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## SPACE LAW: IS IT THE LAST LEGAL FRONTIER?

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CERTAINLY, IN A territorial sense, outer space is the last frontier. Whether the emerging and evolving jurisprudence associated with man's growing activities in space will be, or is, the last legal frontier is highly doubtful and, at the very least, yet to be determined. Nonetheless, space law is undoubtedly the newest legal frontier and, in the authors' opinion, certainly worthy of the title "jurisprudence" in the complete sense of the word, despite the fact that legal dictionaries do not yet define space law. However, if space law is a true jurisprudential entity, it must be definable. That is the objective of this paper.

Space law, as most jurisprudence, encompasses and incorporates many tenets and facets of other legal disciplines. As space law affects and effects law regulating intercourse between nations, it becomes international in scope and incorporates the principles of international law. As man's endeavors in space are motivated more and more by entrepreneurial goals, space law will and does encompass and incorporate certain rules of commercial law. Moreover, certain discrete aspects of law will be, and indeed have already been, subsumed into the jurisprudence of space law. A short and admittedly incomplete

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list includes tax law, copyright and patent law, communications law, and insurance law.

More precisely then, this article first will review the international law aspects already incorporated into the jurisprudence known as space law and call the reader's attention to some pertinent and timely international law issues which have arisen and which will undoubtedly have to be addressed. Second, the growing areas of private commercial enterprise and legal issues which will arise therefrom will be identified. Finally, this article will discuss the highly volatile subject of space insurance, venturing opinions as to what some of the legal problems arising in the area will be and identifying options for resolution of these problems from a legal standpoint.

### INTERNATIONAL SPACE LAW

As might be expected, international space law is the most established segment of this growing jurisprudence as theoreticians and jurists have been considering the international legal ramifications of man's ventures into outer space for slightly over a quarter century. In 1959, the American Bar Foundation contracted with the newly created National Aeronautics and Space Administration ("NASA")<sup>1</sup> to "conduct research on the law of outer space, including but not limited to, review and analysis of all available space literature and proposals which have been made for the control and administration of space activities."<sup>2</sup> When the study was undertaken, there were no treaties or other agreements constituting public or private international space law, customary or otherwise. However, the bases for the propagation of such treaties had already been laid by the United Nation's ad hoc Committee on Peaceful Uses of Outer Space ("COPUOS").

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<sup>1</sup> Pub. L. No. 85-568, § 102, 72 Stat. 426 (1958) (codified at 42 U.S.C. §§ 2451-2477 (1982)).

<sup>2</sup> Stason, *Foreword* to L. LIPSON & N. KATZENBACH, REPORT TO THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION ON THE LAW OF OUTER SPACE at i (1961).

Created largely through the efforts of the United States, it was COPUOS which gave direction to public international space law by formulating the 1963 Declaration of Legal Principles Governing the Activities of the States in the Exploration and Use of Outer Space ("1963 Declaration").<sup>3</sup> The 1963 Declaration is clearly the foundation of

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<sup>3</sup> G.A. Res. 1962, 18 U.N. GAOR Supp. (No. 15), U.N. Doc. A/5515 (1963). Resolution 1962 provides:

Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space.

*The General Assembly,*

*Inspired by the great prospects opening up before mankind and as a result of man's entry into outer space,*

*Recognizing the common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes,*

*Believing that the exploration and use of outer space should be carried on for the betterment of mankind and for the benefit of States irrespective of their degree of economic and scientific development,*

*Desiring to contribute to broad international cooperation in the scientific as well as in the legal aspects of exploration and use of outer space for peaceful purposes,*

*Believing that such co-operation will contribute to the development of mutual understanding and to the strengthening of friendly relations between nations and peoples,*

*Recalling its resolution 110 (II) of 3 November 1947, which condemned propaganda designed or likely to provoke or encourage any threat to the peace, breach of the peace, or act of aggression, and considering that the aforementioned resolution is applicable to outer space,*

*Taking into consideration its resolutions 1721 (XVI) of 20 December 1961 and 1802 (XVII) of 14 December 1962, adopted unanimously by the States Members of the United Nations,*

*Solemnly declares that in the exploration and use of outer space States should be guided by the following principles:*

1. The exploration and use of outer space shall be carried on for the benefit and in the interests of all mankind.

2. Outer space and celestial bodies are free for exploration and use by all States on a basis of equality and in accordance with international law.

3. Outer space and celestial bodies are not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

4. The activities of States in the exploration and use of outer space shall be carried on in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding.

