrieved by a team comprised of representatives of both

countries, and taken to the sample return facility for study. When the MESI canister was opened, it was discovered that the seals in the vials had leaked, and that the blue halophilic bacteria had been exposed to the environment of Phobos, and the Martian return sample. It also was discovered that the blue halophilic bacteria had taken on a purple tint, apparently the same colour as the bacteria discovered in the Martian ice deposits by Ares 1. In addition, the now purple bacteria began to replicate at a very rapid rate within the facility. The purple bacteria did not appear to be toxic in and of itself. However, it was determined that the bacteria was attracted to chlorophyll, and had a tendency to completely cover the leaves of green plants, effectively depriving the plants of carbon dioxide, causing them to suffocate.

21. The rapid reproduction of the bacteria also threatened the security of the physical structure of the sample return facility. It was calculated that left unchecked, within three months the population of the bacteria would overwhelm the ability of the filters and scrubbers of the air conditioning system to remove the bacteria from the air within the facility, and that it was possible it might escape into the atmosphere. However, it was also discovered that the bacteria was neutralized by exposure to a low concentration of sodium chloride. Officials of the Nova Freedonia Space Agency review board concluded that the fans on the Ares 1 spacecraft failed when they became clogged with biofilm from the purple halophilic bacteria.

22. As a precaution, Nova Freedonia ordered the evacuation of the sample return facility, and announced that it was going to fumigate the facility with sodium chloride. As a further precaution, Nova Freedonia announced that it was going to use crop dusters to spray a low concentration of sodium chloride around the perimeter of the facility to a radius of 10 km. In response to the announcements by Nova Freedonia, Zuris declared that the failure of Nova Freedonia to ensure that the bacteria was contained within the sample return facility posed a threat to public health and safety, and ordered the evacuation of Resort City. Zuris also demanded through diplomatic channels that Nova Freedonia return the MESI canister to Zuris for testing and inspection. Nova Freedonia responded by informing Zuris that the MESI canister had been destroyed as a precautionary measure.

23. Nova Freedonia conducted the fumigation of the facility, and also the spraying around the perimeter of the facility. Three weeks later Nova Freedonia declared that the bacteria had been contained and/or neutralized. As a result of the declaration, Zuris lifted the mandatory evacuation of Resort City. However, in the three weeks following the fumigation and spraying of the perimeter of the facility, the natural weather patterns (primarily rain, runoff and wind) carried some of the sodium chloride into Cape Holiday, substantially raising the level of salinity in the water to a level toxic to the lobsters. The lobster population of the Cape declined the following year to the lowest level on record. The population of lobsters increased the following year, and after three years approached pre-contamination levels.

24. Zuris and Nova Freedonia have agreed to submit their dispute to the International Court of Justice.

25. Nova Freedonia asks the Court to declare that:

(i) Zuris is responsible under international law for the MESI experiment and that Zuris contravened international law by contaminating the environment of Mars;

(ii) Zuris violated international law by failing to prevent the contamination of the environment of Earth;

(iii) Zuris interfered with the activities of other states in the exploration and use of Mars; and

(iv) Zuris is liable under international law for the cost of the cancelled Ares mission and the cost to contain and fumigate the purple halophilic bacteria.

26. Zuris asks the Court to declare that:

(i) Nova Freedonia is responsible under international law for the activities of MESI as the launching and registry state;

(ii) Nova Freedonia violated international law by failing to authorize and supervise the activities of MESI;

(iii) Nova Freedonia contravened international law by failing to return the MESI canister to Zuris; and

(iv) Nova Freedonia is liable for the economic damages to nationals of Zuris for the

evacuation of Resort City and the diminution in the lobster harvest in Cape Holiday.

27. Nova Freedonia and Zuris are member states of the United Nations, and are parties to the Outer Space Treaty, the Return and Rescue Agreement, the Liability Convention, the Moon Agreement, and the ITU Convention. Nova Freedonia is a party to the Registration Convention. Both Nova Freedonia and Zuris have National Scientific Institutions as members of COSPAR.

PART C: FINALISTS BRIEFS

MEMORIAL FOR THE APPLICANT REPUBLIC OF ZURIS

National University of Singapore (Singapore)
Ms. Navleen Kaur, Ms. Mrinalini Singh and Mr. Firas Mohamed A.M. Alsuwaigh
Faculty Advisor: Prof. Lim Lei Theng

ARGUMENT

I. NOVA FREEDONIA IS INTERNATIONALLY RESPONSIBLE FOR MESI'S ACTIVITIES UNDER ARTICLE VI OF THE OUTER SPACE TREATY AS MESI'S ACTIVITIES ARE ITS NATIONAL ACTIVITIES IN OUTER SPACE.

Nova Freedonia is internationally responsible for MESI's activities.

First, Article VI imposes direct responsibility on Nova Freedonia for its national activities in outer space. MESI's activities are Nova Freedonia's 'national activities in outer space'. Second, MESI's activities are 'activities in outer space' because the phrase includes experiments conducted in outer space which are prepared and subsequently studied on Earth. Third, MESI's activities are Nova Freedonia's 'national activities' because Nova Freedonia exercises personal, territorial and quasi-territorial jurisdiction over MESI.

A. Under Article VI, a State is directly responsibile for 'activities in outer space' by its non-governmental entities.

Under Article VI of the Outer Space Treaty ["OST"], States bear international responsibility for national activities in outer space, whether carried on by governmental agencies or by non-governmental entities.[1] The

[1] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies art. VI, Jan. 27, 1967, 610 U.N.T.S. 205 [hereinafter *OST*].

travaux préparatoires of the OST shows that the intention of Article VI was to impose direct state responsibility on a State for all national activities in outer space, not merely those acts under its effective direction and control,[2] which is the position under general international law.[3] The OST's drafting history shows that the USSR wanted to restrict space activities to State actors, whereas the USA planned to encourage private participation.[4] As a compromise, they agreed to not rule out private participation in space activities, as long as a State was responsible for such participation.[5] Article VI represents the compromise struck between them. All space activities must therefore be attributed to a state and considered the State's national activity, for which it is internationally responsible.[6]

B. MESI's activities are Nova Freedonia's 'activities in outer space.'

'National Activities in outer space' under the OST includes scientific experiments to be conducted in outer space and prepared and studied on Earth because the phrase 'national activities in outer space' is not restricted cosmographically to only what occurs in outer space.[7] State parties to the OST consider launch activities, which take place on Earth, as activities 'in outer space'.[8] This is borne out by, inter alia, the USA,[9] Sweden[10] and Australia's[11] national legislation on space activities. They regulate the provision of launch services, which take place on Earth.

Furthermore, State practice shows that 'national activities in outer space' includes scientific space research or activities related to the exploration of outer space which may be conducted on Earth. The Russian Federation's Law on Space Activity[12] defines space activities to include scientific space research. Article 31(3)(b) of the Vienna Convention on the Law of Treaties states that 'subsequent practice in the application of the treaty which establishes the agreement of the parties regarding its interpretation' can be used to interpret a treaty. Article 31of the VCLT is customary international law.[13] Therefore, 'national activities in outer space' encompasses scientific experiments conducted in outer space, and which are prepared and subsequently studied on Earth.

MESI's experiment, to study the effects of outer space on living organisms[14] upon its return from outer space is therefore an activity for which a State must be internationally responsible under Article VI of the OST.

C. MESI's Activities are Nova Freedonia's 'National Activities'

[2] International Law Commission, *Draft Articles on Responsibility of States for Internationally Wrongful Acts, Report on its fifty-third session*, art. 8, U.N. GAOR, 56th Sess., Supp. No. 10, UN Doc. A/56/10 (2001) [hereinafter ILC Draft Articles].

[3] *See* Gyula Gál, *State Responsibility, Jurisdiction and Private Space Activities*, 44 PROC. COLLOQ. L. OUTER SPACE 61, 63 (2001); Frans G. von der Dunk, *Liability versus Responsibility in Space Law: Misconception or Misconstruction*, 34 PROC. COLLOQ. L. OUTER SPACE 363, 366 (1991) [hereinafter *Liability versus Responsibility*].

[4] Luis F. Castillo Argañarás, *Some Thoughts on State Responsibility and Commercial Space Activities*, 44 PROC. COLLOQ. L. OUTER SPACE 65 (2001).

[5] Bin Cheng, *Article VI of the Space Treaty Revisited: "International Responsibility", "National Activities", and "The Appropriate State"*, 26 J. SPACE L. 7 (1998) [hereinafter *Article VI Revisited*]; William B. Wirin, *Practical Implications of Launching State – Appropriate State Definitions*, 37 PROC. COLLOQ. L. OUTER SPACE 109, 110 (1994).

[6] *Article VI Revisited*, *supra* note 5.

[7] *Id.*

[8] Motoko Uchitomi, *State Responsibility/ Liability for "National" Space Activities*, 44 PROC. COLLOQ. L. OUTER SPACE 51, 56 (2001).

[9] Commercial Space Launch Act, 49 U.S.C. §§ 70101 et seq. (1984).

[10] Act on Space Activities (1982:963) (Swed.).

[11] Space Activities Act, 1998, No. 123, § 18.

[12] Law on Space Activity 1996, No. 147-F3 (Russ.).

[13] Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory, Advisory Opinion, 2004 I.C.J. 38 (July 9).

[14] Compromis ¶12.

because Nova Freedonia exercises personal, territorial and quasi-territorial jurisdiction over them.

1. *A State's 'national activities' are activities under a State's personal, territorial and quasi-territorial jurisdiction.*

'National Activities' refer to activities under a State's jurisdiction,[15] which is a State's legal power or competence to control.[16] A State has legal power and competence to control activities under its personal,[17] territorial[18] and quasi-territorial jurisdiction.[19] This means that States have international responsibility for, (a) acts of its nationals, which are under its personal jurisdiction, (b) acts on its territory, under its territorial jurisdiction, and (c) acts on spacecrafts it registers, under its quasi-territorial jurisdiction.

2. *Nova Freedonia has personal jurisdiction over MESI's activities because MESI is its national.*

The nationality of a non-governmental entity is that of its State of incorporation.[20] This is the clearest and most unambiguous determination of nationality.[21] This Court noted, in Barcelona Traction, that besides incorporation, a 'genuine connection' between a State and an entity may sometimes be required to determine nationality.[22] The Court did not, however, consider the specific issue of whether there is a 'genuine connection' between an entity and its State of incorporation where its head office is in another State.

Article 9 of the Draft Articles on Diplomatic Protection, which is accepted as a codification of customary international law,[23] specifically addresses the issue of an entity's nationality where its place of incorporation and head office are different. Article 9 states that 'the State of nationality means the State under whose law the corporation was incorporated.' The exception to this rule is 'when (i) a corporation is controlled by nationals of a State other that the State of incorporation and (ii) has no substantial business activities in the State of incorporation, and (iii) the seat of management and financial control of the corporation are both located in another State, that State shall be regarded as the State of nationality.' The International Law Commission's commentary to Article 9 states that only where (i), (ii) and (iii) are cumulatively fulfilled does the State in which the corporation has its seat of management qualify as the State of nationality.[24]

MESI was incorporated in Nova Freedonia[25] and is therefore its national. Since a majority of

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[15] Susanne U. Reif, *"Project 2001": Conclusions and Recommendations of the Working Group on Privatisation with Regard to Issues of International Space Law*, 44 PROC. COLLOQ. L. OUTER SPACE 3, 5 (2001); Henri A. Wassenburg, *Principles of Outer Space Law in Hindsight*, *in* 9 UTRECHT STUDIES IN AIR AND SPACE LAW 52 (1991).

[16] *Article VI Revisited*, *supra* note 5, at 23.

[17] *Liability versus Responsibility*, *supra* note 3, at 367; *see* Michael Gerhard, *National Space Legislation – Perspectives for Regulating Private Space Activities*, *in* 2 ESSENTIAL AIR AND SPACE L. 75, 82 (Marietta Benkö & Kai-Uwe Schrogl eds., 2005).

[18] *Liability versus Responsibility*, *supra* note 3, at 367.

[19] BIN CHENG, STUDIES IN INTERNATIONAL SPACE LAW 622 (1997) [hereinafter CHENG, SPACE LAW]; Jason R. Bonin, *Responsibility and Liability in International Space Law as a Matter of Sequence and Succession*, 52 PROC. COLLOQ. L. OUTER SPACE 27, 30 (2009).

[20] Barcelona Traction (Belg. v. Spain), 1970 I.C.J. 3 (Feb 5).

[21] Dr. Bernhard Schmidt-Tedd, *How to Adapt the Present Regime for Registration of Space Objects to New Developments in Space Applications*, 48 PROC. COLLOQ. L. OUTER SPACE 353, 358 (2005).

[22] Barcelona Traction (Belg. v. Spain), 1970 I.C.J. 3 (Feb 5).

[23] Annemarieke Vermeer-Kunzli, *As If: The Legal Fiction in Diplomatic Protection*, 18 EUR. J. INT'L L. 37 (2007).

[24] International Law Commission, *Draft Articles on Diplomatic Protection, Report on its fifty-eighth session*, art. 9 ¶ 5, U.N. GAOR, 58th Sess., Supp. No. 10, UN Doc. A/61/10 (2006).

[25] Compromis ¶12.

MESI's members are nationals of Nova Freedonia,[26] MESI is also controlled by nationals of its State of incorporation. Only MESI's head office is in Zuris. Zuris does not fulfill the three requirements in Article 9 to be considered MESI's national State. MESI, incorporated in Nova Freedonia, is therefore Nova Freedonia's national.

