When the Nature and Duration of Space Becomes Appropriation: "Use" as a Legal Predicate for a State's Objection to Active Debris Removal

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Abstract

One of the primary legal obstacles to removal of orbital debris is Outer Space Treaty Article VIII, under which the state of registry retains jurisdiction and control over a space object while in space. The prevailing legal opinion is that, without consent from the owner, a nonfunctioning space object cannot be interfered with regardless of its functional status and regardless of the danger it poses. This paper will explore the possibilities of an alternative argument based on "non-use", which permits the current treaty provisions to be given full effect and elucidate successful examples of "use" as a limiting criterion for appropriation. The paper will conclude with the proposition that these requirements are predicates to any legal right of the owner to object to removal of a dangerous and non-functioning space object and may be used to pave the way to ADR without the need to amend the Outer Space Treaty or adopt a new treaty, protocol, resolution or code of conduct.

Introduction

Before passage of the Outer Space Treaty we were cautioned in the popular press, legal journals and *Life Magazine* that, "[b]efore long it will become mandatory for states to remove from orbit unmanned space vehicles and debris that pose a hazard to spacecraft navigation."[1] Nearly half a century later, space law is viewed as a restraint on commercial and governmental enterprise to remove debris.[2]

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1 Hall, R.C., *Comments on Salvage and Removal of Man-Made Objects from Outer Space*, Proc. 9th Colloquium on the Law of Outer Space 117 (1966).

2 *See,* e.g., Dunstan, J.E. and Werb, B., *Legal and Economics Implications of Orbital Debris Removal: Comments of the Space Frontier Foundation in Response*

Readers of this paper will already comprehend the extent of debris encumbering Lower Earth Orbit (LEO)[3] and the continuing practice of launching spacecraft that do not comply with debris mitigation guidelines.[4] But even assuming adherence to the guidelines, active debris removal (ADR) would still be necessary.[5] Many programs are being investigated but none is mature enough to be launched or has even won a consensus among IADC members.[6]

When discussing the necessity of ADR, there are generally two schools of thought. The one most widely discussed argues that the space environment has reached a "tipping point" in which the population of debris objects has reached a threshold where they will continually collide, creating a cascade of collisions

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to DARPA Orbital Debris Removal (ODR) Request for Information for Tactical Technology Office (TTO), Defense Advanced Research Projects Agency (DARPA), October 30, 2009, available at <www.scribd.com/doc/23379988/Legal-and-Economics-Implications-of-Orbital-Debris-Removal>. All online citations for this paper were accessed as of 2 September 2013, unless otherwise specified.

3 There are over 29,000 objects larger than 10 centimeters in lower earth orbit that pose collision risks. Heiner Klinkrad, ESA Space Debris Office, believes there is a consensus that the present debris-environment is at the rim of becoming unstable within a few decades and that only active removal of 5-10 large objects per year can reverse debris growth. Amos, J., "*'Urgent Need' To Remove Space Debris*," BBC News, 25 April 2013 access at <www.bbc.co.uk/news/science-environment-22299403>.

4 Satellite owners are loath to use the fuel required to assure a controlled re-entry within 25 years, which could otherwise generate revenue. *See*, Peter B. de Selding, "*Orbital Debris Experts Call for Space Junk Removal Missions*," Space News, Apr. 26, 2013, referencing comments of Luisa Innocenti, head of ESA's Clean-space program, and Christophe Bonnal (French Space Agency, CNES), accessed at <www.spacenews.com/article/civil-space/35073orbital-debris-experts-call-for-space-junk-removal-missions>.

5 *See,* Report of Inter-Agency Space Debris Committee (IADC) Study, "*Stability of the Future LEO Environment*," presented at the 50th Session, Scientific and Technical Sub-Committee to the COPUOS, access at <www.unoosa.org/pdf/pres/stsc2013/tech-12E.pdf>, which summarizes the models developed by each of six IADC members, ASI, ESA, ISRO, JAXA, NASA and UKSA.

6 Removing large objects from orbit is difficult because they may have antennas, solar arrays or other projections and may be tumbling or spinning, making them difficult to control. The IAF held a symposium on Active Debris Removal on the opening day of the Scientific and Technical Subcommittee of COPUOS in February 2013 to inform it of concepts being considered for ADR. Presentations on methodologies (including lasers, robotics, space sails, solar concentrators, electrodynamic tethers, drag augmentation devices, orbital transfer vehicles and others) by representatives from the US, France, Japan, Germany, Russia and ESA can be accessed at <www.oosa.unvienna.org/oosa/en/COPUOS/stsc/2013/iafsymposium.html>.

that will make LEO unusable in mere decades.[7] This view argues that it is necessary to remove at least five large objects in LEO each year.[8]
Another school of thought, less widely published, acknowledges that space debris is a serious issue and debris mitigation is necessary, but that models used to predict catastrophe describe events well when changes are small relative to some scale of the physical problem but questionable when extrapolated to a large population over many years.[9] This view suggests that a new equilibrium will be established at higher concentrations, not runaway exponentiation.
This paper does not endorse either view but instead proceeds from an assumption that at some point in time – due to accumulated danger in the distant future or a specific threat in the near future – ADR will be necessary and the legal authority to utilize the technology must be established.