5. States bear international responsibility for national activities in outer space, whether carried on by governmental agencies or non-

the five multilateral treaties which presently comprise international space law.<sup>4</sup>

Chronologically, the first of the five treaties is the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space including the

governmental entities, and for assuring that national activities are carried on in conformity with the principles set forth in these present Declarations. The activities of non-governmental entities in outer space shall require authorization and continuing supervision by the State concerned. When activities are carried out in outer space by an international organization, responsibility for compliance with the principles set forth in this Declaration shall be borne by the international organization and by the States participating in it.

6. In the exploration and the use of outer space, States shall be guided by the principle of co-operation and mutual assistance and shall conduct all their activities in outer space with due regard for the corresponding interests of other States. If a State has reason to believe that an outer space activity or experiment planned by it or its nationals would cause potentially harmful interference with activities of other States in the peaceful exploration and use of outer space, it shall undertake appropriate international consultations before proceeding with any such activity or experiment. A State which has reason to believe that an outer space activity or experiment planned by another State would cause potentially harmful interference with activities in the peaceful exploration and use of outer space may request consultation concerning the activity or experiment.

7. The State on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and any personnel thereon, while in outer space. Ownership of objects launched into outer space, and of their component parts, is not affected by the passage through outer space or by their return to the earth. Such objects or component parts found beyond the limits of the State of registry shall be returned to that State, which shall furnish identifying data upon request prior to return.

8. Each State which launches or procures the launching of an object into outer space, and each State from whose territory or facility an object is launched, is internationally liable for damage to a foreign State or to its natural or juridical persons by such object or its component parts on the earth, in air space, or in outer space.

9. States shall regard astronauts as envoys of mankind in outer space, and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of a foreign State or on the high seas. Astronauts who make such a landing shall be safely and promptly returned to the State of registry of their space vehicle.

*Id.*

<sup>4</sup> See C. CHRISTOL, *THE MODERN INTERNATIONAL LAW OF OUTER SPACE* (1982) (detailed discussion of the five United Nation treaties discussed below).

Moon and Other Celestial Bodies ("1967 Treaty").<sup>5</sup> Its seventeen articles closely follow the 1963 Declaration stating that exploration and use of outer space is for the benefit of all mankind<sup>6</sup> and must be accomplished in accordance with international law and in the interest of peace and international cooperation.<sup>7</sup> It makes astronauts envoys entitled to assistance and safe return<sup>8</sup> and places legal responsibility for damages on launching states.<sup>9</sup> Further, it provides that launching states maintain jurisdiction over space vehicles and persons on board<sup>10</sup> and requires dissemination of pertinent information to the Secretary General of the United Nations, as well as the other signatories.<sup>11</sup> As with all five treaties referred to above, the covenants therein are applicable to international intergovernmental organizations which adopt the principles.<sup>12</sup> The Treaty is open to all states for signature, is subject to ratification,<sup>13</sup> and allows for proposed amendments<sup>14</sup> and withdrawal by the signatory state one year after notice of intent to withdraw is given.<sup>15</sup>

Following the 1967 Treaty and expanding on the 1963 Declaration is the 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space ("1968 Agreement").<sup>16</sup> The ten articles comprising the 1968 Agreement are an elaboration of the principles set out in the 1963 Declara-

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<sup>5</sup> Dec. 19, 1966, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205 [hereinafter cited as 1967 Treaty]. For a detailed discussion of the 1967 Treaty, see C. CHRISTOL, *supra* note 4, at 12-50.

<sup>6</sup> 1967 Treaty, *supra* note 5, art. I.

<sup>7</sup> *Id.* art. III.

<sup>8</sup> *Id.* art. V.

<sup>9</sup> *Id.* art. VII.

<sup>10</sup> *Id.* art. VIII.

<sup>11</sup> *Id.* art. XI.

<sup>12</sup> *Id.* art. XIII.

<sup>13</sup> *Id.* art. XIV.

<sup>14</sup> *Id.* art. XV.

<sup>15</sup> *Id.* art. XVI.