3. Nova Freedonia has territorial jurisdiction over MESI's activities because they occur on Nova Freedonia's territory.

A State has territorial jurisdiction over activities conducted on its territory.[27] Nova Freedonia has territorial jurisdiction over MESI's activities because two important stages of the experiment occurred on its territory. First, MESI prepared the canisters containing bacteria to be carried on the sample return spacecraft in Nova Freedonia.[28] Second, the experiment was brought down to Earth and studied in Nova Freedonia's territory.[29] Nova Freedonia's involvement in the space mission was precisely to provide the state-of-the-art research facility in its territory[30] for the study of return samples.[31] MESI's experiment, prepared and studied on its territory, is therefore Nova Freedonia's national activity, for which Nova Freedonia is responsible under Article VI of the OST.

4. Nova Freedonia has quasi-territorial jurisdiction over MESI's activities because they take place on board the spacecraft launched and registered by Nova Freedonia.

Article VIII of the OST confers jurisdiction over a space object on the state of registry. Article I(c) of the Registration Convention[32] states that only a launching State can register a space object. The jurisdiction retained by the launching State which registers is quasi-territorial, and extends over all activities on board the spacecraft.[33] As Article VIII of the OST refers to 'retaining' jurisdiction and control over space objects, it implies that such jurisdiction exists before such objects enter outer space, and is not restricted to the period when they are in it.[34] Since States are responsible for national activities that they have jurisdiction over, a State with jurisdiction over a space object and all activities occurring on it is therefore responsible for those activities under Article VI of the OST.

Nova Freedonia exercised jurisdiction over the sample return spacecraft carrying its experiment because it is the launching State which registered the spacecraft. It was therefore also responsible for MESI's activities as the experimental stage of MESI's activity occurred on the spacecraft Nova Freedonia registered.

a) Nova Freedonia launched the sample return spacecraft and is its launching State.

Nova Freedonia is a launching State of the sample return spacecraft under Article I(c)(i) of the Liability Convention. Learned publicist Kerrest explains that a State which launches is a state which has granted its nationality to an enterprise which launches a spacecraft.[35] Nova Freedonia granted its nationality to Dor-Godol, a private entity which launched the sample return spacecraft. Nova Freedonia is therefore its launching State.

b) Nova Freedonia registered the spacecraft and is its State of registry.

Article I(c) of the Registration Convention provides that the launching State which carries a space object on its national

[26] Compromis ¶12.
[27] *Liability versus Responsibility*, *supra* note 3, at 367.
[28] Compromis ¶14.
[29] Compromis ¶20.
[30] Compromis ¶3.
[31] Compromis ¶9.
[32] Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 1023 U.N.T.S. 15 [hereinafter *Registration Convention*].
[33] CHENG, SPACE LAW, *supra* note 19, at 490.
[34] CHENG, SPACE LAW, *supra* note 19, at 608.
[35] Armel Kerrest, *The Launch of Spacecraft from the Sea*, *in* OUTLOOK ON SPACE LAW OVER THE NEXT 30 YEARS 217, 229 (Gabriel Lafferranderie et al. eds., 1997).

registry it's the object's State of registry.[36] Registry States must notify the United Nations ["UN"] under Article IV of the Registration Convention of the object's launch.[37] Jurists agree that it is not the actual detail provided about a spacecraft in accordance with Article IV of the Registration Convention that is crucial, but rather a State's acknowledgement of responsibility for the space object through registration and notification to the UN.[38] Therefore, the launching State which registers remains its registry State notwithstanding the absence of some details provided in its notification.

Article II (2) of the Registration Convention recognizes that where there are multiple launching States, they shall jointly determine which one of them would register the object.[39] However, the treaty does not invalidate registration if there was no prior agreement between the launching States.

Nova Freedonia is the launching State which registered the sample return spacecraft because it carried the spacecraft on its national registry[40] and notified the UN of its launch.[41] It is therefore the registry State in accordance with the Registration Convention,[42] despite referring to the spacecraft only as the Dor-Godol rocket's payload. Although both Zuris and Nova Freedonia are launching States of the sample return spacecraft, Nova Freedonia did not 'jointly determine' which one of them would register the space object, but held itself out as the State with jurisdiction and control over the spacecraft.

c) MESI's activities took place on board the spacecraft.

The experiment MESI prepared was conducted on board the sample return spacecraft. MESI's activities therefore took place on board the spacecraft launched and registered by Nova Freedonia. Nova Freedonia cannot argue that it was unaware that MESI's experiment would be carried on the spacecraft as MESI's participation in the mission was announced.[43] Nova Freedonia also granted an MESI an export license and was aware of the general nature and purpose of the canisters.[44]

Nova Freedonia thus exercises quasi-territorial jurisdiction over MESI's activity, and represented itself as the State internationally responsible for the spacecraft. MESI's activities are therefore Nova Freedonia's national activities, for which Nova Freedonia is responsible under Article VI of the OST.

D. The MESI experiment is not Zuris' 'national activity' and Zuris is not internationally responsible for it.

Where multiple States are involved in a space activity, international responsibility cannot fall entirely on the State which provides the spacecraft to the mission.[45] The OST is silent on the scope of responsibility of each State where multiple States are involved in a space activity. The current trend is for States to divide responsibility so that each State is responsible for various aspects of the activity.[46] The State which merely provides the spacecraft carrying an experiment contributed by a third party is not responsible for that entire experiment. Rather, the entity which prepared the experiment, and the State responsible for that entity, remains responsible for it.

In 2011, Russia launched the Phobos-Grunt mission, which is substantially similar to Zuris'

[36] *Registration Convention*, *supra* note 32, art. I(c).
[37] *Id.* art. IV.
[38] Valérie Kayser, *Launching Space Objects: Issues of Liability and Future Prospects*, *in* 1 SPACE REGULATIONS LIBRARY 302 (2001).
[39] *Registration Convention*, *supra* note 32, art. II(2).
[40] Clarification no. 46.
[41] Compromis ¶15.
[42] *Registration Convention*, *supra* note 32, art. I(c).
[43] Compromis ¶11.
[44] Clarification no.1.
[45] *See generally* CHENG, SPACE LAW, *supra* note 19, at 609.
[46] *See generally* ERAMUS USER CENTRE & COMMUNICATION OFFICE OF THE DIRECTORATE OF HUMAN SPACEFLIGHT, MICROGRAVITY AND EXPLORATION PROGRAMMES, EUROPEAN SPACE AGENCY, EUROPEAN USERS GUIDE TO LOW GRAVITY PLATFORMS (2005) [hereinafter ESA USER GUIDE].

mission to Mars.[47] It carried the 'Living Interplanetary Flight Experiment' (LIFE), identical to MESI's, into deep space. However, the Planetary Society, a U.S organization which prepared the LIFE experiment, remains responsible for ensuring the safety and adequacy of the canisters used for the experiment.[48] The Planetary Society has undertaken extensive testing to ensure that the canisters carrying living organisms are sealed multiple times to prevent the bacteria leaking into the environment of outer space.[49] Russia, however, is responsible for the adequacy of the spacecraft carrying the experiment.[50]

Similarly, when Russia carries experiments by the European Space Agency ["ESA"] onto its Progress and Soyuz spacecrafts as payloads, Russia is obliged to subject ESA payloads to tests which ensure the payload can withstand shocks.[51] None of their tests involve opening the ESA canisters to ensure the seals within are adequate.[52] The ESA, the entity carrying out the experiment and piggybacking on Russia's spacecraft, is responsible for ensuring that their equipment is adequate.[53]

Zuris is therefore not responsible for MESI's experiment in itself, but for the adequacy of the spacecraft carrying it and for controlling the spacecraft while in outer space.[54] Zuris conducted pre-launch testing of the spacecraft after the canisters had been integrated into it.[55] While the Compromis is silent on what exactly these tests involved, the trend in pre-launch testing has been to put the spacecraft through extensive shock and impact tests, to ensure the spacecraft can withstand the pressure of take-off and landing.[56] Zuris is therefore responsible for the spacecraft and its own mission and experiments,[57] not the entire MESI experiment, for which it merely transported to outer space and back.

II. NOVA FREEDONIA BREACHED ITS DUTY AS THE APPROPRIATE STATE UNDER ARTICLE VI OF THE OUTER SPACE TREATY TO AUTHORIZE AND SUPERVISE MESI'S ACTIVITIES.

A. Nova Freedonia is the 'appropriate State' to authorize and supervise MESI's activities because it is best placed to control MESI.

The 'appropriate State' is the State with the most realistic chance of exercising control over an activity.[58] The 'appropriate State' has been variously defined to include the State of nationality, the launching State or the State where the production plant is located.[59] A 'functional approach'[60] to the appropriate State

[47] The Planetary Society, Projects: LIFE Experiment: Shuttle & Phobos, http://planetary.org/programs/projects/life/ (last visited July 25, 2011).

[48] The Planetary Society, Projects: LIFE Experiment: Phobos: Frequently Asked Questions, http://planetary.org/programs/projects/life/facts.html (last visited July 25, 2011).

[49] 365 Days of Astronomy, September 27th: The Phobos LIFE Experiment, http://365daysofastronomy.org/2009/09/27/september-27th-the-phobos-life-experiment/ (last visited July 25, 2011).

[50] Doug Messier, Phobos-Grunt Undergoes Vacuum Chamber Tests (June 6, 2011), http://www.parabolicarc.com/2011/06/06/phobos-grunt-undergoes-vacuum-chamber-tests/.

[51] ESA USER GUIDE, *supra* note 46.

[52] ESA USER GUIDE, *supra* note 46, at 7.13.1.2.2.

[53] *Id.*

[54] Clarification no. 9.

[55] Clarification no. 35.

[56] NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, LIFE INTO SPACE: SPACE LIFE SCIENCES EXPERIMENTS (Souza, Kenneth, Robert Hogan, and Rodney Ballard eds., 1995).

[57] Compromis ¶3.

[58] G. Silvestrov, *On the Notion of the "Appropriate" State in Article VI of the Outer Space Treaty*, 34 PROC. COLLOQ. L. OUTER SPACE 326 (1991).

[59] Michel Bourely, *Rules of International Law Governing the Commercialization of Space Activities*, 29 PROC. COLLOQ. L. OUTER SPACE 157 (1986).

[60] Dr. Karl-Heinz Bocksteigel, *The Terms 'Appropriate State' and 'Launching State' in the Space Treaties – Indicators of State*

is essential, ensuring that only the State in the best position to assert jurisdiction[61] and secure practical fulfillment of the non-governmental entity's responsibilities[62] must authorize and supervise an activity.

1. *Nova Freedonia is best placed to control MESI's activities, which took place on its territory.*

Nova Freedonia is best placed to control MESI's activities as they take place under Nova Freedonia's territorial jurisdiction. States with territorial jurisdiction over space activities are the 'appropriate State' to license them. The national legislation on space activities of, inter alia, the USA,[63] Russia[64] and Sweden[65] apply their rules to non-governmental entities functioning on the State's territory. States with territorial jurisdiction over space activities therefore must authorize them.

Nova Freedonia had the capacity to control MESI's activities as MESI prepared the canisters with bacteria on Nova Freedonia's territory. Also, the actual study of the bacteria on its return from Mars, which was the purpose of the entire experiment,[66] was to take place on Nova Freedonia's territory.[67] MESI's canisters were subjected to export licenses,[68] showing Nova Freedonia ability to apply controls to the corporation's activities. It verified that the canisters were not prohibited munitions.[69] Nova Freedonia was therefore the appropriate State to authorize and supervise MESI's activities.

2. *Nova Freedonia is best placed to control the activities of MESI, its national.*

Alternatively, the 'appropriate State' is an entity's State of nationality because States apply their laws to their nationals. State practice shows that nationals of a State are governed by national legislation regulating space activities, whether or not they function within the state's territory.[70] This is consistent with Article IX of the OST, where a duty of consultation by the State Party exists with regard to 'an activity or experiment planned by…its nationals'.[71] The State of nationality which is responsible under Article VI for 'national activities' can therefore be the appropriate State to supervise non-governmental activities.

Nova Freedonia is thus the appropriate State to authorize MESI's activities because MESI is its national, as discussed in I(C)(2). Nova Freedonia's laws apply to its nationals, even when their activities occur beyond Nova Freedonian territory. Nova Freedonia's licensing regime for launch activities is applied to Dor-Godol, a private company, even though its services are provided outside Nova Freedonian territory.[72] Nova Freedonia is therefore the state obliged and able to authorize and supervise MESI's activities.

B. As the appropriate State, Nova Freedonia had an obligation to enact a licensing regime to authorize and supervise MESI's activities.

There is no doubt that the obligation to authorize and continually supervise requires 'a minimum of licensing'[73] space activities to ensure, inter alia, that space activities meet

Responsibility and Liability for State and Private Space Activities, 34 PROC. COLLOQ. L. OUTER SPACE 13 (1991).

[61] Ricky J. Lee, *Liability Arising from Article VI of the OST: States, Domestic Law and Private Operators*, 48 PROC. COLLOQ. L. OUTER SPACE 216 (2005).

[62] HL VAN TRAA-ENGLEMAN, COMMERCIAL UTILIZATION OF OUTER SPACE 281, Martinus Nijhoff Publishers 1993.

[63] Commercial Space Launch Act, 49 U.S.C. §§ 70101 et seq. (1984).

[64] Law on Space Activity 1996, No. 147-F3 (Russ.).

[65] Act on Space Activities (1982:963) (Swed.).

[66] Compromis ¶12.

[67] Compromis ¶9.

[68] Compromis ¶14.

[69] Compromis ¶14.

[70] Outer Space Act, 1986, 38 (U.K.); Space Activities Act, 1998, No. 123, § 18; Space Affairs Act 84 of 1993 (S. Afr.).

[71] *OST*, *supra* note 1, art. IX; Bocksteigel, *supra* note 60, at 13.

[72] Compromis ¶15.