Overview of Legal Issues

ADR usually employs dual use technologies with legal and political concerns about their potential of antagonistic use for intelligence gathering, surveillance, reconnaissance and anti-satellite tests.[10] Legal concerns pertaining to export

7 *See*, IADC Study, *supra* note 5. *See also*, National Research Council Committee for the Assessment of NASA's Orbital Debris Programs Summary Report, *Limiting Future Collision Risk to Spacecraft: An Assessment of NASA's Meteoroid and Orbital Debris Programs* (2011) (NRC Report) at 5 (available at <www.nap.edu/catalog.php?record_id=13244>) and Report of the International Interdisciplinary Congress on Space Debris Remediation and On-Orbit Satellite Servicing, *Active Debris Removal – An Essential Mechanism for Ensuring the Safety and Sustainability of Outer Space*, presented to the UNCOPUOS Scientific and Technical Subcommittee, Forty-ninth session, A/AC.105/C.1/2012/CRP.16 (Jakhu, R., Ed., 2012) (Third International Interdisciplinary Space Debris Congress Report) at 16 and 20. *See,* also Kallender-Umezu, P., *A Market for Cleaning Up Space Junk?*, G-SEC Working Paper No.30, (2012), access at <https://www1.gsec.keio.ac.jp/imgdata/working/32_pdf.pdf> (G-SEC Paper), at 10-12.

8 *See,* European Space Agency, *Key Findings from the 5th European Conference on Space Debris* (2009), <www.esa.int/esaCP/SEMKO5EHITFindex.html>; Liou, J.C. & Johnson, N.L., *Risks in Space from Orbiting Debris*, 311 Science, 340 (2006); Imburgia, J.S., *Space Debris and Its Threat to National Security: A Proposal for a Binding International Agreement to Clean up the Junk*, 44 Vand. J. Transnat'l L. 589-642 (2011); Klinkrad, H., Johnson N., *Space Debris Environment Remediation Concepts*, NASA- DARPA International Conference on Orbital Debris Removal (2009); Third International Interdisciplinary Space Debris Congress Report, *supra* note 7, at 21.

9 *See, e.g.,* D. Finkleman, *Space Debris as an Epidemic, Complexity and Dynamical Systems in the Debris Problem*, Paper No. AAS 13-842, presented at the 2013 Astrodynamics Specialist Conference hosted American Astronautical Society and American Institute of Aeronautics and Astronautics.

10 *See,* Third International Interdisciplinary Space Debris Congress Report, *supra* note 7, at 37-38.

control regulations,[11] intellectual property,[12] registration[13] and salvage rights[14] are also relevant.[15] This paper does not address those issues; rather, it seeks to obviate a fundamental obstacle for nonconsensual removal of another state's object from space[16] (keeping in mind that, whether or not the state consents, it continues to be liable for any damage caused by the object.[17])

Although ADR technologies have wide application on a "for hire" (consensual) basis, this paper addresses the legal issues that arise when *nonconsensual* use of the technology to remove debris from orbit becomes necessary for the safety of all. The focus here is on those states that refuse to consent to removal of a dangerous object and also refuse to do anything about it.

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11 *See,* overview discussion of the legal issues in Listner, M., *The Legal and Political Issues of Space Debris Removal*, OnOrbitWatch, available at <www.onorbitwatch.com/feature/legal-and-political-issues-space-debris-removal>.

12 *See, e.g.*, Listner, M., *A Primer on the Legal Issues Surrounding Space Debris Remediation, Part 1*, Space Safety Magazine (July 6, 2012), accessed at <www.spacesafetymagazine.com/2012/07/06/primer-legal-issues-surrounding-space-debris-remediation-part1/>.

13 "[W]hile the UN OOSA website claims that approximately 93.5% of all functional space objects have been registered with the Secretary-General, it has also been noted that about 56% of all registered space objects are non-functional. Rather than representing a hopeful trend among states to register their debris, this figure is really testament to the poor track record of registering states to voluntarily update the transmitted information on functional space objects. De Man, P., *The Threat of Space Debris to the Further Exploration of Outer Space: An ITU Solution*? GLEX-2012,13,2,6,x12308 (2012) at 3-4.

14 Salvage law relies on abandonment. Admiralty and international law hold that "a sovereign vessel that appears to have been abandoned remains the property of the nation to which it belonged at the time of sinking unless that nation has taken formal action to abandon it or to transfer title to another party." *Sea Hunt, Inc. v. Unidentified Shipwrecked Vessel*, 221 F.3d 634, 643 (4th Cir. 2000). An entity that wants to salvage space debris must get permission to do so. *See,* Jasentuliyana, N., *Regulation of Space Salvage Operations: Possibilities for the Future*, 22 J. Space L. 5, 18 (1994).