<sup>16</sup> Dec. 19, 1967, 19 U.S.T. 7570, T.I.A.S. No. 6599, 672 U.N.T.S. 119 [hereinafter cited as 1968 Agreement]. For a detailed discussion of the 1968 Agreement, see C. CHRISTOL, *supra* note 4, at 152-204; D. WEDEGAONKAR, *THE ORBIT OF SPACE LAW* 15-19 (1984).

tion. The 1968 Agreement places a duty on signatory states to provide notification of accidents or distress of astronauts to the launching state and to the Secretary General of the United Nations.<sup>17</sup> Assistance in the rescue of astronauts,<sup>18</sup> whether on the territory of the signatory state or the adjacent high seas,<sup>19</sup> and the safe and prompt return of astronauts and space objects or their components is mandatory.<sup>20</sup>

Subsequently, in 1972 the Convention on International Liability for Damage Caused by Space Objects was offered for signature by the United Nations General Assembly.<sup>21</sup> This Treaty set up a regime of absolute liability for damages caused by space objects on the Earth's surface or to aircraft in flight.<sup>22</sup> The launching state(s) must provide full compensation to the victim state in accordance with the provisions of the Treaty which set up a Claims Commission,<sup>23</sup> a time table for filing and pursuing claims, and administrative procedures for resolving such claims.<sup>24</sup> Joint and several liability is provided for when more than one state participates in the launch or when the launch is undertaken by international intergovernmental organizations.<sup>25</sup> The Claims Commission must act promptly in accordance with international law.<sup>26</sup> No appeal process is provided unless through agreement of the contentious parties.<sup>27</sup> The Claims Commission determines liability and damages and awards damages in the currency of the

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<sup>17</sup> 1968 Agreement, *supra* note 16, art. I.

<sup>18</sup> *Id.* art. II.

<sup>19</sup> *Id.* art. IV.

<sup>20</sup> *Id.* art. V.

<sup>21</sup> Nov. 29, 1971, 24 U.S.T. 2389, T.I.A.S. No. 7762 [hereinafter cited as 1972 Convention]. For a detailed discussion of the 1972 Convention, see C. CHRISTOL, *supra* note 4, at 59-148; D. WADEGAONKAR, *supra* note 16, at 22-27.

<sup>22</sup> 1972 Convention, *supra* note 21, art. II; D. WADEGAONKAR, *supra* note 16, at 22-25.

<sup>23</sup> 1972 Convention, *supra* note 21, arts. XIV-XVII.

<sup>24</sup> *Id.* art. X.

<sup>25</sup> *Id.* art. V.

<sup>26</sup> *Id.* art. XIX.

<sup>27</sup> *Id.*

victim state unless otherwise agreed upon.<sup>28</sup> The decision of the Claims Commission is to be certified to the Secretary General of the United Nations and to each signatory state.<sup>29</sup> The expense of the Claims Commission is to be shared equally unless agreed otherwise.<sup>30</sup>

The Treaty goes further to require a launching state knowledgeable of a large scale danger or of serious interference with human living conditions or functioning of vital centers to "examine the possibility of rendering appropriate and rapid assistance."<sup>31</sup> The Treaty automatically becomes applicable to international intergovernmental organizations if a majority of the organization members are signatories.<sup>32</sup> In that case, joint and several liability attaches to all of the members.<sup>33</sup>

Just as the preceding three treaties found their bases in the 1963 Declaration, the 1974 Convention on Registration of Objects Launched into Outer Space is also premised on the 1963 Declaration.<sup>34</sup> The twelve articles comprising this Convention mandate that every state or international intergovernmental organization establish a registry of objects launched into Earth orbit or beyond.<sup>35</sup> The contents of the registry and conditions of its maintenance are left to the launching state except that the launching state must notify the Secretary General of the United Nations of the existence of the registry.<sup>36</sup> Further, for every vehicle launched into Earth orbit or beyond, the launching state must furnish the Secretary General of the United Nations, as soon as practicable after launch, the name of the launching state, the appropriate designator

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<sup>28</sup> *Id.* art. XIII.

<sup>29</sup> *Id.* art. XIX.

<sup>30</sup> *Id.* art. XX.

<sup>31</sup> *Id.* art. XXI.

<sup>32</sup> *Id.* art. XXII.

<sup>33</sup> *Id.*

<sup>34</sup> Nov. 12, 1974, 28 U.S.T. 695, T.I.A.S. No. 8480 [hereinafter cited as 1974 Convention]. For a detailed discussion of the 1974 Convention, see C. CHRISTOL, *supra* note 4, at 213-40; D. WADEGAONKAR, *supra* note 16, at 19-22.

<sup>35</sup> 1974 Convention, *supra* note 34, art. II.