[73] 1 MANUAL ON SPACE LAW 17 (Nandasiri Jasentuliyana & Roy S. K. Lee eds., 1979); Silvestrov, *supra* note 58, at 327.

safety standards.[74] A United Nations' Review[75] shows that it is State practice to authorize space activities using licenses. The USA,[76] Russia,[77] the UK,[78] and Sweden[79] make it mandatory to obtain a license before carrying out space activities on their territory. Licenses for space activities are given on the condition that the risks associated with the space activity are minimized.[80] Publicists specifically state that a State which allows a private company to use its territory needs to be concerned with minimizing the risks of the space activity.[81]

C. Nova Freedonia breached its obligation to enact a licensing regime to authorize and supervise MESI's activities.

Nova Freedonia breached its obligation to authorize and supervise MESI's activities under Article VI of the OST by not enacting a licensing regime to ensure the safety of the experiment MESI prepared.[82] MESI received only an export license verifying that the canisters were not 'munitions.' It was not a license to authorize and supervise space activities. MESI therefore received no authorization for the experiment or its preparation.[83] Nova Freedonia, although equipped with resources such sophisticated research facilities,[84] did not fulfill the minimum obligation to enact a licensing regime to space activities occurring on its territory.

Nova Freedonia therefore breached its obligation to authorize and supervise MESI's activities.

III. NOVA FREEDONIA VIOLATED ARTICLE 5 OF THE RETURN AGREEMENT BY FAILING TO RETURN THE MESI CANISTER TO ZURIS.

Nova Freedonia violated Article 5 of the Return Agreement[85] by destroying the canister containing bacteria instead of returning it to Zuris. Nova Freedonia was under an implied obligation to safekeep the canister for eventual return to the Zuris, especially in light of the legally-binding Memorandum of Understanding [MOU] between them.

The canister was not hazardous when Nova Freedonia destroyed it. Any potential harm posed by the canister was nullified when Nova Freedonia neutralized it with sodium chloride. Even if the canister remained hazardous, Nova Freedonia should have notified Zuris so that Zuris could take steps to eliminate the danger arising from it.

The right to return space objects is present in the space regime to facilitate scientific research on such objects returning from space.[86] By unilaterally destroying the canister, Nova Freedonia effectively deprived Zuris' right to study the bacteria it contained.

A. Nova Freedonia was obliged by Article 5 of the Return Agreement to

[74] SPACE SAFETY REGULATIONS AND STANDARDS 32-33 (Joseph N. Pelton & Ram S. Jahku eds., 2011).

[75] U.N. COMM. PEACEFUL USES OUTER SPACE [COPUOS], Legal Sub-comm., *Review of existing national space legislation illustrating how States are implementing, as appropriate, their responsibilities to authorize and provide continuing supervision of non-governmental entities in outer space*, A/AC.105/C.2/L.224 (Jan. 22, 2001)

[76] Commercial Space Launch Act, s. 70104, 49 U.S.C. §§ 70101 et seq. (1984).

[77] Law on Space Activity 1996, art. 9, No. 147-F3 (Russ.).

[78] Outer Space Act, s. 3, 1986, 38 (U.K.).

[79] Act on Space Activities, s. 2, (1982:963) (Swed.).

[80] Commercial Space Launch Act, s. 70105, 49 U.S.C. §§ 70101 et seq. (1984); Law on Space Activity 1996, art. 4, No. 147-F3 (Russ.); Outer Space Act, s. 4, 1986, 38 (U.K.).

[81] Silvestrov, *supra* note 58.

[82] Compromis ¶14.

[83] Compromis ¶14.

[84] Compromis ¶1.

[85] Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 672 U.N.T.S 119 [hereinafter *Return Agreement*].

[86] MANUAL ON SPACE LAW, *supra* note 73, at 159.

safekeep the canister for return to its launching authority, Zuris.

1. Nova Freedonia violated Article 5(3) by failing to safekeep the canister so that it could be returned at Zuris' request.

Article 5(3) of the Return Agreement provides that, upon request, space objects 'shall be returned'[87] to the launching authority. A State with possession of a launching authority's space object has the implied obligation to safekeep the object so it can be returned to the launching authority.[88] Without an implied obligation to safekeep the object until the request has been formally made, the launching authority's right to retrieve its space object is nugatory.

State practice is to safekeep a space object while giving the launching authority time to formally request the object. In 1972, parts of a space object were found in New Zealand. Its government spent one and a half years searching for its possible owner. After such due diligence, it rightly considered the object abandoned and disposed of it. The launching authority's right to request the object had been foregone.[89] Learned publicists explain that New Zealand's actions were consistent with Article 5 and should be regarded as precedent.[90] In 2000, Japan temporarily stored space objects found on its territory which it knew belonged to the USA, awaiting a formal request to return the objects.[91] It had already notified the USA of the space objects' return and was aware that the USA would request its return.[92] States therefore give launching authority time to ask for their space objects, and safekeep them until a request is made.

Similarly, Nova Freedonia was obliged under Article 5 to give Zuris time to request its canister and not take unilateral action before then.

2. Additionally, Nova Freedonia was obliged to safekeep the canister for Zuris pursuant to a legally binding agreement between them.

Nova Freedonia was particularly obliged to safekeep the canister for Zuris because it must have been aware that a request for it would be forthcoming. Zuris' space object was only on Nova Freedonia's territory pursuant to a legally-binding MOU between them.[93]

State practice shows that States and international organizations treat MOUs for space activities as legally binding. The frequent use of MOUs in space ventures has made them major legal instruments.[94] The European Space Agency treats its MOUs with the National Aeronautics and Space Agency ["NASA"] on, inter alia, the construction of a space laboratory as binding under international law.[95] Similarly, NASA's 'Procedures and Guidance' confirms that MOUs are international agreements binding under international law.[96]

In light of state practice on MOUs for space activities and its legally binding status, the MOU here created binding obligations under international law. Since the canister was only on Nova Freedonia's territory by mutual agreement,[97] Nova Freedonia should have been aware that Zuris would eventually seek its return. Zuris did, in fact, demand the return of its canister upon Nova Freedonia's announcement

[87] *Return Agreement*, *supra* note 85, art. 5(1).
[88] MANUAL ON SPACE LAW, *supra* note 73, at 65.
[89] MANUAL ON SPACE LAW, *supra* note 73, at 65.
[90] MANUAL ON SPACE LAW, *supra* note 73, at 65.
[91] Frans G. von der Dunk, *A Sleeping Beauty Awakens: The 1968 Rescue Agreement after 40 Years*, 34 J. SPACE L. 411, 427 (2008) [hereinafter *A Sleeping Beauty Awakens*].
[92] *A Sleeping Beauty Awakens*, *supra* note 91, at 428.
[93] Compromis ¶9 & ¶20.
[94] H. Jiefang, *Roles of Bilateral Agreements in Space Law*, 31 PROC. COLLOQ. L. OUTER SPACE 172 (1988).
[95] Michél Bourely, *The legal hazards of transatlantic cooperation in space*, SPACE POLICY, Nov. 1990, at 323, 325.
[96] John B. Gantt et al., *Status of Multilateral Space Agreements in International and United States Law*, 45 PROC. COLLOQ. L. OUTER SPACE 84, 94 (2002).
[97] Compromis ¶9 & ¶20

that it evacuated its research facility.[98] However, Nova Freedonia had already destroyed the canister.

Nova Freedonia should have given Zuris time to request its canister's return. The obligation to return Zuris' space object existed pursuant to Article 5(3) of the Return Agreement and the States' MOU. Nova Freedonia therefore had an obligation to safekeep the MESI canister for eventual return to Zuris.

3. Zuris is the launching authority.

Article 5 of the Return Agreement entitles the launching authority to the return of a space object. Under Article 6 of the Return Agreement, the launching authority is defined as the 'State responsible for launching.' [99] The Return Agreement does not specify what makes a State responsible for launching. However, while negotiating the Return Agreement, States frequently used the phrase 'the State which announced the launching' when referring to the State entitled to the return of space objects.[100]Therefore, the State which announced a space object's launch is its launching authority. Given that the launching authority is the State entitled to the return of the space object, it must be the State entitled to determine access to the space object.

Zuris is the launching authority of the canister carried on the sample return mission as it announced the mission's launch.[101] Zuris was also responsible for the launch as it controlled the spacecraft,[102] and launched the space object off its facility.[103] Furthermore, the MOU shows that the parties agreed that Zuris would be State entitled to control access to the space object. The MOU clearly stipulated that Zuris would determine scientific access to the canister.[104] MESI, the Nova Freedonian national itself, had no expectation that it would obtain possession of the canister after contributing the canister to the mission.[105] Zuris and Nova Freedonia therefore agreed that Zuris would be the launching authority of the canister, entitled to determine access to it and therefore request its return.

Therefore, under Article 5 of the Return Agreement, Nova Freedonia was obliged to return the canister to Zuris, its launching authority.

B. Article 5(4) of the Return Agreement does not entitle Nova Freedonia to destroy Zuris' space object.

States can make a launching authority help remove danger presented by a hazardous space object on its territory, but are not empowered to unilaterally destroy the object.[106] Under Article 5(4), Nova Freedonia could have notified Zuris if it believed the canister was hazardous and deleterious and made Zuris take steps to eliminate the danger. Nova Freedonia breached its obligation to return the canister to Zuris by destroying the canister, especially when it was no longer dangerous.

The obligation to return a space object to a launching authority arising from Article 5(3) of the Return Agreement is unconditional.[107] States may merely eliminate the danger posed by a hazardous and deleterious object.[108] They are entitled to have the object removed from their territory or ensure that toxic fuels are rendered harmless.[109] However, States must return a space object to its launching authority once the harm has been eliminated.[110]

Nova Freedonia therefore violated Article 5 of the Return Agreement by destroying the canister which should have been returned to

[98] Compromis ¶22.
[99] *Return Agreement*, *supra* note 85, art. 6.
[100] *Report of the Legal Sub-Committee of COPUOS*, U.N. GAOR Legal Sub-Committee of COPOUS, U.N. Doc. A/AC 105/19 (1964).
[101] Compromis ¶5.
[102] Clarification no. 9.
[103] Compromis ¶15.
[104] Compromis ¶10.
[105] Clarification no. 28.
[106] *Return Agreement*, *supra* note 85, art. 5(4).
[107] Stephen Gorove, *Recovery and Return of Space Objects Launched into Outer Space: A Legal Analysis*, 4 INT'L LAW. 682, 689 (1969) [hereinafter Gorove, *Recovery and Return*]; MANUAL ON SPACE LAW, *supra* note 73, at 71.
[108] *Return Agreement*, *supra* note 85, art. 5(4).
[109] Paul G. Dembling & Daniel M. Arons, *The Treaty on Rescue and Return of Space Objects*, 9 WM. & MARY L. REV 630, 656 (1967).
[110] Gorove, *Recovery and Return*, *supra* note 107, at 689.

Zuris. Nova Freedonia claimed to effectively contain the threat of harm posed by the purple halophilic bacteria by neutralizing it with sodium chloride.[111] By then destroying the canister when the hazardous and deleterious nature of the canister had been eliminated, Nova Freedonia violated its obligation to return the canister to Zuris.

IV. NOVA FREEDONIA IS LIABLE IN INTERNATIONAL LAW FOR THE SIGNIFICANT ECONOMIC DAMAGE SUFFERED BY ZURIS ARISING FROM RESORT CITY'S EVACUATION AND THE DIMINUTION IN ITS LOBSTER HARVEST.

A. Nova Freedonia Is Liable Under Article Ii Of The Liability Convention For Zuris' Economic Damage, Arising From The Evacuation Of Resort City.

Under Article II of the Liability Convention,[112] a launching State is absolutely liable for damage caused by a space object to the surface of the Earth. The damage must be of a nature compensable under the Liability Convention.

Resort City's evacuation constituted damage to property caused by the MESI canister, which is a space object. Nova Freedonia is therefore absolutely liable under the Liability Convention.

1. *The MESI canister containing halophilic bacteria is a 'space object' under Article I(d) of the Liability Convention.*

A 'space object' includes its 'component parts'[113] and its contents,[114] even after it is detached from the original object for movement in outer space.[115] A payload on a spacecraft is considered a 'component part' of a space object.[116]

The canister was a payload carried on the sample return spacecraft, and contained halophilic bacteria. Together, the canister and bacteria which turned purple on exposure to Phobos' environment[117] constitute a 'space object' under Article I(d) of the Liability Convention. As explained in I(C)(4)(a) above, Nova Freedonia is a launching State of the canister.

2. *Nova Freedonia caused 'damage to property' to Zuris.*

a) *Zuris' loss of utility in Resort City constitutes 'damage to property.'*

Nova Freedonia is obliged to compensate Zuris for the loss of utility of Resort City because it constitutes 'damage to property'. Zuris was unable to use and earn revenue from Resort City and suffered a loss of utility in its property. Loss of utility in property constitutes 'damage to property' under Article 1(a) of the Liability Convention.

The *travaux préparatoires* is silent on the definition of 'damage to property.' In Nuclear Tests[118], the ICJ recognized that Australia had suffered damage as its property was rendered unfit for use after contamination by France's nuclear weapon testing.[119]

Jurists state that 'damage to property' occurs when it is rendered less suitable for those purposes for which it was originally valued[120]

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[111] Compromis ¶21.

[112] Convention on International Liability For Damage Caused By Space Objects, May 29, 1972, 961 U.N.T.S 187 [hereinafter *Liability Convention*].

[113] *Liability Convention*, *supra* note 112, art. I(d).

[114] Stephen Gorove, *International Protection of Astronauts and Space Objects*, 20 DEPAUL L. REV. 597, 614 (1971).

[115] W. F. Foster, *The Convention on International Liability for Damage Caused by Space Objects*, 10 CAN. Y.B. INT'L L. 137, 159 (1972).

[116] Bruce A. Hurwitz, *State Liability for Outer Space Activities*, *in* 11 UTRECHT STUDIES IN AIR AND SPACE LAW 24 (1992).