15 *See also*, G-SEC Paper, *supra* note 7, at 8 and Jasentuliyana, supra note 14, at 9-16.

16 This paper is an elaboration of an argument presented by the author at the 63rd International Astronautical Congress in Naples, in the Joint IAF/IISL Session on Legal Framework for Cooperative Space Endeavors, Italy 2012, Force, M.K., "*Interpretation of Space Law to Enable Active Debris Removal*," published in the 55th IISL Colloquium on the Law of Outer Space at p. 727 (2012).

17 Even "by renouncing rights of ownership the state is not released from those obligations which rest upon it as the result of launching the object or from further consequences thereof" (*i.e.*, liability.) Lachs, M., The Law of Outer Space: An Experience in Contemporary Law-Making, 73 (1972).

1. Definition of Space Debris

The lack of an agreed definition of either "space object" or" space debris" is often cited as an obstacle to ADR.[18] The concern is that a technical definition of space debris focusing on functionality does not suffice for purposes of ADR since space objects that are non-functional may still have value (e.g., proprietary or security information). However, it is submitted that an owner's unilateral declaration of an object's subjective value in occupying a congested orbit, at the unbounded expense and hazard to everyone else, is not definitive.[19] Space policy should favor the safe movement of all vehicles above the idiosyncratic concerns of an individual owner whose pointless occupation of an orbit endangers other users. The owner – if it values the object – should be responsible for removing it or else accept the consequences of living in a society that must use and interpret its laws to protect the whole. If action to solve the debris problem is conditioned on international agreement on a definition of debris, nothing will get done.[20]

2. Jurisdiction and Control

The Outer Space Treaty,[21] in Article VIII,[22] provides that the state of registry retains jurisdiction and control over it while in space. The prevailing legal analysis of the issue concludes debris removal activity that involves selecting and removing any object from space (other than the state's own object) crosses international legal thresholds;[23] without an owner's consent, a nonfunctioning satellite cannot be interfered with.[24] Removing the requirement of consent af-

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18 *See, e.g.,* Third International Interdisciplinary Space Debris Congress Report, *supra* note 7, at 30.

19 *See, e.g.,* de Man, P., *supra* note 13, at 8.

20 *See,* Listner, *Legal Issues, supra* note 11. ("[A] strictly legal approach in the form of a treaty focused at the UN level has little chance of being implemented any time soon …".)

21 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, 18 UST 2410 (1967) (Outer Space Treaty).

22 Article VIII provides: A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body. Ownership of objects launched into outer space … is not affected by their presence in outer space …

23 *See,* NRC Report, *supra* note 7, at 4.

24 *See, e.g.,* Amos, J., "Urgent need", *supra* note 3 ("International law permits only the launching nation or agency to touch an object in orbit, so it is necessary to reach agreements with the owners of debris object to permit them to be removed.") and Bill Read, Aerospace Insight Blog, Royal Aeronautical Society, June 28, 2013, accessed at <http://media.aerosociety.com/aerospace-insight/2013/06/28/sweeping-up-space-debris-can-it-be-solved/8352/> ("legal issues [concern] the ownership of space debris objects and reaching agreements with the owners of debris object to permit them to

forded by Article VIII is the primary challenge that ADR must overcome without having to amend treaty provisions or adopt new ones.

3. Liability

The primary rules for liability in space law are contained in the Liability Convention[25] and customary international law. Under Article III of the Liability Convention,[26] a state will be considered liable for accidents in space only if it can be shown that the damage caused was due to its fault. It has been argued that absolute liability should be imposed upon the state of registry for any damage caused by its nonfunctioning debris.[27] But in the absence of treaty modification, a decision to interfere with an owner's space object involves consideration of the tradeoff of benefits that may be achieved for safe spacecraft navigation versus potential international disturbance caused by pursuing nonconsensual ADR.

A state authorizing ADR will retain responsibility for damages caused in the course of the removal and accidents that cause further space debris contamination. But for the removal itself, fault will be shared by the state whose reckless nonfeasance threatens catastrophic damage to all other legitimate users of the orbits involved and it will ultimately be left to judge which one is the more culpable.[28] Custom and precedent proceed at the risk of conflict and any action designed to resolve the issue without international agreement will ultimately be subjected to the risk of litigation. The strength of the legal arguments favoring ADR and the social and economic policies they further will ultimately be tested in contested proceedings.

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be removed.") *See also,* Sterns, P., and Tennen, L., *Orbital Sprawl, Space Debris and the Geostationary Orbit*, 6 Space Policy 221, 224-225 (1990) (hereinafter, Sterns and Tennen).