<sup>36</sup> *Id.*

or registry number, the date and place of the launch, the general function or purpose of the launch, and the basic orbital parameters, including modal period, inclination, apogee, and perigee.<sup>37</sup> In turn, the United Nations will also maintain a separate registry, recording this information and giving open access of this information to other states.<sup>38</sup> This Convention goes even further to allow a state not able to identify an object causing damage to ask for assistance from states with expertise.<sup>39</sup> Those states shall respond, leaving the precise arrangements under which assistance shall be rendered to the requesting states.<sup>40</sup>

The last treaty to be considered is the 1979 Agreement Governing Activities of States on the Moon and Other Celestial Bodies ("Moon Treaty").<sup>41</sup> The Moon Treaty, like those mentioned above, derives its basic tenets from the 1963 Declaration. Its purpose, however, is more ideological than practical. The major thrust of the Moon Treaty is to reserve and preserve scientific information gained in

<sup>37</sup> *Id.* art. IV.

<sup>38</sup> *Id.* art. III.

<sup>39</sup> *Id.* art. VI.

<sup>40</sup> *Id.*

<sup>41</sup> Dec. 5, 1979, U.N. Doc. A/34/20, 18 I.L.M. 1434 [hereinafter cited as Moon Treaty]. The United States has not adopted the Moon Treaty. In explaining why the United States has not ratified the Moon Treaty, Christol states:

Before the executive branch can bring the Moon Treaty into force, it will be necessary to obtain the approval of the U. S. Senate. The latter will have to take account of a number of objections that have been voiced by spokesmen for special interests. These charges, which cannot be supported by the negotiating history of the proposed agreement, include the view that the treaty terms are hostile to the free enterprise system—despite the clear provisions allowing for the present mining of surface and subsurface natural resources—; that the CHM [common heritage of mankind] principle is detrimental to the interests of advanced States; that the agreement contains a moratorium on present exploitation; and that the language of the treaty must be read literally without regard for the long and documented history of formal positions put forward by States during the negotiations. Objection has also been voiced over the absence of a formal definition of the CHM principle. . . .

C. CHRISTOL, *supra* note 4, at 317. For a detailed discussion of the Moon Treaty, see C. CHRISTOL, *supra* note 4, at 246-341; D. WADEGAONKAR, *supra* note 16, at 30-37.

exploration of celestial bodies for dissemination to other state signatories.<sup>42</sup> Noteworthy is the fact that the Moon Treaty does not apply to exploration and use of Earth resources or materials from outer space which reach Earth by natural means.<sup>43</sup> Central to the theme of the Moon Treaty is the banning of nuclear weapons, other weapons of mass destruction, and military activities in general.<sup>44</sup> However, complete freedom to conduct scientific studies is mandated.<sup>45</sup> The underlying premise of the Moon Treaty is that the Moon and other celestial resources are the common heritage of mankind and not subject to appropriation or claims of sovereignty.<sup>46</sup> The Moon Treaty calls for disseminating both the purpose of extraterrestrial endeavors and the scientific information gleaned from such endeavors.<sup>47</sup> It creates an international regime to distribute such information, as well as the technology used to obtain the information.<sup>48</sup> The Moon Treaty also expands the rights of launching states with respect to use of other states' facilities if the launching states' personnel are in distress.<sup>49</sup> It also provides that each state may assure itself that activities of other states are compatible with this agreement and allows for onsite inspections.<sup>50</sup> Consultation is mandatory if a state has reason to believe another state is not in compliance with the Moon Treaty.<sup>51</sup>

The above-enumerated treaties constitute the entirety of public international space law upon which further treaties will eventually be based.<sup>52</sup> However, it is postulated

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<sup>42</sup> Moon Treaty, *supra* note 41, art. 5.

<sup>43</sup> *Id.* art. 1.

<sup>44</sup> *Id.* art. 3.

<sup>45</sup> *Id.* art. 6.

<sup>46</sup> *Id.* art. 11.

<sup>47</sup> *Id.* art. 5.

<sup>48</sup> *Id.* art. 11.

<sup>49</sup> *Id.* art. 12.

<sup>50</sup> *Id.* art. 15.

<sup>51</sup> *Id.*

<sup>52</sup> See generally D. WADEGAONKAR, *supra* note 16, at 1-38; Gorove, *Current Issues of Space Law Before the United Nations*, 11 J. SPACE L. 5 (1983).

that further developments in the international space law area will show a decreasing growth rate with a possible leveling of the curve in the next decade. Contemporaneously, international law developments likely will become more specific and tend toward the international commercial aspects of man's space endeavors.