[117] Compromis ¶20.

[118] Nuclear Tests (Aust. v. Fra.), 1974 I.C.J 252 (Dec. 20).

[119] Kevin D. Heard, "Space Debris and Liability: An Overview" (1986) 17 Cumb. L. Rev. 178

[120] Bryan Schwartz & Mark L. Berlin, *After the Fall: An Analysis of Canadian Legal Claims for*

and when property is 'in any way rendered unfit for the use for which it was intended.'[121] Professor Gorove adds that 'loss of or damage to property' covers the loss of use of property.[122]

For example, radioactive fallout from Cosmos 954 damaged Canadian property because the area where pieces of the USSR's space object fell could not be used.[123] Canada suffered damage because its property was rendered less suitable for human use.[124]

Zuris suffered a loss of utility in Resort City arising from Nova Freedonia's inadequate containment of the purple halophilic bacteria in its sophisticated research facility. Nova Freedonia and Zuris share a border.[125] Zuris' had to evacuate Resort City for three weeks[126] to protect people from the threat to public safety until Nova Freedonia could contain the bacteria. Zuris' nationals could not earn revenue from its popular tourist destination during this time. Resort City was therefore rendered uninhabitable and unfit for its intended use. The damage suffered, valued at the loss of profits it could have earned in 3 weeks, was therefore a loss of utility in Resort City. This is damage to property, compensable under the Liability Convention.

b) The damage to Resort City was 'caused by a space object' carrying bacteria.

The damage to Resort City was caused by a space object because it was the natural and foreseeable consequence of the canister's inadequate handling. The travaux préparatoires only states that damage is 'caused by a space object' where there is a causal link between the accident and the damage.[127] The lex specialis does not provide a definitive test of causation. In international law, however, the International Law Commission has accepted the test of 'proximate causation.'[128] There is proximate causation in international law when the damage is a natural and foreseeable consequence.[129]

The loss of utility in Resort City was caused by Nova Freedonia's inadequate containment of the purple bacteria in its research facility. The evacuation of Zuris' densely populated tourist destination was a natural and foreseeable consequence of Nova Freedonia's announcements of its failure to contain the bacteria within its research facility. Nova Freedonia released no information on the extent of the threat posed by the bacteria. The evacuation of Nova Freedonia's own research facility alerted its neighbouring State, Zuris, to take the necessary precautions. The release of purple halophilic bacteria necessitated the densely populated Resort City's evacuation to minimize the threat to public health and safety.[130]

In conclusion, the loss of utility in Resort City is economic damage to property compensable under the Liability Convention and was caused by Nova Freedonia's inadequate handling of a space object. Therefore, Nova Freedonia is absolutely liable under Article II of the Liability Convention for Zuris' economic damage arising from the evacuation of Resort City.

3. Nova Freedonia is solely liable for the damage caused as Zuris is exonerated from liability under Article VI(1) of the Liability Convention by Nova Freedonia's gross negligence.

Damage Caused by Cosmos 954, 27 MCGILL L.J. 676, 698 (1982).

[121] Foster, *supra* note 115, at 156-157.

[122] S. GOROVE, STUDIES IN SPACE LAW: ITS CHALLENGES AND PROSPECTS 128 (1977).

[123] Joseph A. Burke, *Convention on International Liability for Damage Caused by Space Objects: Definition and Determination of Damages after the Cosmos 954 Incident*, 8 FORDHAM INT'L L.J. 255, 276 (1985).

[124] Kevin D. Heard, *Space Debris and Liability: An Overview*, 17 CUMB. L. REV. 167, 177 (1986).

[125] Compromis ¶1.

[126] Compromis ¶23.

[127] CARL Q. CHRISTOL, THE MODERN INTERNATIONAL LAW OF OUTER SPACE 110 (1982).

[128] ILC Draft Articles, *supra* note 2, art. 31.

[129] *Id.*

[130] Compromis ¶22.

Nova Freedonia and Zuris are joint launching States. However, they are not jointly liable for the damage caused by the space object under Article V of the Liability Convention. Under Article VI(1) of the Liability Convention, Zuris is exonerated from liability by Nova Freedonia's gross negligence.

a) Nova Freedonia was grossly negligent under Article VI(1) of the Liability Convention.

Under Article VI(1) of the Liability Convention, any State liable under Article II can be exonerated if the damage resulted from the claimant State's gross negligence.[131] Nova Freedonia was grossly negligent by handling the canister in its return facility without safeguards in place. Zuris is therefore exonerated from any liability for the cost to contain and fumigate the bacteria.

The drafting history of the Liability Convention and the views of publicists indicate that 'gross negligence' under Article VI(1) refers to 'a high degree of contributory negligence.'[132] Article 32 of the VCLT permits the use of a treaty's preparatory material to confirm the meaning of a word where its plain and ordinary meaning is obscure. The views of publicists and the drafting history of the Liability Convention are instructive in determining the interpretation of 'gross negligence' because the text is silent on the exact definition of 'gross negligence.' Gross negligence has been defined as a conscious and voluntary disregard of the need to use reasonable care, which is likely to cause foreseeable grave injury or harm to persons, property, or both.[133]

Nova Freedonia failed to ensure that the canisters were handled carefully once entrusted to its research facility. It was therefore grossly negligent when it released the purple halophilic bacteria into its research facility and the surrounding environment.

Nova Freedonia has put forward no evidence that the canisters brought to its research facility[134] were opened in a contained environment before being exposed to the entire research facility. The bacteria replicated rapidly[135] and threatened the security of the entire facility's physical structure.[136] As a result of its own negligence, Nova Freedonia therefore had to evacuate and fumigate its entire facility and its surroundings[137] to ensure that the bacteria was completely contained. Zuris was also forced to evacuate its popular tourist destination after Nova Freedonia's announcements of its failure to contain the bacteria. Nova Freedonia was highly negligent in failing to ensure that the canister containing biological material was not quarantined before being exposed to an entire research facility.

Therefore, due to Nova Freedonia's gross negligence, Zuris is exonerated from absolute liability under the Liability Convention. Nova Freedonia is solely liable for the damage caused by the bacteria.

b) Zuris' claim is not barred by Article VII of the Liability Convention.

Article VII of the Liability Convention states that the provisions of the Liability Convention shall not apply to damage caused by a space object of a launching State to "nationals of that State."[138]

While the nationals of Zuris are precluded from claiming damages from Zuris, this does not prohibit their claim when there is gross negligence on the part of the foreign launching State. [139] Zuris' nationals can therefore claim compensation from Nova Freedonia under the Liability Convention.

B. <u>Nova Freedonia is liable for Zuris' economic damage arising from the drastic reduction in its lobster harvest under general international law.</u>

Article III of the OST specifically provides for space activities to be conducted 'in

[131] *Liability Convention*, *supra* note 112.
[132] Heard, *supra* note 119, at 185.
[133] S Clark & R McInnes, *Gross Negligence*, 12 INS. L. J. 1, 2 (2001).
[134] Compromis ¶20.
[135] Compromis ¶20.
[136] Compromis ¶21.
[137] Compromis ¶22.
[138] *Liability Convention*, *supra* note 112, art. VI.
[139] Hurwitz, *supra* note 116, at 44.

accordance with international law.'[140] Under general international law, Nova Freedonia is liable to compensate Zuris for the transboundary harm Zuris suffered when Nova Freedonia sprayed sodium chloride around its research facility. It is therefore internationally responsible and liable to compensate Zuris for the damage caused by its breach of international law. Furthermore, the nature of the damage suffered by Zuris is recoverable under general international law, which demands that the damage suffered, such as loss of profits, be financially assessable and not too remote.

1. Nova Freedonia breached its international obligation to prevent transboundary harm.

Nova Freedonia is obliged to prevent transboundary harm to its neighbouring state under the Trail Smelter[141] principle. The Trail Smelter principle stipulates that States are obliged to prevent harm caused by their nationals to other States even where the harmful activity itself is lawful. This principle was affirmed by the International Court of Justice in Corfu Channel, where the Court declared that it was the obligation of every state 'not to allow its territory to be used for acts contrary to the rights of other States.'[142] Principle 21 of the 1972 Stockholm Declaration on the Human Environment[143] confirms that it is every State's responsibility to ensure that activities within their jurisdiction and control do not cause damage to the environment of other States. Principle 21 has been accepted as customary international law.[144] States affected by transboundary harm may claim compensation for environmental damage and the depletion of natural resources.[145]

Nova Freedonia did not ensure that activities under its jurisdiction would not cause damage to its neighbouring State's environment. Nova Freedonia fumigated the areas surrounding its research facility with enough sodium chloride to raise the salinity of the water around Cape Holiday to a level toxic to its lobster population for 3 years.[146] As a result, Zuris lost a significant part of its usual profits from its fishing industry.

2. The economic damage arising from Nova Freedonia's breaches is financially assessable damage that is not remote.

a) The economic damage to Zuris is financially assessable because it can be evaluated in financial terms.

The economic damage Zuris suffered is compensable under general international law. Article 36(2) of the ILC Draft Articles stipulates that a State responsible for an internationally wrongful act shall compensate for financially assessable damage, including loss of profits. Financially assessable damage is damage which can be evaluated in financial terms.[147] Prospective profits being claimed for cannot be 'too speculative',[148] but must be reasonably anticipated and not merely possible.[149]

The loss of profits suffered by Zuris is financially assessable damage because it is capable of being evaluated in financial terms. Cape Holiday is world famous for its lobsters and lobster exports constitute a significant part of Zuris' fishing industry.[150] Zuris is likely to have a 'well-established history of dealings'[151] and be able to calculate the difference between its usual profits and the revenue it earned over the 3 years where its harvest was diminished.

[140] *OST*, *supra* note 1, art. III.
[141] Trail Smelter Arbitration (U.S. v. Can.), 35 AM. J. INT'L. ARB. 684 (1941).
[142] Corfu Channel (U.K. & N. Ir. v. Alb.), 1949 I.C.J. 4 (Apr. 9).
[143] United Nations Conference on the Human Environment, Stockholm, Swed., June 5-16, 1972, *Stockholm Declaration*, ¶ 21, UN Doc A/CONF/.48/14.
[144] G.A. Res. 2996, U.N. GAOR, 27th Sess., U.N. Doc. A/8901 (Dec. 15, 1972); PATRICIA W. BIRNIE & ALAN E. BOYLE, INTERNATIONAL LAW AND THE ENVIRONMENT 90 (1992).
[145] ILC Draft Articles, *supra* note 2, at 101.
[146] Compromis ¶34.
[147] ILC Draft Articles, *supra* note 2, at 99.
[148] ILC Draft Articles, *supra* note 2, at 104.
[149] 3 M. M. WHITEMAN, DAMAGES IN INTERNATIONAL LAW 1837 (1943).
[150] Compromis ¶3.
[151] ILC Draft Articles, *supra* note 2, at 104.

Zuris' loss of revenue from the drastic 3-year reduction in its lobster harvest is therefore financially assessable damage that can be claimed for under Article 36(2) of the ILC Draft Articles.

b) The economic damage to Zuris is compensable because it is not remote.

The economic damage suffered by Zuris can be claimed for also because it is not remote.[152] In Angola,[153] it was considered necessary to exclude losses unconnected with an initial act, save by exceptional circumstances which could not have been foreseen.

The loss that Zuris has suffered was clearly foreseeable. It is foreseeable that sodium chloride sprayed into the air might be carried over to a neighboring State. It is not exceptional that subsequent rain would raise the salinity of water around a coastal State.[154] The economic damage suffered by Zuris is therefore compensable for not being too remotely connected to Nova Freedonia's inadequate containment of space objects under its care.

V. ZURIS IS NOT LIABLE FOR THE COST OF NOVA FREEDONIA'S CANCELLED ARES I MISSION UNDER THE LIABILITY CONVENTION BECAUSE IT WAS NOT AT FAULT FOR THE DAMAGE SUFFERED.

Liability under Article III of the Liability Convention requires fault, which is the breach of an international obligation[155] or the failure to exercise a reasonable degree of prudence.[156] Zuris did not breach its international obligations. It fulfilled its duty under Article IX of the OST to consult other States with whose space activities it might interfere by giving Nova Freedonia information on multiple occasions about its mission to Mars. It also exercised a reasonable degree of prudence when conducting its space activities by carrying out pre-launch tests to ensure the safety of its mission.

A. Zuris did not breach its international obligations under Article IX of the Outer Space Treaty.

1. 'Fault' is the breach of an international obligation.

Professor Bin Cheng explains that 'fault' under international law refers to a breach of an international obligation.[157] The Prats Case[158] held that 'fault' is to be identified with an unlawful act. The Jamaica Case[159] recognized that a failure to observe one's obligations amounted to an unlawful act. 'Fault' therefore refers to the breach of an international obligation.

2. Zuris is not at fault because it fulfilled its obligations to undertake appropriate international consultations under Article IX of the Outer Space Treaty.