25 Convention on International Liability for Damage Caused by Space Objects, 24 UST 2389 (1972) (Liability Convention).

26 Article III provides: "In the event of damage being caused elsewhere than on the surface of the Earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable only if the damage is due to its fault or the fault of persons for whom it is responsible."

27 *See,* Third International Interdisciplinary Space Debris Congress Report, *supra* note 5, at 42. *See also,* Cheng, B., Studies In International Space Law, Ch. 13: Outer Space: Legal Framework at 506-07 (1997).

28 *See,* Listner, M., *Revisiting the Liability Convention: reflections on ROSAT, Orbital Space Debris, and the Future of Space Law,* The Space Review (October 17, 2011), available at <www.thespacereview.com/article/1948/1>.

Indefinite Non-Use Is Appropriation

This paper challenges the view that Article VIII of the Outer Space Treaty, under which a state of registry retains ownership, jurisdiction and control over its space object indefinitely, forbids any outside interference with the object under any circumstances absent express consent. Such a view of an owner's absolute right of free access to space overlooks the express treaty predicates that (1) the object must be in use and (2) its occupation does not amount to appropriation. Further, it ignores the difference between the right to use space, on the one hand, and the right of ownership, on the other.

1. Distinguishing Rights of Ownership from Right to Use Space

There is a distinction between the right to use space and the rights conferred by ownership of a space object. An analogy may illustrate the distinction: All licensed drivers have the right to drive on a public freeway. The driver may own a car with significant sentimental or monetary value, or it may contain or be comprised of secret technical information relating to the owner's personal security. But once the car is left stranded in the middle of a freeway, its inherent value (to the owner) will not prevent its removal – with or without the owner's consent – for the greater safety of the traveling public.

Ownership remains unaffected. But the car is occupying space on the freeway in a manner that is not authorized – it must be driven, not stationary. The owner still owns the car (and is still liable for any damage it caused) but the right of society to have a safe and navigable thoroughfare for travel supersedes his right of ownership. The laws of society requiring removal of the car will overcome the right of the owner in retaining control and jurisdiction over it.

In the same way, Article VIII preserves the owner's right of (and liability for) ownership. However, Article I provides that the object must be in lawful "use" (i.e., a car must be driven on the freeway); Article II provides that the object cannot appropriate space to the exclusion of everyone else (i.e., a car cannot block a traffic lane indefinitely) and Article IX embodies the social and public policy of laws designed to protect the users of space from hazardous activities of those who do not comply with treaty requirements (i.e., the car's possession of a traffic lane for a purpose not intended by law is a hazard that endangers the safety of the public and the efficacy of its traffic). The requirements for lawful use of the object may inhibit the rights of ownership when public safety is at risk.

2. Outer Space Is Free for "Exploration and Use" (Article I)

Outer Space Treaty Article I declares that "[o]uter space … shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, …"[29] As long as a state

29 Article I provides: The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind. Outer space, including the Moon and other celestial

is exploring space or otherwise performing some activity furthering a peaceful purpose or goal in space, it has a right to occupy space in outer space.
The question is whether national jurisdiction ceases or is nullified when a space vehicle's useful life is ended – when its transmitters are shut down and all equipment ceases to function – and it just becomes a hazard to spacecraft navigation for eons until the friction of the upper atmosphere slows it sufficiently for reentry.[30] In resolving the issue, there is no need to limit the concept of "use" by any means other than standard contract interpretation of the treaty language,[31] keeping in mind that loss of function is distinct from loss of control.[32]
In this context, use is commonly defined as the "application or employment of something for a purpose,"[33] or to "take, hold, or deploy (something) as a means of accomplishing or achieving something."[34] Inherent in using something is the existence of a goal to be fulfilled; remove the purpose that is its *raison d'être* and one removes the justification of a thing's existence.[35] The ordinary meaning of "useful" is "serving some purpose; advantageous, helpful or of good effect."[36] If it has no purpose, a space object has no use.
The largest organization in the space domain, the International Telecommunications Union (ITU), restricts its members' activity based on use. Though hundreds of administrations file for rights to a protected frequency every year, only a third end up completing the process;[37] in the meantime, efforts by new users to register and coordinate their satellite systems are stymied because orbit and spectrum positions are "reserved" by many satellites that are not actually using

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bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies. There shall be freedom of scientific investigation in outer space, including the Moon and other celestial bodies, and States shall facilitate and encourage international cooperation in such investigation.

30 *See,* Hall, *supra* note 1, at 119.

31 1969 Vienna Convention on the Law of Treaties, United Nations Treaty Series, vol. 1155 (VCLT), Article 31.