### COMMERCIAL SPACE LAW

At this time, space commerce is in its embryonic stages. Hence, commercial space law is also in a nascent state. There is no unified body of statutes or common law which comprises a jurisprudence which can be called commercial space law. Nonetheless, the growth of space commerce over the past decade has been nothing less than phenomenal and the potential growth over the next decade or two is absolutely mind boggling.<sup>53</sup> Such growth in the unique environment of space is certain to give rise to unique legal issues. To understand how and why those legal issues might arise, it is necessary to understand the type of commerce that is being undertaken in outer space.

Just a mere two decades ago space commerce did not exist. The only role a private company had in space at that time was that of a contractor for a government space program. Now in excess of 350 private companies have already been, or soon will be, undertaking their own production of goods and services which are space related.<sup>54</sup> These commercial endeavors in space can be categorized into areas involving communications, remote sensing, space manufacturing, energy, and transportation services.<sup>55</sup>

The first area of commercial endeavor in space was telecommunications.<sup>56</sup> It still far and away attracts the largest

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<sup>53</sup> See E. FINCH & A. MOORE, *ASTROBUSINESS* xv-xvi (1985).

<sup>54</sup> *Id.* at 8. Finch and Moore note that such industries as pharmaceuticals, electronics, glass, metallurgy, and energy are exploring the prospects of production in space. *Id.* at 9-14.

<sup>55</sup> *Id.*

<sup>56</sup> *Id.* at 3.

portion of private capital invested in space and returns the largest revenues.<sup>57</sup> Telecommunications, of course, means the placement of satellites in geostationary orbit for direct broadcast, relay, or position finding.<sup>58</sup> The legal issues arising from such activities are many and varied and, quite frankly, not primarily commercial in nature.

The fact that geostationary orbit slots are limited has given rise to many issues, such as whether the geostationary orbit is a common heritage of mankind and thus owned by all nations. Third world nations not yet requiring direct broadcast satellites or relay systems allege that the geostationary orbit is common heritage and that an international body such as the International Telecommunications Union should allocate the slots in an equal and fair basis to all countries.<sup>59</sup> It would then be the option of the owner of the slot to use it, leave it empty, or lease it to another state.<sup>60</sup> Obviously, the third world is desirous of holding such options, while those nations capable of utilizing such a system favor a regime of free entry.

Satellites, of course, are also used for remote sensing of the Earth's surface for exploration of natural resources, weather monitoring, crop forecasting, and even monitoring of hazardous waste dumps.<sup>61</sup> The legal issues raised by the capability of remote sensing satellites also create a controversy between the developed and developing nations.<sup>62</sup> The issue is primarily one of international law,

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<sup>57</sup> *Id.*

<sup>58</sup> *Id.* at 3-4.

<sup>59</sup> See Jakhu, *The Principle of Non-Appropriation of Outer Space and the Geostationary Satellite Orbit*, PROCEEDINGS OF THE TWENTY-SIXTH COLLOQUIUM ON THE LAW OF OUTER SPACE 21 (1984).

<sup>60</sup> *Id.* at 21-23.

<sup>61</sup> E. FINCH & A. MOORE, *supra* note 53, at 5-7.

<sup>62</sup> Whilborg & Wijkman, *Costs and Benefits of Alternative Legal Regime for Remote Sensing*, PROCEEDINGS OF THE SYMPOSIUM OF EARTH-ORIENTED SPACE ACTIVITIES AND THEIR LEGAL IMPLICATIONS 101 (1983). Whilborg and Wijkman state "the fundamental problem facing a small country that lacks remote sensing facilities is the following: a foreigner can by remote sensing obtain an exclusive knowledge which enables him to purchase the resource of a country, or the right to exploit it, at 'too low a price.'" *Id.* at 114.

but it also directly affects commerce in the sense that the resolution will directly impact the commercial development of the Earth's natural resources.<sup>63</sup> At this time, third world countries are not taking the stance which would prohibit remote sensing satellites from overflying their territory.<sup>64</sup> Rather, they propose that the data gathered be given to them along with the technology to translate and interpret such data.<sup>65</sup> Of course, the entities capable of launching remote sensing satellites argue that they should have a proprietary interest, not only in the translation and interpretation of technology, but also in the data gathered by satellite.<sup>66</sup>

While satellite communications and remote sensing are presently the dominant commercial endeavors in space, space manufacturing is an area of significant interest and potential.<sup>67</sup> The relatively dust-free, microgravity environment of space offers a unique laboratory setting for the development and processing of certain chemicals, pharmaceuticals, semi-conductor crystals, glass, and metal alloys.<sup>68</sup> Certain chemicals and pharmaceuticals can be produced in space's microgravity at rates up to 500 times that possible on earth and in a purity unobtainable on earth.<sup>69</sup> The potential market for products has been estimated at \$20 billion in annual sales.<sup>70</sup>

Similarly, the relatively uncontaminated low gravity environment of space has been found to be optimal for growing crystals used in computers, optoelectronics, and ultrasonic equipment.<sup>71</sup> Moreover, there is a significant possibility that fluoride glass may be developed which is far

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<sup>63</sup> *Id.* at 114-15.