Publicists agree that a State's duty to consult under Article IX requires contact with other States whose space activities it might interfere with[160] and is designed to promote international understanding and cooperation.[161]

Zuris undertook appropriate consultations by providing Nova Freedonia with information on its mission on multiple occasions. Zuris publicly unveiled detailed plans on its mission to Mars, including the number of probes it would use, the

[152] Libyan Arab Foreign Investment Company v. Burundi, 96 I.L.R. 279 (Arb. Trib. 1996).
[153] Port. v. Germany, 2 R.I.A.A. 1011, 1031 (Portugo-German Arbitral Tribunal 1928).
[154] Compromis ¶1.
[155] BIN CHENG, GENERAL PRINCIPLES OF LAW 225 (Grotius Publications 1987) (1953) [hereinafter BIN CHENG, GENERAL PRINCIPLES].
[156] Hurwitz, *supra* note 116, at 28.
[157] BIN CHENG, GENERAL PRINCIPLES, *supra* note 155, at 225.
[158] Salvador Prats (Mex. v. U.S.), 3 Int. Arb. 2886, 2893 (1868).
[159] The Jamaica Case (U.K. v. U.S.), 4. Int. Arb. 489, 497-499 (Mixed Claims Comm. 1978).
[160] Michael C. Mineiro, *FY-1C and USA-193 ASAT Intercepts: An Assessment of Legal Obligations under Article IX of the Outer Space Treaty*, 34 J. SPACE L. 321, 338 (2008).
[161] Philip McGarrigle, *Hazardous Biological Activities in Outer Space*, 18 AKRON L. REV. 103 (1984).

types of landing system each probe would utilize,[162] and how samples from Mars would be collected and brought back to Earth.[163] Zuris later announced that other experiments and sensors would be included in its mission.[164] Nova Freedonia must have been aware of, and have studied with some care, various aspects of Zuris' mission to Mars, especially as it subsequently agreed to have the Mars return samples studied at its research facility.[165] Zuris was therefore in contact with Nova Freedonia, who had information on the sample return mission supplied to it on multiple occasions, and who decided to supply services in support of the mission. Therefore, even if Zuris had 'reason to believe' its activities would interfere with Nova Freedonia's space activities, Zuris fulfilled its obligations under Article IX to conduct appropriate consultations with its neighbour.

Zuris is therefore not liable for damage to the Ares 1 spacecraft or mission as it was not at fault.

B. Alternatively, Zuris was not at fault because it exercised a reasonable degree of prudence in conducting its space activities.

Professor Bruce Hurwitz argues that 'fault' is the "failure to exercise the degree of prudence considered reasonable in the circumstances".[166] The standard of behavior constituting a reasonable degree of prudence in conducting space activities is stipulated in Article IX of the OST. Article IX does not provide for a regime of strict liability, where States will have breached their international obligations the moment they contaminate the environment of outer space or Earth. Rather, Article IX requires States to take steps to avoid the harmful contamination of outer space or adverse changes in Earth's environment.[167]

Zuris was not at fault for the damage caused to Ares 1 because it exercised a reasonable degree of prudence in carrying out its sample return mission. As explained in I(D) above, Zuris carried out pre-launch tests to ensure the safety of its mission.[168] It is therefore not at fault, and not liable for the damage to the Ares 1 spacecraft and mission.

VI. ZURIS IS WHOLLY EXONERATED FROM ANY LIABILITY FOR THE COST TO CONTAIN AND FUMIGATE THE PURPLE BACTERIA BY NOVA FREEDONIA'S GROSS NEGLIGENCE UNDER ARTICLE VI OF THE LIABILITY CONVENTION.

Even if Zuris is liable for the cost to contain and fumigate the purple halophilic bacteria, it is exonerated under Article VI of the Liability Convention by Nova Freedonia's gross negligence. Under Article VI(1) of the Liability Convention, any State liable under Article II can be exonerated if the damage resulted from the claimant State's gross negligence.[169] Nova Freedonia was grossly negligent by failing to supervise its national space activities and carelessly handling the canister in its return facility, as explained in IV(A)(3)(a) above. Zuris is therefore exonerated from any liability for the cost to contain and fumigate the bacteria released due to Nova Freedonia's grossly negligent handling of the canisters entrusted to it.

SUBMISSIONS TO THE COURT

For the foregoing reasons, the Republic of Zuris (Applicant) respectfully requests the Court to adjudge and declare that:

1. Nova Freedonia is responsible under international law for the activities of MESI;
2. Nova Freedonia violated international law by failing to authorize and supervise MESI's activities;
3. Nova Freedonia contravened international law by failing to return the MESI canister to Zuris;
4. Nova Freedonia is liable for the economic damages to nationals of Zuris for the

[162] Compromis ¶5.
[163] Compromis ¶6.
[164] Compromis ¶11.
[165] Compromis ¶9.
[166] Hurwitz, *supra* note 116, at 28.
[167] *OST*, *supra* note 1, art. IX.
[168] Clarification no. 35.
[169] *Liability Convention*, *supra* note 112.

evacuation of Resort City and the diminution in the lobster harvest in Cape Holiday;
5. Zuris was not at fault for the damage caused to Nova Freedonia's Ares Mission; and
6. Zuris is exonerated from liability for the cost to clean up and fumigate the purple halophilic bacteria by Nova Freedonia's gross negligence.

Respectfully submitted.

MEMORIAL FOR THE RESPONDENT

THE COMMONWEALTH OF NOVA FREEDONIA

Florida State University College of Law (USA)
Ms. Tanya Cronau, Ms. Lynn Guery and Ms. Anne Marie Rossi
Faculty Advisor: Prof. Nat Stern

ARGUMENT

I. ZURIS IS RESPONSIBLE UNDER INTERNATIONAL LAW FOR THE MESI EXPERIMENT AND ZURIS CONTRAVENED INTERNATIONAL LAW BY CONTAMINATING THE ENVIRONMENT OF MARS.

A. This Court has Jurisdiction to Adjudicate the Claims Presented by Zuris.

This Court has jurisdiction in this matter because both parties agreed to submit the dispute to the Court.[170] According to Article 36 of the Statute of the International Court of Justice, "[t]he jurisdiction of the Court comprises all cases which the parties refer to it."[171]

B. Zuris is Responsible Under International Law for the MESI Experiment.

Zuris is responsible for the MESI experiment for three reasons. First, the MESI experiment was a national activity of Zuris and international law holds states responsible for their national activities. Second, Zuris was responsible for authorizing and supervising MESI's activities as the appropriate state party. Third, Zuris was the launching state and was liable for all of its space objects, including the MESI canisters.

1. Zuris is Responsible for the MESI Experiment Because it was a Zuran National Activity.

[170] *Compromis* ¶ 24.
[171] Statute of the International Court of Justice, 75 I.C.J. Acts & Docs. 6, art. 36.

Article VI of the OST provides that "State Parties to the Treaty shall bear international responsibility for national activities in outer space . . . whether such activities are carried on by governmental agencies or by non-governmental entities."[172] The MESI experiment was a national activity because MESI was an agent used by Zuris to carry out its national space mission.

The mission itself, within which the MESI canisters were incorporated, was a national activity of Zuris. Zuris publicly announced to the international space community that it, as a nation, planned to conduct a sample return mission to Mars.[173] Whether the mission was actually carried out by the Zuran government or by Zuran agents is irrelevant because "national activities obviously include those by the State itself through its own agencies."[174]

The MESI experiment itself was a Zuran national activity because it was a material part of the overall mission. While organizing its mission, the Zuran government publicized its plans to contract with other states and organizations for the purposes of "the inclusion of experiments, sensors, and other forms of participation in the mission."[175] One such organization, MESI, supplied the canisters which contained the sample life forms which the mission was designed to test; thus, the canisters were integral to Zuris's mission.[176] MESI prepared the canisters and then sent them to the Zuris Ministry of Space Affairs, a governmental agency of Zuris.[177] Hence, MESI not only participated significantly in Zuris's national space mission, but also directly cooperated with the government of Zuris to provide these canisters. Equity requires the MESI experiment to be considered a national activity of Zuris because otherwise, a state will be incentivized to undertake a mission on a national level, utilize the services of a private party, and shield itself from national liability.[178]

Because the MESI experiment is a national activity, Zuris is responsible for it under both space law and customary international law. Article VI of the OST provides that states "shall bear international responsibility for national activities in outer space,"[179] which requires states to "assume direct State responsibility for non-governmental national activities."[180] Thus, under the OST, Zuris is responsible for the MESI experiment simply because it was a national activity.

Article III of the OST requires states to conduct their space activities "in accordance with international law."[181] This Court recognized in *Corfu Channel* that "a State on whose territory or in whose waters an act . . . has occurred, may be called upon to give an explanation."[182] Thus, customary international law holds a state responsible for activities undertaken within its territory. The mission was planned within Zuris's territory through its government and, no matter where the canisters were constructed, they were sent to and controlled by Zuris.[183] Also, the United Nations

[172] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, art. VI, *opened for signature* Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205, [hereinafter *OST*].

[173] *Compromis* ¶ 5.

[174] Bin Cheng, *Article VI of the 1967 Space Treat Revisited: "International Responsibility", "National Activities", and the "Appropriate State,"* 26 J. Space L. 7, 20 (1998).

[175] *Id.* ¶ 11.

[176] *Id.* ¶ 12.

[177] *Id.* ¶ 14.

[178] *See* Cheng, *supra* note 93, at 23 ("Now, under Article VI, what is intended no doubt is that every State Party should be directly responsibl[e] for any space activity that is within its legal power or competence to control.").

[179] *OST*, *supra* note 91, art. VI.

[180] Cheng, *supra* note 93, at 15.

[181] *OST*, *supra* note 91, art. III.

[182] *Corfu Channel* (U.K. v. Alb.), Judgment, 1949 I.C.J. 4 (Apr. 9) ("It is true, as international practice shows, that a State on whose territory or in whose waters an act contrary to international law has occurred, may be called upon to give an explanation.").

[183] *Compromis* ¶ 14 (showing that the canisters were sent to Zuran authorities before launch);

(the "UN") considers a state liable for any activity undertaken by that state, even if the activity at issue was done by a third party under the control of the state.[184]

Because Zuris used MESI to complete its national mission, both space law and customary international law require Zuris to assume responsibility for the MESI experiment.

2. Zuris is Responsible as the Appropriate State Party.

Even if this Court determines that MESI's activities are not national activities of Zuris, it should still find that Zuris was responsible for the MESI experiment because Zuris was the appropriate party to authorize and continually supervise MESI's activities. The OST deviates from customary international law in some respects, one being that a state does not need to have exercised actual or direct control over the activities of a non-governmental entity in order to qualify as the appropriate party to supervise and authorize that entity's activities.[185] Article VI of the OST requires the "appropriate state party" to authorize and continually supervise the "activities of non-governmental entities in outer space," and does not qualify the term "activities" with "national."[186] The responsibility to authorize and supervise is an automatic obligation, "imposed on the State concerning all private activities, regardless of State control, direction or influence over the activity."[187] Therefore, if MESI is considered a non-governmental entity of Zuris, and Zuris was in the best position to control MESI's activities, then Zuris is the appropriate state party under Article VI of the OST and should have ensured that MESI's activities complied with international law.[188]

The connection between Zuris and MESI qualifies MESI as a non-governmental entity of Zuris. This Court, in *Barcelona Traction, Light and Power Co., Ltd*[189] ("*Barcelona Traction*"), furnished a test to determine to which country a particular corporation belongs. For a corporation to belong to a specific country there must be a "genuine connection" between the corporation and the state "of the kind familiar from other branches of law."[190] The reason for

compromis ¶ 15 (showing that the mission was launched from Zuris's platform).

[184] Draft Articles on Responsibility of States for Internationally Wrongful Acts, *in* Rep. of the Int'l Law Comm'n, 53rd sess, Apr. 21–June 1, July 2–Aug. 10, 2001, U.N. Doc. A/56/10; GAOR, 56th Sess., Supp. No. 10 (2001), *available at* http://www.un.org/law/ilc [hereinafter *Draft Articles*].

[185] *Cf. Flexi-Van Leasing Inc. v. Iran*, 12 Iran-U.S. Cl. Trib. Rep. 335 (1986) (holding that Iran could not be liable for activities of a corporation under its control unless the US could show that the acts were under the direct influence of the Iranian government).

[186] *OST*, *supra* note 91, art. VI.

[187] Ricky Lee, *Liability Arising from Article VI of the Outer Space Treaty: States, Domestic Law and Private Operators*, 48 Proc. Coll. L. Outer Sp. 216, 218 (2005). Academically, this could lead to a situation where there are two responsible states: State A, which is conducting a "national" activity, and State B, which is in the appropriate position to authorize and supervise State A's activities. *See* Jason R. Bonin, *Responsibility and Liability in International Space Law as a Matter of Sequence & Succession*, 52 Proc. Coll. L. Outer Sp. 27 (2009). However, a discussion of that possibility is irrelevant here because Zuris qualifies as either state.

[188] Ulrike M. Bohlmann et al., *Cologne Commentary on Space Law, Volume 1 Outer Space Treaty* 109 (Stephan Hobe et al. eds., 2009) (noting that the purpose of the supervision requirement is to ensure that states abide by and enforce their obligations under the space treaties).

[189] *Barcelona Traction, Light and Power Co., Ltd.* (Belg. v. Spain), Judgment, 1970 I.C.J. 3 (Feb. 5).

[190] *Id.* This Court chose the "genuine connection" test, even though the traditional rule attributes a corporation's nationality "to the State under the laws of which it is incorporated and in whose territory it has its registered office," *id.*, and some States will give a company incorporated therein a national identity "solely

this "genuine connection" requirement is that international law treats a corporation as "an institution created by States in a domain essentially within [the State's] jurisdiction."[191] Without a genuine connection, that corporation will not be classified as an entity of that state.

There is, however, "no absolute test of the 'genuine connection,' " so courts must conduct a balancing test to determine whether a corporation belongs to one state as opposed to another.[192] Two factors to consider are the location of incorporation of the company, a location that a company may freely select, and the headquarters of a company, which shows a "strong indication of nationality."[193] While the nationality of shareholders is also a factor to consider, it does not hold as much weight.[194]

In this case, there is a "genuine connection" between MESI and Zuris. In determining whether there is such a connection, the links and ties that each country has with MESI should be balanced against each other. First, although MESI is incorporated in Nova Freedonia, it is headquartered in Zuris.[195] This Court should consider MESI's headquarters as a weighty factor in favor of deeming MESI an entity of Zuris because, according to *Barcelona Traction*, the location of the headquarters shows a strong indication of a corporation's nationality. Second, although a majority of the members of MESI are from Nova Freedonia, Zuris nationals comprise twenty percent of the remaining membership – a significant amount considering that more than fifty countries belong to the organization.[196] Because MESI is headquartered in Zuris, and has a significant number of Zuran members, MESI should be considered a non-governmental entity of Zuris.[197]

The determination of whether a state is the appropriate state party depends not only on the nationality of the private entity, but also upon which state is in the best position to assert control over the activities of that private entity. In fact, the plain reading of the term "appropriate state party" suggests that one state is in a better, or more appropriate, position to supervise,[198] and that only the "appropriate" state should be required to authorize and supervise an entity.[199] Zuris was in the best position to assert control over the MESI experiment, and should therefore be considered the appropriate state party.