32 It is possible to have a satellite that does not maneuver but still be of use, such as scientific craft providing useful data and information or satellites parked in orbit intended for activation later. *See,* Perek, L., *Rational Space Traffic Management*, 53 ZLW 573, 581 (2004). In addition, a satellite may be "repurposed" after having outlived its estimated operational lifetime, or after a technical anomaly renders it unfit for its primary function, but still able to perform useful functions. *See,* Baker, H.A., *Application of Treaty Law to the Regulation of Space Refuse*, Proceedings of the 31st Colloquium on the Law of Outer Space at 111 (1988).

33 The Free Dictionary.com, <www.thefreedictionary.com/use>.

34 Oxford University Press, <http://oxforddictionaries.com/definition/english/use>.

35 The Free Dictionary, <www.thefreedictionary.com/raison+d'etre>.

36 Random House Webster's College Dictionary, (HAR/CDR IN ed., 2005).

37 Statement of Zoller, J.N., Chairman of the Radio Regulations Board in 2011, Satellite Regulations, Improving the international satellite regulatory framework, available at <www.itu.int/net/newsroom/wrc/2012/features/satellite_regulations.aspx>.

them (i.e., the problem of "paper satellites.") Thus, the ITU has regulations to ensure operators "bring into use" an assignment within a finite period of time and, if not, the privilege is cancelled.[38] The ITU implicitly recognizes that legitimate "use", in a congested frequency spectrum, is the central consideration of a state's right to remain in space.

This procedure – which requires an owner actually to use its assigned frequencies and orbital positions – is a concrete elaboration of the use requirement in Article I of the Outer Space Treaty. Both the Outer Space Treaty and the ITU aim to ensure the actual and efficient exploration and use of outer space and its natural resources by states, in order to safeguard the corresponding rights of other states to engage in similar space undertakings.[39] The ITU – and its specialized function – is merely one component of the entire domain of space enterprise. But all users of space share the same foundations, including peaceful use as the reason for occupying space and the need for the Outer Space Treaty to regulate it.

3. Appropriation of Outer Space Is Forbidden (Article II)

Perhaps even more axiomatic than freedom of use is the principle that appropriation of outer space is forbidden. Article II of the Outer Space Treaty provides that "[o]uter space … is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[40]

The prevailing interpretation of "appropriation" is a taking for exclusive use with a measure of permanence.[41] Permanence has typically been measured by the intent of the occupying party,[42] so the time frame for determining appropriation has been open to question. But the ambiguity inherent in gauging intent undermines the probative value of the appropriation principle.

Both precepts (nonappropriation and freedom of use) have crystallized into customary international law.[43] The question is: At what point does nature and duration of the use of an orbital path become appropriation?[44]

This paper proposes an answer: Occupation of an orbital slot or position becomes forbidden "national appropriation" at the point that it is no longer be-

38 Article 11 (Notification and Recording of Frequency Assignments), ITU Provisional Final Acts, World Radiocommunication Conference (WRC-12), Modified RR NO. #8198 11.44. A frequency assignment is considered to be brought into use when the satellite has been deployed and maintained at the notified orbital position for a continuous period of 90 days. *Id*., RR No. #820111.44B.

39 *See,* de Man, *supra* note 13, at 8.

40 Outer Space Treaty, *supra* note 21.

41 *See,* Gorove, S., Studies in Space Law: Its Challenges and Prospects 82 (1977).

42 *See,* Martinez, L., Communication Satellites: Power Politics in Space at 92 (1985).

43 *See,* Lyall, F., and Larsen, P., Space law: A Treatise at 71 (2009).

44 Bin Cheng alluded to the potential difficulties of the issue, without providing an opinion. *See,* Cheng, B., Studies In International Space Law at 401 and 506-07 (1997).

ing "used" – when it is no longer capable of furthering a legitimate purpose.[45] Not only is there an absence of the premise upon which Article I freedoms are granted (exploration and use) but the state is also violating Article II by misappropriating space.

Once rights granted under the Outer Space Treaty are interpreted as being predicated on executing beneficial exploration and use, the intent of permanence can be inferred (without control, it will remain in orbit indefinitely). When a state's object becomes nonfunctional and uncontrollable, the state is appropriating space because its occupation of that orbital position is effectively keeping everyone else out of it indefinitely.

4. A State's Use of Space Must Be Consonant with Due Regard for Other Uses (Article IX)

a. Violation of Peaceful Use of Space Is a Material Breach of the Treaty

A material breach of a multilateral treaty by one of the parties entitles a party specially affected by the breach to invoke it as a ground for suspending the operation of the treaty in whole or in part in the relations between itself and the defaulting State.[46] A material breach is the violation of a provision essential to the accomplishment of the object or purpose of the treaty.[47] The Vienna Convention on the Law of Treaties (VCLT) regulates in Article 60 the suspension or termination of treaties in relation with a material breach. The ICJ has considered this article a customary rule of international law.[48]