First, Zuris solicited the services of MESI, so it was in the best position to monitor MESI's compliance with its agreement.[200] Second, Zuris had jurisdictional control over the MESI experiment, because MESI sent the canisters to the Zuris Ministry of Space affairs and Zuris launched MESI's finished product from its own facility,[201] and a state which exercises jurisdictional control over an entity should be held responsible for that entity.[202] Third, the

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when it has its seat of management or center of control in [the State's] territory, or when a majority or substantial proportion of shares has been owned by nationals of the State concerned," *id.*

[191] *Id.* at 34.

[192] *Id.*

[193] *Id.* at 50.

[194] *Id.* at 50.

[195] *Compromis* ¶ 12.

[196] *Id.*

[197] Even if this Court decides that MESI is considered a national of Nova Freedonia, this should not change the analysis that it should be considered a non-governmental entity of Zuris for the limited purposes of the space mission.

[198] *See generally* Lee, *supra* note 106 (reasoning that the definition of "appropriate state party" should not be limited to include only the State to which the monitored entity is a national, because States are already responsible for national activities through the first sentence of Article VI; an extra term with no additional effect would assume that the drafters intended to insert a superfluous provision.)

[199] This interpretation also alleviates the problem of a state having to authorize and supervise every activity which happens to take place outside of its territory. It would be difficult, administratively, for a State to do this, and unnecessary considering the existence of a more appropriate State.

[200] *Compromis* ¶ 14.

[201] *Id.* ¶ 11, 14, 15.

[202] Cheng, *supra* note 93, at 23-26.

sheer fact that this was Zuris's national mission[203] suggests that Zuris was in the best position to authorize and supervise MESI, because Zuris had complete control over which objects it would incorporate into its mission. Last, Zuris had the duty to ensure that its mission, including the incorporation of the MESI canisters, conformed to international law.[204] Because the space objects were last in Zuris's possession, Zuris was in the best position to inspect the canisters and ensure that they complied with international standards.[205] These foregoing factors indicate that Zuris was in the best position to monitor and control MESI's experiment.

Because MESI was a non-governmental entity of Zuris, and Zuris was in the best position to assert control over MESI, Zuris was the appropriate state party responsible for authorizing and continually supervising the MESI experiment.

3. Zuris is Responsible as the Launching State.

Finally, Zuris is responsible for the MESI experiment because under the definition provided by the Liability Convention and Registration Convention, Zuris is the launching state liable for its mission and the space objects launched in that mission.[206] Because liability cannot exist under the Liability Convention without a pre-existing responsibility,[207] Zuris is responsible for anything that is considered its space object.

According to both treaties, a state is classified as a "launching state" in any of four ways: if it launches a space object; procures the launching of a space object; if a space object is launched from its territory; or if a space object is launched from its facility.[208]

First, the space objects were launched from Zuris's facility on its offshore launch platform.[209] This clearly satisfies the fourth definition of a launching state. Second, Zuris procured[210] the launch of the space objects by soliciting the Dor-Godol launching service to launch its spacecraft.[211] But for Zuris organizing and hiring parties to participate in the launch, the launch would not have occurred; therefore, Zuris procured the launch, thereby satisfying the first definition of a launching state. Because Zuris satisfies two of the definitions of a launching state under the Liability Convention, this Court should deem Zuris the launching state.[212]

Because Zuris was the launching state, it was liable for the MESI canister so long as the MESI canister was "its" space object. The canister is both a space object generally, and Zuris's space object specifically. Article I of the Liability Convention defines a "space object" as

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[203] *See* discussion *supra* Part I.b.i.

[204] *OST*, *supra* note 91 at Art. VI ("States Parties to the Treaty shall . . . assur[e] that national activities are carried out in conformity with the provisions set forth in the present Treaty.").

[205] Such as the pre-launch standards promulgated by COSPAR.

[206] Convention on International Liability for Damages Caused by Space Objects, art. II, *opened for signature* Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.S.T 187 [hereinafter *Liability Convention*].

[207] Neither form of liability imposed by the Liability Convention can exist without the launching state having a duty to act in a certain way; without the responsibility to act a certain way, there can be no breach, and therefore no liability. *See* Bonin, *supra* note 106 at 4 ("liability is attributed to the responsible state.").

[208] Convention on the Registration of Objects Launched into Outer Space, art. I(a), *opened for signature* Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter *Registration Convention*]; *Liability Convention*, *supra* note 125, art. II.

[209] *Compromis* ¶ 15.

[210] *Black's Law Dictionary* (9th ed. 2009) (defining procure as "[t]he act of getting or obtaining something or of bringing something about.").

[211] *Compromis* ¶ 15.

[212] Fulfillment of these definitions should control over any argument that because Dor-Godol is a Nova Freedonian company, Nova Freedonia itself launched the space object. Nova Freedonia's attenuated connection to the launch is greatly outweighed by Zuris's clear control over the launch.

"includ[ing] component parts of a space object as well as its launch vehicle and parts thereof."[213] The MESI canisters are "space objects" because they were objects launched into outer space.[214]

The MESI canisters are Zuris's space objects for three separate and independent reasons. First, the MESI canisters were part of a Zuran mission, and Zuris had control over the schedule for the access to the canisters' contents under the MOU.[215] Zuris therefore exercised dominion and control over the canisters. Second, MESI had no expectation to receive the canisters after the mission was over,[216] thereby transferring all control over the canisters to Zuris. Third, the sheer fact that Zuris is bringing a claim that Nova Freedonia is responsible for not returning the canisters logically rests solely on the fact that Zuris possessed a property interest in the canisters.[217] Because the MESI canisters were Zuris's space object, and Zuris was the launching state for those canisters, it is responsible for the MESI experiment by virtue of the Liability Convention.

C. Zuris Contravened International Law When it Contaminated Mars.

1. International Law Prohibits States from Contaminating Outer Space.

In order to preserve the scientific value of outer space,[218] the OST, Moon Treaty and customary international law require that states prevent its contamination.[219] Article IX of the OST requires state parties to undergo space exploration in a manner that actively seeks to prevent the harmful contamination of outer space, and to "undertake appropriate international consultations" if it believes that its activities would potentially interfere with other states' use of outer space.[220] Although the OST provides no contamination threshold (for example, as to what constitutes "harmful"), it is generally interpreted to prohibit forward contamination[221] because forward contamination

[213] *Liability Convention*, *supra* note 125, art. I(d).

[214] Bin Cheng, *Studies in International Space Law* (1997); *see also* discussion *infra* Part IV.a.i (analyzing the definition of a space object and why the MESI canisters are properly considered space objects).

[215] *Compromis* ¶ 10.

[216] *Additional Facts* ¶ 28.

[217] Zuris must have possessed an interest in the canisters themselves, because it possessed no interest in its contents by operation of the OST. *OST*, *supra* note 91, art. II ("Outer space, including the Moon and other celestial bodies, is not subject to national appropriation . . . ."). Although, under the Moon Treaty, samples collected by a state may remain at that state's disposal, that does not necessarily give the state a full property interest in the samples because the state must still consider making the samples available to other states. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, *opened for signature* Dec. 18, 1979, 1363 U.N.T.S. 3, art. 6 [hereinafter *Moon Treaty*].

[218] *See, e.g.*, Jeb Butler, *Unearthly Microbes and the Laws Designed to Resist Them*, 41 Ga. L. Rev. 1355, 1366 (2007) (noting that introducing life onto Mars could lead to "false positive" test results and taint future experiments); Molly K. Macauley, *Flying in the Face of Uncertainty: Human Risk in Space Activities*, 6 Chi. J. Int'l. L. 131, 143 (2005) (noting that preventing contamination in outer space is important in order to protect the integrity of samples collected from Mars).

[219] *OST*, *supra* note 91, art. IX; *Moon Treaty*, *supra* note 136, art. 7; COSPAR/IAU Workshop on Planetary Protection, COSPAR Planetary Protection Policy, at preamble, Oct. 20, 2002 [hereinafter *PPP*] (amended 2008). The contamination of outer space is commonly referred to as "forward contamination." Butler, *supra* note 137, at 1361.

[220] *OST*, *supra* note 91, art. IX.

[221] Mahulena Hoffman, *Is There any Legal Regime for the Protection of the Moon's Environment?*, 50 Proc. Coll. L. Outer Sp. 302 (2007); Comm. on Preventing the Forward Contamination of Mars, Nat'l Research Council, *Preventing the Forward Contamination of Mars* 13 (2006).

is harmful to the interests of other states in space exploration.[222]

The Moon Treaty more broadly requires state parties to prevent the "disruption of the existing balance of [the outer space] environment, whether by introducing adverse changes in that environment, by its harmful contamination through the introduction of extra-environmental matter or otherwise."[223]

2. Zuris Contaminated Mars.

Circumstantial evidence shows that Zuris contaminated Mars by introducing into its environment a terrestrial form of bacteria, which mutated upon being exposed to the outer space environment. Nova Freedonian officials discovered purple bacteria in the southern region of the ice deposit when Ares 1 landed on Mars,[224] although the previous study of the ice deposit revealed no signs of that bacteria.[225] Thereafter, Nova Freedonia discovered that Zuris's Deimos probe, which carried samples of blue bacteria similar to the purple bacteria discovered on Mars, crashed into the northern region of the ice deposit.[226] Therefore, this Court should infer[227] that Zuris introduced the bacteria onto Mars through the crash of the Deimos probe.[228]

The introduction and mutation of the blue halophilic bacteria contaminated the Martian environment. Contamination occurs when one object makes another "unfit for use by the introduction of unwholesome or undesirable elements."[229] The blue bacteria mutated, proceeded to reproduce across the Martian surface,[230] and the ice deposit is no longer useable due to the existence of the mutated bacteria.[231] There is also no known process for removing the bacteria.[232] Thus, Zuris contaminated the Martian environment by introducing a bacterial which made the ice deposit permanently unfit for use by the international space community.

For the foregoing reasons, this Court should hold that Zuris is responsible for the MESI experiment and violated international law by contaminating the environment of Mars.

II. ZURIS VIOLATED INTERNATIONAL LAW BY FAILING TO PREVENT THE CONTAMINATION OF THE ENVIRONMENT OF EARTH.

International law required Zuris to take measures to prevent its sample return mission from causing backward contamination.[233] Zuris failed to prevent the contamination of Earth when it did not comply with COSPAR policies or act with due care to ensure that the MESI canister would not adversely harm Earth's environment.

A. International Law Required Zuris to Prevent Earth's Contamination.

Article IX of the OST required Zuris to conduct its space activities "so as to avoid . . . adverse changes in the environment of Earth resulting from the introduction of extraterrestrial

[222] Darlene A. Cypser, *International Law and Policy of Extraterrestrial Planetary Protection*, 33 Jurimetrics J. 315, 324-25 (1993).
[223] *Moon Treaty*, *supra* note 136, art. 7.
[224] *Compromis* ¶ 18.
[225] *Additional Facts* ¶ 13.
[226] *Compromis* ¶ 19.
[227] This court has previously relied on circumstantial evidence in determining fact-based fault inquiries in circumstances where there is no way to uncover direct evidence. *See Corfu Channel* (U.K. v. Alb.), Judgment, 1949 I.C.J. 4 (Apr. 9).
[228] One of the vials from the MESI canister that returned to Earth contained purple bacteria similar to the purple bacteria found on Mars; however, before the vial was sent into space, the bacteria inside was blue. This Court should infer that the bacteria that landed on Mars mutated in the same manner as the bacteria that returned to Earth.
[229] Merriam-Webster, Inc., *Merriam-Webster's Dictionary* (2011).
[230] *Compromis* ¶ 16, 17.
[231] *Compromis* ¶ 18.
[232] *Id.*
[233] Backward contamination is defined as "the concept of microbes traveling from an extraterrestrial environment to Earth." Butler, *supra* note 137, at 1361.

matter and, where necessary, [to] adopt appropriate measures for [that] purpose."[234] This principle is echoed in Article 7 of the Moon Treaty, which required Zuris to "take measures to avoid harmfully affecting the environment of the Earth through the introduction of extraterrestrial matter or otherwise."[235] In other words, the OST and Moon Treaty are violated if a party fails to prevent contamination, not when contamination occurs; this Court should interpret these provisions as imposing conduct-based liability, as opposed to results-based liability.

The OST's and Moon Treaty's general preventative clauses do not clearly specify the types of preventative measures a state must undertake before embarking on a space mission.[236] However, this Court should consider the guidelines of the Planetary Protection Policy ("PPP") promulgated by COSPAR as evidence of the "appropriate measures" a state must utilize when conducting a sample return mission to Mars.[237]

More generally, customary international law requires states to act with a heightened duty of care when dealing with *res communis*[238] property, which applies to outer space because the OST treats space as *res communis* property.[239] For example, this Court has previously held that a state is "obliged to use all the means at its disposal" to avoid "causing significant damage to the environment of another state."[240] Furthermore, customary international law recognizes the importance of adhering to the Precautionary Principle (the "Principle") when undertaking an action that could affect Earth's environment or natural resources.[241] Under the Principle, a state undertaking a potentially environmentally dangerous activity must act with a heightened duty of care and must prove, through scientific data or otherwise, that its actions pose only a minimal chance of harm.[242] If an actor cannot

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[234] *OST*, *supra* note 91, art. IX.

[235] *Moon Treaty*, *supra* note 136, art. 7. Additionally, customary international law required Zuris to conduct its space activities in a manner that would not harm the environment of other States or of areas beyond the limits of national jurisdiction. *Corfu Channel* (U.K. v. Alb.), Judgment, 1949 I.C.J. 4 (Apr. 9)

[236] *See* Butler, *supra* note 137, at 1375-79.

[237] The PPP was drafted by representatives from the USA, Australia, France, Japan, Russia, Germany, Canada, and The Netherlands. Report of the COSPAR/IAU Workshop on Planetary Protection, at appendix F-1 (Apr. 2-4, 2002). Additionally, some states have adopted their own procedures similar to the PPP. *See, e.g.*, NASA Policy Directive: Biological Contamination Control for Outbound and Inbound Planetary Spacecraft, NBD 8020.7G (1999), *available at* http://nodis3.gsfc.nasa.gov (United States); ESA Planetary Protection Requirements, ESSB-ST-PP-001 (2010) *available at* ftp://ftp.rssd.esa.int (Europe). Therefore, a majority of the most well-known spacefaring nations follow procedures similar, if not identical to, the PPP. Moreover, international law considers technological advances in evaluating what are appropriate measures in preventing transboundary contamination, *Trail Smelter Arbitration* (U.S. v. Can.), 3 R. Int'l Arb. Awards 1911, 1965 (U.S.-Can. Arb. Trib. 1941), and the PPP incorporates current feasible technology used in previous Mars missions. *PPP*, *supra* note 138, at 1, A-3.

[238] *Res communis* property is defined as "[t]hings common to all; things that cannot be owned or appropriated, such as light, air, and the sea." *Black's Law Dictionary* (9th ed. 2009).

[239] *See, e.g.*, Bernard K. Schafer, *Solid, Hazardous, & Radioactive Wastes in Outer Space: Present Controls & Suggested Changes*, 19 Cal. W. Int'l L.J. 1, 11-12 (1988) (arguing that the OST classifies outer space as *res communis* property by its use of the language "the common heritage of mankind").

[240] *Pulp Mills on the River Uruguay* (Arg. v. Uru.), Judgment, 2010 I.C.J. 1, 38 (Apr. 20).

[241] Indur M. Goklany, *The Precautionary Principle: A Critical Appraisal of Environmental Risk Assessment* 2-4 (2001).

[242] *See id.*; *see also* Wingspread Conference on the Precautionary Principle, January 23-25, 1998, *The Wingspread Consensus Statement on the Precautionary Principle*, http://www.sehn.org/wing.html (defining the precautionary principle); Comm'n of the European Communities, *Communication from*

rebut the presumption that the action will result in harm, the Principle may prohibit the action entirely.[243] This Court should hold the Principle applicable to Zuris's mission because space activities are inherently dangerous,[244] the space environment is *res communis* property, and Zuris's mission was seen as complicated and far-reaching.[245]

B. Zuris Failed to Take Appropriate Measures to Prevent Earth's Contamination.

The PPP provides specific procedures that state members of COSPAR should follow before entering outer space, which vary based on the type of mission contemplated.[246] For example, a lander mission that is intended to travel to Mars and back is categorized as a "Restricted Earth Return Category V" mission.[247] Before undertaking such missions, states must sanitize their space objects to meet certain bacteria threshold levels[248] in order to safeguard against both Earth's bacteria being altered in the Martian environment and then returned back to Earth, and Martian bacteria being transferred to Earth.[249]

Although the PPP requires states to comply with pre- and post-launch regulations to prevent the contamination of Earth, Zuris failed or refused to implement such regulations. Specifically, prior to the launch, Zuris was required to sterilize the exterior of the probe, including the MESI canisters,[250] to a level of less than thirty spores, and ensure that they could not have been re-contaminated.[251] Additionally, the PPP requires that samples be secured within fail-safe containers.[252] The facts show that the vials and canisters were sealed at MESI facilities,[253] and that the canisters were not opened until they returned to Earth. Yet, upon return, it was discovered that the inside of the canister had been exposed to the Martian environment.[254] Zuris cannot reasonably argue that the canisters were properly sealed because there is no other way that the outer space environment was able to penetrate the closed canister.

Following the launch, Zuris was required to: review and re-approve the mission prior to re-entering Earth; verify that the sample return canister had a fail-safe method of containing the bacteria; ensure that there was a way to "break the chain of contact" with Mars; and prevent any uncontained hardware that contacted Mars from coming back to Earth.[255] Zuris has not shown that it followed any of these procedures. Because the bacteria were uncontained within the canister, exposed to Mars and returned to Earth while under Zuris's control, this Court

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the Comm'n on the Precautionary Principle, at 3-4, COM (2000) 1 final (Feb. 2, 2000) (discussing when the precautionary principle applies); United Nations Conference on Environment and Development, Rio de Janeiro, Braz., June 3-14, 1992, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I), Princ. 15 (Aug. 12, 1992) [hereinafter *Rio*] (requiring the precautionary approach to be applied in order to protect the environment).

[243] Paul B. Larsen, *Application of the Precautionary Principle to the Moon*, 71 J. Air L. & Com. 295, 303-05 (2006).

[244] *Id.* (arguing that the precautionary principle should be officially recognized as applicable to the Moon).

[245] *Compromis* ¶ 7.

[246] *PPP*, *supra* note 138, Table 1; *see also* Butler, *supra* note 137, at 1359-60 ("[The PPP] provides detailed anti-contamination measures calibrated to the nature and destination of every space mission.)

[247] *Id.*, at A-1.

[248] *Id.* Table 1.

[249] *Id.* at policy.

[250] The canisters were located on the exterior of the probe. *Additional Facts* ¶ 53.

[251] *Id.* at A-2.

[252] *Id.*

[253] *Compromis* ¶ 13, 14.

[254] *Additional Facts* ¶ 23.

[255] *PPP*, *supra* note 138, at A-3. The National Research Council has proposed that if there is no way to ensure that an object is in a fail-safe container or sterilized, that object should not be brought back to Earth. National Research Council, *Mars Sample Return: Issues and Recommendations* 20 (1997).

should infer that Zuris did not follow COSPAR pre- or post-launch procedures.[256]

Even if Zuris cannot be held *per se* liable for failing to follow COSPAR procedures, this Court should still find Zuris liable for not otherwise acting with due care. MESI was under Zuris's jurisdiction and control, so Zuris could and should have monitored the preparation of the canisters to ensure they were properly constructed and sealed by MESI officials, or by confirming such through its own Space Ministry. The sheer fact that Zuris sent into space a faulty canister which contaminated Earth upon return suggests that Zuris was negligent, and did not act with due care in order to prevent Earth's contamination.[257] Because the OST imposes absolute liability upon a state to undertake anticontamination measures,[258] this Court should place the burden on Zuris to prove that it acted with the duty of care appropriate for *res communis* property, specifically that it used all means at its disposal to prevent Earth's contamination.

III. ZURIS VIOLATED INTERNATIONAL LAW BY INTERFERING WITH THE ACTIVITIES OF OTHER STATES IN THE EXPLORATION AND USE OF MARS.

The various treaties governing activities in outer space, principles adopted by the UN, and international law governing international resources show principles of cooperation and commonality. Zuris either failed or refused to follow such principles.

A. International Law Requires Cooperation and Commonality in Space Exploration.

Each UN treaty governing space activities recognizes in its preamble "the common interest in all mankind in . . . the exploration and use of outer space."[259] This principle is further elaborated within each treaty. The OST contemplates that the exploration of outer space should be carried out for the benefit of all mankind, and that parties to the OST should both encourage and facilitate international cooperation in scientific investigation of outer space.[260] The OST further states that its parties must study and explore outer space with due regard for other states' interests in outer space, and that they must be guided by "the principle of cooperation and mutual assistance."[261] The Registration Convention advances the principle of international cooperation by requiring that parties record all outer space missions in an international registry, and collaborate when an unregistered or unknown space object could pose a threat to the general public.[262] The Moon Treaty reminds its parties that space exploration must be carried out in a manner that promotes international cooperation in and mutual understanding of outer space, and that the exploration and use of celestial bodies "shall be the province of all mankind and shall be carried out for the benefit and in the interest of all countries," and that "[d]ue regard shall be paid to the interests of present and future generations."[263] Lastly, the UN Declaration of Legal Principles Governing Activities of States in the Exploration and Use of Outer Space mirrors the provisions above, with the hope that

[256] This Court has previously held that circumstantial evidence is appropriate when determining fact-based fault if and when the opposing party has access to the evidence and the moving party does not. *See Corfu Channel* (U.K. v. Alb.), Judgment, 1949 I.C.J. 4 (Apr. 9).

[257] This court should follow the doctrine of *res ipsa loquitor*, that a breach of a duty can be implied based off of the nature of the resulting harm.

[258] The OST clearly indicates that states "shall" conduct their space activities in a way that avoids contamination. *OST*, *supra* note 91, art. IX.

[259] *OST*, *supra* note 91, at preamble; *Liability Convention*, *supra* note 125, at preamble; *Registration Convention*, *supra* note 127, at preamble; *see Moon Treaty*, *supra* note 136, at preamble.

[260] *OST*, *supra* note 91, art. I.

[261] *Id.* art. IX.

[262] *Registration Convention*, *supra* note 127, arts. II, VI.

[263] *Moon Treaty*, *supra* note 136, arts. 2, 4.

every state will be guided by these principles while exploring and using outer space.[264]

International law governing other *res communis* property also recognizes the principle of commonality.[265] The Stockholm Declaration of 1972 states that Earth's natural resources must be protected for present and future generations,[266] and requires that states "take all possible steps" to prevent pollution of international waters that would interfere with its legitimate use.[267] The Declaration also imposes responsibility upon states to ensure that their activities "do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction."[268] Although the Declaration is not expressly applicable to outer space, it is an example of international customary law governing the treatment of *res communis* property: internationally owned property must not be used in a self-serving manner, or in a way that may diminish the value of the property; it must, instead, be used for the benefit of all.

B. Zuris Violated International Law by Interfering with Other States' Ability to Use and Explore Mars.

Zuris manned a self-serving mission to Mars. By contaminating Mars, Zuris negatively impacted the planet's potential future use to the international space community.

1. Zuris Acted, Before and During the Mission, Without Due Regard for the International Space Community.

Zuris did not comply with the principles of cooperation and commonality while conducting its sample return mission. Zuris prepared for the mission without fully appreciating the potentially harmful consequences to other states, instead focusing on its own self-interested goals. Notwithstanding the fact that three out of its last five missions to Mars ended in crash failures,[269] Zuris insisted on conducting another mission.[270] Although Zuris solicited third parties to construct the materials used in the mission,[271] it did not ensure that those parties would properly construct the materials,[272] notwithstanding the fact that MESI does not have its own scientific expertise,[273] which heightened the risk that the canisters would not be adequately constructed.

Even after the mission failed, Zuris took no action to protect the interests of other states. Zuris did not notify the international community that it lost communication with the Deimos probe.[274] Also, the record does not show that Zuris took any action to find the missing probe. Months after the crash, around the time of the Ares 1 landing, satellite images of the Deimos probe debris on Mars were taken coincidently by

[264] Declaration of Legal Principles Governing Activities of States in the Exploration and Use of Outer Space, U.N. Doc. A/RES/1963(XVIII) (Dec. 13, 1963).

[265] *See generally* Jayson Haile, *The New Age of Conquest and Colonialism: How Admiralty Will Be Used on the Final Frontier*, 29 Tul. Mar. L.J. 353 (2005) (comparing the similarities between space and the sea, and arguing that principles of maritime law be applied to ambiguities in construing current space law); Elizabeth A. Pucciarelli, *The Case for a Federal Common Law of Space*, 33 N.Y.L. Sch. L. Rev. 509 (1988) (same).

[266] United Nations Conference on the Human Environment, Stockholm, Swed., June 5-16, 1972, *Stockholm Declaration on Environment and Development*, princ. 2, U.N. Doc. A/CONF.48.14/Rev1 (June 16, 1972).

[267] *Id.* at princ. 7.

[268] *Id.* at princ. 21. This principle was also recognized in *Trail Smelter*. *Trail Smelter Arbitration* (U.S. v. Can.), 3 R. Int'l Arb. Awards 1911, 1965 (U.S.-Can. Arb. Trib. 1941).

[269] *Compromis* ¶ 2.

[270] Although the space community urged Zuris to seek assistance from more experienced countries, it was only after the international community approached Nova Freedonia that the countries began negotiations. *Id.* ¶¶ 8, 9.

[271] *Id.* ¶ 11.

[272] There is no evidence to show that Zuris adequately monitored MESI or Dor-Godol at any stage during the process of the mission.

[273] *Additional Facts* ¶ 3.

[274] *Compromis* ¶ 16.

Indian and Brazilian satellites.[275] These images arguably could have been taken earlier had Zuris notified the international community that the probe went missing, because the community may have actively searched for its remnants. Zuris's lack of responsibility and oversight came after the public had already criticized Zuris for embarking on such a complicated mission, considering its inexperience and lack of expertise in space activities.[276] Although a state should exercise extraordinary care in such complex missions and in the face of such scrutiny, Zuris exercised none.

2. Zuris's Mission Diminished the International Community's Ability to Use and Explore Mars.

Even if this Court does not impute a self-motivated attitude onto Zuris, it should still find that Zuris caused the exact result international principles attempt to avoid: Zuris contaminated another planet and destroyed another state's space mission. Zuris's space objects failed, crashed, and contaminated the Martian environment. Zuris did not notify the international community of its rogue probe, and another state's space object unwittingly landed in a contaminated area. At the very least, Zuris's mission stripped the international community of its shared right to explore the Martian ice deposit, and caused the destruction of Ares 1.