The general rule of VCLT Article 31(1) is that treaties must be interpreted in good faith in accordance with their ordinary meaning in the light of the treaty's object and purpose. The preamble – and the text of the treaty - emphasizes the peaceful use of space in the interests of international cooperation. Antithesis of peace, cooperation and friendly relations is permitting an object to recklessly endanger all other current and future users of a series of orbits without any redeeming purpose. It is submitted that such a "use of space is in itself a violation of Article IX

45 Other commentators have expressed similar views. *See, e.g.,* Sterns and Tennen, *supra* note 24, at 226 ("Although the law of outer space does not require removal of inactive satellites, refusal to remove a nonfunctional craft could be the equivalent of misappropriation of space prohibited by Art. II."); Meredith, P., *Spacecraft Motion Management (SMM): Institutional and Legal Frameworks*, Proceedings of the 35th Colloquium on the Law of Outer Space 102, 107 (1992) ("[S]ituations are conceivable where the nature and duration of the use and occupation are such that, in essence, an orbital path, or a collection of orbital paths, is being appropriated").

46 VCLT, *supra* note 31, Article 60(2)(b)).

47 *Id*., Article 60(3).

48 *Legal Consequences for States of the Continued Presence of South Africa in Namibia (South West Africa) notwithstanding Security Council Resolution 276 (1970)*, *I.C.J. Reports 1971*, p. 16, at p. 47, ¶95; *Case concerning the Appeal Relating to the Jurisdiction of the ICAO Council (*India *v*. Pakistan*), I.C.J. Reports 1972*, p. 46, at p. 67, ¶38; *Case concerning the Gabcčíkovo-Nagymaros Project* (Hungary/Slovakia), *I.C.J. Reports 1997,* p. 7, at p. 38, ¶46.

of the Outer Space Treaty,[49] a material provision which broadly requires states to conduct all activities with due regard for interests of other states. Permitting objects to endanger other states' space navigation is contrary to their interests and due regard requires that states prevent their objects from causing harmful interference with space activities,[50] presuming there is a means to do so.[51]

b. Permitting Hazardous Space Debris Violates International Law.

The "use" of space is not unbounded. There are many uses of space that are not allowed, including for hostile purposes such as hosting nuclear or weapons of mass destruction.[52] Perpetual maintenance of an object in orbit – with no other purpose than to be an obstacle to treaty-sanctioned traffic – could, at the "tipping point" of space congestion, be considered a hostile use of outer space that is contrary to international law.

Concurrent with loss of control and function, the satellite is transformed into an object capable of being only a detrimental hazard to other states using space. After exhaustion of its legitimate use, the orbital mechanics exerted on the now inert mass pose a threat to other states' use of the orbit without benefitting anyone. It is this additional element of a threat to others' peaceful use of space – i.e., active violation of international law – that gives rise to a duty to ameliorate risk of harm to others.[53]

States have a continuing responsibility for their space debris.[54] Paragraph 4 of Article V of the Rescue and Return Agreement[55] is the first logical step in ef-

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49 Outer Space Treaty Article IX: In the exploration and use of outer space, including the Moon and other celestial bodies, States Parties to the Treaty shall be guided by the principle of cooperation and mutual assistance and shall conduct all their activities in outer space, including the Moon and other celestial bodies, with due regard to the corresponding interests of all other States Parties to the Treaty. ….

50 *See,* Baker, *supra* note 32, at 215.

51 "Due care" in international law means a state can incur responsibility for private acts taking place on its territory or perpetrated by its national if the state could reasonably have prevented such acts. *See e.g.*, International Law Commission, Draft Articles Responsibility of States for Internationally Wrongful Acts, November 2001, Supplement No. 10 (A/56/10), chp.IV.E.1, Arts. 11(2) and 23; *See also*, Brownlie, I., Principles of Public International Law at 440-441 (7th ed., 2008).

52 Outer Space Treaty, Article IV.

53 *Cf.,* Roberts, L.D., *A Lost Connection: Geostationary Satellite Networks and the International Telecommunication Union*, 15 Berkeley Tech. L.J. 1095, 1126 (2000) ("While mere occupancy by a state or a party for which such state exercises jurisdiction might be insufficient to constitute national appropriation in light of the endorsement of free access and use under Article I of the Outer Space Treaty, *the broad prohibition contained in Article II limits the scope of that use*) (emphasis added.) *See also*, Martinez, *supra* note 42, at 87-88.

54 Outer Space Treaty, Articles VI and VII.

55 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205.

fecting removal of the space object: A state which has reason to believe that a space object "is of a hazardous or deleterious nature" would notify the launching state, which must then take effective steps to eliminate possible danger of harm.[56] Although this may be an imperfect application, since it refers to space objects "recovered" by the discovering state, it is possible to imply the provision applies to constructive recovery without having to literally recover it by capture or possession. In any event, the owner must have an opportunity to ameliorate or remove the danger.
Beyond the Rescue Agreement, violation of the Outer Space Treaty Article IX requirement of due regard for and cooperation with other states is one that may merit recourse in reliance on VCLT Article 60.

c. International Law Defines Standard of Conduct

Pronouncement of environmental responsibility to avoid interference with the environment of another state, alone, does little to define the types of conduct that cause harm; there must be a violation of generally accepted international rules and standards.[57]
Principle 21 of the Stockholm Declaration,[58] endorsed by 178 countries, recognizes the right of all States to exploit their own resources pursuant to their own policies, on one hand, while on the other hand also recognizing their responsibility to ensure that activities within their jurisdiction and control do not cause damage to areas beyond the limits of national jurisdiction. The principle has long been recognized as customary law by most scholars[59] and endorsed by the International Court of Justice:

> The existence of the general obligation of States to ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond

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56 *See,* Diederiks-Verschoor, I.H.Ph., *The Increasing Problems of Space Debris and Their Legal Solutions*, Proceedings of the 32nd Colloquium on the Law of Outer Space 77, 79 (1989).

57 *See,* Gorove, K., *International Responsibility for Endangering the "Space Commons": Focus on a Hypothetical Case*, Proceedings of the 33rd Colloquium on the Law of Outer Space 297, 299 (1990).

58 United Nations Conference on the Human Environment, *Stockholm Declaration on the Human Environment*, U.N. Doc. A/CONF.48/14/Rev. 1, 3 (1973), U.N. Doc. A/Conf.48/14, 2, Corr. 1 (1972), *reprinted in* 11 I.L.M. 1416 (192) (Stockholm Declaration).

59 *See, Amicus Curiae* Brief Submitted on Behalf of Fourteen International Environmental Law Professors And Practitioners in the case of *Arias, et al. v. DynCorp, et al.*, United States District Court for the District of Columbia, Case No. 1:01cv01908 (RWR-DAR) (2011). *See also,* Baker, H.A., *Current Space Debris Policy and its Implications*, Proceedings of the 32nd Colloquium on the Law of Outer Space 59, 60 (1989), *citing* Kiss, A., *The International Protection of the Environment*, in Structure and Process of International law 1069 at 1074-75 (McDonald, R. St. J. and Johnson, D.M., eds., 1986).

> national control is now a part of the corpus of international law relating to the environment.[60]

"[J]urisdiction and control" is also the operative term of art in Article VIII of the Outer Space Treaty, so it is logical to extend Principle 21 to the space environment[61] and, indeed, protection against the threat to others' use of outer space is widely regarded as being equally applicable to the space environment.[62] But the duty not to cause significant transboundary environmental harm is not absolute; there is a due diligence standard:

> The standard of due diligence against which the conduct of State of origin should be examined is that which is generally considered to be appropriate and proportional to the degree of risk of transboundary harm in the particular instance. For example, activities which may be considered ultra-hazardous require a much higher standard of care in designing policies and a much higher degree of vigor on the part of the State to enforce them. ....[63]

The due diligence inquiry is a fact-specific inquiry that requires evaluation of the potential risks of the activity with the actions taken to control the transboundary impacts of that activity. Under International law, a state is obliged to take all appropriate measures to prevent significant transboundary harm or at any event to minimize its risk.[64]
Thus, in the event a state has knowledge that its space object is nonfunctional and permits it to occupy an orbit that causes hazards of navigation to other space users, that state is vulnerable to a claim of violating generally accepted international rules and standards if it fails to take steps "appropriate and proportional to the degree of risk" to abrogate or ameliorate the danger.[65] The opportunity to take measures in accordance with its duty of due diligence should be accorded under ¶4 of Article V of the Rescue Agreement, whereby after

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60 *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, 1996 I.C.J. 226, ¶¶29- 30 (July 8). The International Court of Justice reaffirmed this statement in *Gabcčíkovo-Nagymaros, supra* note 48, and again in the case *Concerning Pulp Mills on the River Uruguay* (Arg. v. Uru.), Judgment, I.C.J. Reports 2010, p. 14 at ¶ 193.

61 *See,* Roberts, L.D., *Addressing the Problem of Orbital Space Debris: Combining International Regulatory and Liability Regimes,* 15 B. C. Int'l & Comp. L. Rev. 51-74 (1992).

62 *See, e.g.*, Marchisio, S., *Protecting the Space Environment*, Proceedings of the 46th Colloquium on the Law of Outer Space 9, 12 (2003); Baker, *supra* note 10, at 73.

63 The Draft Articles on Prevention of Transboundary Harm from Hazardous Activities adopted by the International Law Commission at its fifty-third session and submitted to the U.N. General Assembly (A/56/10) (ILC Draft Articles), Article 3, ¶11. The International Court of Justice has recently applied the due diligence requirement to transboundary pollution in the *Pulp Mills* case, *supra* note 60.

64 *Id.* Article 3 derives from Principle 21 of the Stockholm Declaration. *Id.,* Comment 1.