It is also important to note the consequences that could have, or still may, occur. There is no known process for removing the purple bacteria from the ice deposit,[277] and it is unknown how far the bacteria may have spread. Thus, the contamination may span the entire Martian environment, not just the ice deposit. Additionally, Zuris has yet to confirm that the entire probe crashed on Mars, so potentially parts of the probe may have become space debris and may endanger other space objects.[278] Therefore, Zuris's mission has already harmed, and may continue harming, the international community's interest in exploring Mars.

IV. ZURIS IS LIABLE UNDER INTERNATIONAL LAW FOR THE COST OF THE CANCELLED ARES MISSION AND THE COST TO CONTAIN AND FUMIGATE THE PURPLE HALOPHILIC BACTERIA.

A. Zuris is Responsible for the Cost of the Canceled Ares 1 Mission.

Zuris is liable to Nova Freedonia under the Liability Convention and customary international law for the cost of the canceled Ares 1 mission, because the canceled mission was a result of Zuris's breach of international law.

1. Zuris is Liable Under Article III of the Liability Convention.

The Liability Convention imposes fault liability on a launching state[279] if, while in space, it causes damage to another state's space object.[280] The record shows that the Ares 1 lander was damaged by Zuris's space object while it was on the surface of Mars,[281] so the damage properly falls under the terms of Article III as damage caused in outer space.

Additionally, the MESI canister is properly considered a "space object." The Liability

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[275] *Id.* ¶¶ 16, 19, *Additional Facts* ¶ 50.
[276] Id. ¶ 7.
[277] *Compromis* ¶ 18.
[278] *See, e.g.*, Kelly A. Gable, *Rules Regarding Space Debris: Preventing a Tragedy of the Commons*, 50 Proc. Coll. L. Outer Space 257 (2007) (noting the problem with space debris and the danger it presents).
[279] As discussed *supra* Part I.b.iii, Zuris is the launching state for this mission.
[280] *Liability Convention*, *supra* note 125, arts. I, III. Although a portion of the Liability Convention imposes absolute liability on a launching state, it is inapplicable to this claim. *Id*; *see generally* Ricky J. Lee, *Reconciling International Space Law with the Commercial Realities of the Twenty-First Century*, 4 Sing. J. Int'l & Comp. L. 194, 221 (2000) (noting that international law generally measures liability on a fault-basis for breaches of international obligations that have a harmful effect on other states).
[281] *Compromis* ¶ 18.

Convention defines a "space object" as including the component parts of a space object.[282] Although the convention does not define "component parts," it is largely interpreted to mean the "payload," which includes all parts within or on a space object intended to be launched into space,[283] even if these parts are detachable.[284] It has been suggested that a "component part" does not necessarily include the payload, but only those parts integral to the operation of the space object.[285] This Court should not apply this interpretation because, under the Liability Convention, a state's liability to compensate another is governed by the principles of law and equity.[286] To interpret "component parts" in such a limited manner would preclude from the definition most parts carried on or within a space object. This is an inequitable result, as a certain space object and all of its parts were fully intended to be brought into space. For this reason, this Court should interpret component parts as including the payload and any objects that are purposely sent into outer space.

Under this more broad and equitable definition, the MESI canisters constitute component parts of a space object under the Liability Convention, because Zuris intended the MESI canisters to be launched into space, they were attached to the Dor-Godol rocket, and they were exposed to the space environment throughout the mission.[287]

2. Zuris Failed to Act with Due Care, Which Caused the Destruction of the Ares 1 Probe.

Fault liability is imposed upon a party that fails to exercise the reasonable degree of care that is due under the circumstances, depending on the nature of the foreseeable harm.[288] Zuris breached its obligation to act with due care by following neither COSPAR regulations nor standards of reasonableness given the situation.

As discussed *supra*,[289] Zuris failed or refused to comply with COSPAR regulations. Even assuming that the crash of the Deimos probe could not have been prevented, COSPAR required Zuris to send a fail-safe container into outer space. The MESI canister was clearly not fail-safe because the container did not remain structurally sound when the lander system failed and crashed.[290] Alternatively, Zuris acted irresponsibly by failing to send a well-constructed probe into space. Instead, Zuris sent a probe into outer space that suffered from electrical problems. Zuris should have considered the very real possibility that the probe may be defective or crash, and ensured that the MESI canister would withstand such an incident.

Because Zuris failed to send a fully-functioning canister into space, the blue bacteria escaped the canister, mutated, and replicated along the Martian surface. Due to the replication of the purple bacteria overwhelming Nova Freedonia's facility on Earth,[291] it should be inferred that the bacteria acted the same on Mars. Whether Zuris's duty of care is measured by COSPAR standards or standard principles of reasonableness, Zuris breached its international obligations by contaminating Mars and causing the destruction of Ares 1.

3. The Harm to Nova Freedonia is Compensable.

[282] *Liability Convention*, *supra* note 125, art. I.
[283] N. Matte, *Aerospace Law* 157 (1977); Carl Q. Christol, *International Liability for Damage Caused by Space Objects*, 74 Am. J. Int'l L. 346, 356-57 (1980).
[284] Christol, *supra* note 202, at 357.
[285] *See id.* at 356-57; *see* W. F. Foster, *The Convention for International Liability for Damage Caused by Space Objects*, 10 Can. Y.B. Int'l L. 137 (1972).
[286] *Liability Convention*, *supra* note 125, at art. XII.
[287] *Additional Facts* ¶ 53.
[288] *See, e.g.*, L. F. E. Goldie, *Liability for Damage and the Progressive Dev. of Int'l Law*, 14 Int'l & Comp. L. Q. 1189, 1196-97 (1965).
[289] Part II.b.
[290] That the container was not fail-safe assumes, *arguendo*, that the container was not porous, even though the MESI canister which returned to Earth was porous. *Compromis* ¶ 20.
[291] *Compromis* ¶ 21.

The Liability Convention provides that a claimant may recover for property damage.[292] Clearly, the destruction of Nova Freedonia's property, Ares 1, falls within this definition. Equity requires that Nova Freedonia be fully compensated for this injury, because compensation will return Nova Freedonia to its *status quo ante* after being irreparably injured by Zuris's detrimental interference with its Ares 1 mission.

B. Zuris is Responsible for the Cost to Contain and Fumigate the Purple Bacteria.

Zuris is also responsible for the costs associated with containing and fumigating the purple bacteria because the containment and fumigation constituted damage to Earth under Article II of the Liability Convention. Additionally, the containment and fumigation was proximately caused by Zuris's breach of international law.

1. Zuris is Liable Under the Liability Convention.

The Liability Convention imposes absolute liability on a launching state that causes damage on the surface of Earth.[293] Because the MESI canister is properly considered a space object,[294] Zuris is absolutely liable for the damage to Nova Freedonia's facility, and all costs resulting there from.

The MESI canister is not only properly considered a space object for the damage it caused on Mars, but also for the damage it caused on Earth. It is recognized that a space object has a temporal nature – an object launched into space is no longer considered a space object after it has been back on Earth for a certain amount of time.[295] The central issue in deciding whether a space object is still a "space object" is whether that object is still performing the functions it was intended to perform in space.[296] The MESI canister caused damage to the surface of Earth upon its return, while it was still performing its intended function of containing the bacteria. Because of this, the MESI canister should be considered a space object while it was in Nova Freedonia's return facility. For the above reasons, Zuris is subject to Article II of the Liability Convention, and is therefore absolutely liable for all damage the canister caused.

2. Zuris was the Proximate Cause of the Containment and Fumigation of the Facility.

The breach in this case initially occurred when Zuris failed to take appropriate pre- and post-launch contamination prevention measures. But for the canisters leaking, no Martian environment would have entered the canisters, and the bacteria inside would not have mutated and contaminated the return facility. This breach first caused Nova Freedonia's sample return facility to be contaminated with bacteria that was in the process of overwhelming its infrastructure, and that threatened to escape into the Earth's environment and suffocate any plant life it encountered.[297] Zuris's breach also caused the fumigation of the sample return facility.

Nova Freedonia fumigated the sample return facility to mitigate the damage to its facility and to prevent future harm to Earth. Under customary principles of international law, reasonable mitigation efforts do not cut off a tortfeasor's initial liability.[298] Nova Freedonia's

[292] *Liability Convention*, *supra* note 125, art. I.
[293] *Id.* at art. II.
[294] *See* discussion *supra* Part IV.a.i.
[295] Bin Cheng, *Studies in International Space Law* 300-06 (1998).
[296] *Id.*

[297] *Compromis* ¶¶ 20, 21.
[298] This Court, for example, has previously held that a plaintiff has a duty to mitigate its damages, or it may not be compensated for all of the resulting harm. *Gabcikovo-Nagymaros Project* (Hung. v. Slovk.), Judgment, 1997 I.C.J. 7, 51 (Sept. 25). This principle is also recognized by American law and the European Group on Tort Law, in that a plaintiff may recover for damage it assumes while attempting to reduce the harm or prevent the harm posed by a tortfeasor. *See, e.g.*, European Group on Tort Law, *Principles of European Tort Law*, art 2:104 ("Expenses incurred to prevent threatened damage amount to recoverable damage in so far as reasonably incurred.").

fumigation was reasonable under the circumstances. Although scientists from Nova Freedonia estimated that the bacteria would escape potentially within three months, the fact remains that the scientists were confronted with a completely unknown form of bacteria. The molecular structure of the purple bacteria is markedly different from that of the blue bacteria. First, the blue bacteria were halophilic in nature, such that they would have thrived in environments of high salinity.[299] The purple bacteria, however, are halophobic in nature, as they are weakened and neutralized[300] in saline environments. Additionally, the bacteria's reproduction characteristics changed. The blue bacteria were dormant, and had been for thousands of years,[301] whereas the purple bacteria replicated at a rapid rate and was parasitic in nature.[302] Nova Freedonia's scientists were confronted with an unknown, mutated, unstable parasitic bacterial; to neutralize it with table salt was undoubtedly entirely reasonable.

Also, Nova Freedonia had to neutralize the bacteria to protect the entire planet. Because the purple bacterial was extraterrestrial,[303] there were necessarily no life forms on Earth which would have been exposed to it or had any sort of immunity to it. Because the bacteria would have had no natural predator in Earth's environment, it could have run rampant on Earth's plant life. Nova Freedonia's actions not only mitigated its own damages, but also protected against bacteria escaping into the Earth's atmosphere and endangering public welfare and health. Due to the nature of the harm the bacteria posed, Nova Freedonia's actions were reasonable, and did not cut off Zuris's liability under Article II of the Liability Convention.

3. The Harm to Nova Freedonia is Compensable.

The direct and indirect harm resulting from the contamination in this case is compensable because harm caused by contamination is property damage recoverable under the Liability Convention.[304] Thus, Zuris is liable for the damage to the sample return facility that resulted from the contamination.

The Liability Convention does not limit a claimant to direct damages.[305] Additionally, Article VII of the OST holds a state "internationally liable for damage to another State Party to the Treaty" without limiting damages to property damage. Therefore, Zuris is also liable for the costs and effects of the fumigation within the facility because the fumigation was a result of Zuris's negligence. Zuris can only return Nova Freedonia to its *status quo ante* by compensating it for the costs associated with neutralizing the bacteria. The Liability Convention is victim-oriented, and must be guided by principles of equity. It would be inequitable to require Nova Freedonia to bear the costs of the fumigation, and would also incentivize victims of tortfeasors to actually refrain from mitigating damages and allow their damages to get worse and more costly for the tortfeasor.[306] Any other interpretation of the Liability Convention would be counterintuitive

[299] Halophile is defined as "an organism that flourishes in a salty environment." Merriam-Webster, Inc., *Merriam-Webster's Dictionary* (2007).

[300] *Compromis* ¶ 21.

[301] *Id.* ¶ 13.

[302] *Id.* ¶ 21.

[303] Extraterrestrial matter is defined as anything "originating, existing, or occurring outside the earth or its atmosphere." Merriam-Webster, Inc., *Merriam-Webster's Dictionary* (2011). The purple bacteria should be considered extraterrestrial. The mutation originated and occurred outside Earth. The mutation transformed the molecular structure of the bacteria so materially that a completely new form of bacteria generated outside of the Earth's atmosphere.

[304] *Foster*, *supra* note 204, at 155 (noting that damage occurs when contamination emanates from a space object); *Christol*, *supra* note 202, at 359 (1980) (noting that recovery is allowed for harm produced by contamination).

[305] *Christol*, *supra* note 202, at 360-62.

[306] As recognized by this court in *Gabcikovo-Nagymaros*, the failure of a party to mitigate damages may bar it from recovery. *Gabcikovo-Nagymaros Project* (Hung. v. Slovk.), Judgment, 1997 I.C.J. 7, 51 (Sept. 25).

to the victim orientation of the Liability Convention.

For the foregoing reasons, this Court should find that Zuris caused, and is liable for, the containment and fumigation of the purple extraterrestrial bacteria.

SUBMISSIONS TO THE COURT

For the foregoing reasons, the Government of the Commonwealth of Nova Freedonia, Respondent, respectfully requests this Court to adjudge and declare that:

I. Zuris is responsible under international law for the MESI experiment and Zuris contravened international law by contaminating the environment of Mars;
II. Zuris violated international law by failing to prevent the contamination of the environment of Earth;
III. Zuris violated international law by interfering with the activities of other states in the exploration and use of Mars; and that
IV. Zuris is liable under international law for the cost of the cancelled Ares mission and the cost to contain and fumigate the purple halophilic bacteria.

Report prepared by:
Dr. Martha Mejía-Kaiser
Co-Chair
Manfred Lachs Space Law Moot Court Committee
IISL