65 *See*, Gorove, K., *supra* note 57, at 300.

notification by the launching state, the owner must then take effective steps to eliminate possible danger of harm.[66]

d. Defense of Necessity

An ADR advocate has other legal tools at its disposal. In addition to affirmative rights that derive from the treaties and international law discussed above, there are also exculpations – preclusions of wrongfulness – that may apply to excuse wrongfulness under the circumstances.

The International Court of Justice views a state of necessity as the situation of a State whose sole means of safeguarding an essential interest threatened by a grave and imminent peril is to adopt conduct not in conformity with what is required of it by an international obligation to another State."[67] The Court, citing the International Law Commission draft articles on State Responsibility (ILC Draft Articles),[68] noted the following criteria are necessary to invoke a state of necessity:[69]

- it must have been occasioned by an "essential interest" of the State which is the author of the act conflicting with one of its international obligations
- that interest must have been threatened by a "grave and imminent peril"
- the act being challenged must have been the "only means" of safeguarding that interest
- that act must not have "seriously impair[ed] an essential interest" of the State towards which the obligation existed
- the State which is the author of that act must not have "contributed to the occurrence of the state of necessity.

Environmental concerns relate to an "essential interest", in line with the court's previous *advisory opinion* in *Legality of the Threat or Use of Nuclear Weapons,* discussed, supra.[70]

An ADR advocate must be prepared to establish the objective existence of a "peril" that is also "imminent" and not just a "possibility." It must be a threat to the interest at the actual time. A "peril" may appear in the long term and held to be "imminent", but it must be established at the point in time at which necessity is invoked. The realization of that peril, however far off it might be,

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66 *See,* Diederiks-Verschoor, I.H.Ph., *The Increasing Problems of Space Debris and Their Legal Solutions*, Proceedings of the 32nd Colloquium on the Law of Outer Space 77, 79 (1989).

67 *Gabčíkovo-Nagymaros, supra* note 48, ¶50, citing *Yearbook of the International Law Commission,* 1980, Vol. II, Part 2, p. 34.

68 *Id.* at ¶ 52. *See*, Draft Articles on Responsibility of States for Internationally Wrongful Acts adopted by the International Law Commission at its fifty-third session (extract from *Official Records of the General Assembly, Fifty-sixth session, Supplement No. 10* (A/56/10), chp.IV.E.2) (2001)).

69 *Id.*

70 *Legality of the Threat or Use of Nuclear Weapons, supra* note 60, ¶ 29.

is not thereby any less certain and inevitable.[71] Moreover, the ADR measures must be the only possible response to the danger.

Conclusions

The words in our space treaties provide the most concrete basis for permitting or forbidding an activity in space. The contract that each of the space faring states made with the rest of the world binds them to act only in accordance with its authorization and only to receive benefits (rights) when the all the conditions have been fulfilled. Interpreting the status of space objects in terms of their use permits us to use the treaty language as a tangible touchstone to balance the competing interests of exploitation and due regard for all users of space. Standard contract interpretation of the treaty language provides a persuasive argument that indefinite non-use of space becomes is appropriation when a space vehicle's useful life is ended. If it has no purpose, a space object has no use. ITU procedures implicitly recognize active "use" as a predicate for engaging in space activity.

National appropriation of outer space is forbidden. This paper has argued that occupation of an orbital position becomes appropriation when it is no longer being "used" or capable of furthering a legitimate purpose. Not only is there an absence of the premise upon which Article I freedoms are granted (exploration and use) but the state is also violating Article II by misappropriating space.

The requirement in Article IX of due regard for interests of other states is confluent with the international law requirement that states ensure that activities within their jurisdiction and control respect the environment of areas beyond national control. States have a due diligence obligation to evaluate the potential risks and take action to control the harm or minimize its risk. A state is vulnerable to a claim of violating generally accepted international rules and standards if it fails to take steps "appropriate and proportional to the degree of risk" to abrogate or ameliorate the danger and breach of the treaty under VCLT Art. 60. In the alternative, even a finding of wrongfulness of nonconsensual ADR in general may be excused by a finding of its necessity under the circumstances.

There will still be disagreements concerning the allocation of costs and damages for removal and collateral liability for any damage resulting from the attempted ADR itself (creation of additional debris or damage of other space objects not targeted for removal.) But these issues are the consequences of the right to use of space being limited by the due regard owed to others and are suited to resolution by mechanisms already in place, such as the Optional Rules for Arbitration of Disputes Relating to Outer Space Activities.[72]

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71 *Gabčíkovo-Nagymaros, supra* note 48, at 42.

72 Optional Rules for Arbitration of Disputes Relating to Outer Space Activities, accessed at <www.pca-cpa.org/showpage.asp?pag_id=1188> and available for PDF download. *See,* F. Pocar, An Introduction to the PCA's Optional Rules for Arbitration of Disputes Relating to Outer Space Activities, 38 J. Sp. L. 171 (2012).