<sup>64</sup> *Id.* at 102-03.

<sup>65</sup> *Id.* Providing information to lesser developed countries without charge, however, would discourage private sensing operations and thus lessen the overall level of knowledge. *Id.* at 114.

<sup>66</sup> *Id.* at 107-09.

<sup>67</sup> E. FINCH & A. MOORE, *supra* note 53, at 7-14.

<sup>68</sup> *Id.* at 9-14.

<sup>69</sup> *Id.* at 9-10.

<sup>70</sup> *Id.* at 9.

<sup>71</sup> *Id.* at 10-11.

superior to Earth-made glass used in laser and fiber optic applications.<sup>72</sup> Further, it may be possible to create altogether new metal alloys, as well as metals of higher purity and structural uniformity than those made on earth.<sup>73</sup>

It is not likely that the marketing of such new products will affect present legal regimes regarding tort, contract, and sales. But the fact that such products are manufactured in space may drastically affect the regulatory regimes that many of these products are subject to in Earth manufacture. Further, and perhaps more importantly, the new manufacturing processes raise significant issues regarding proprietary interests and antitrust law when the new technology is developed with assistance from direct or indirect government subsidy.

The fourth area of commercial endeavor in space is solar energy production.<sup>74</sup> While research indicates that the technology is available, it also indicates that the cost of building a commercially viable solar power generating station is incredibly high.<sup>75</sup> Hence, such a project may only be feasible through cooperative international efforts with the attendant legal issues raised by such efforts.

Lastly, there is a proven market for private space transportation services, even though virtually all such services are governmentally operated and funded today. Nonetheless, at least the United States Government has made a commitment to private enterprise to reduce the red tape which now must be cut through to pursue private space launches.<sup>76</sup> This commitment includes more than simply streamlining the bureaucratic approval process to launch a rocket. The government of the United States is consid-

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<sup>72</sup> *Id.* at 11.

<sup>73</sup> *Id.* at 11-12.

<sup>74</sup> *Id.* at 12-14.

<sup>75</sup> *Id.*

<sup>76</sup> See Ross, *Department of Transportation's New Role in Commercializing Space Transportation*, PROCEEDINGS OF THE AMERICAN BAR ASSOCIATION'S FORUM COMMITTEE ON AIR AND SPACE LAW, FIRST ANNUAL FORUM 2-3 (1984). See also Exec. Order No. 12,490, 49 Fed. Reg. 40,393 (1984) (NASA's Commercial Space Policy statement).

ering making government launch facilities available to private companies in the near future.

The legal issues attendant to space commerce identified herein are diverse and cross many legal disciplines. However, that is not unexpected given the fact that space commerce is in its embryonic stages. Moreover, it is clear that as space commerce matures, the legal regime known as commercial space law will take on further definition and form.

### SPACE INSURANCE

As has been shown with commercial space law, the legal implications surrounding space insurance are similarly nascent. Nevertheless, other than space technology itself, space insurance is the single most important device allowing man to proceed with commercial space ventures.<sup>77</sup> Thus, knowledge of how space insurance came into existence and what it covers is necessary if the legal community is to be called on to apply its trade on behalf of an insured or an insurer under its subrogation rights and to identify the legal issues peculiar to space insurance.<sup>78</sup>

Space insurance, like space exploration, is a relatively new phenomenon. Until 1965 space insurance did not exist. In 1965, the first policy insuring a commercial space venture was placed to cover the Early Bird launch vehicle.<sup>79</sup> However, this policy did not cover the post-launch vehicle prior to intentional ignition.<sup>80</sup> It was not until 1968 that a consortium of underwriters in London and the United States wrote a policy covering post-launch risks.<sup>81</sup> This policy insured a satellite owned by Intelsat, but only with respect to the interests of the Communications Satellite Corporation ("COMSAT").<sup>82</sup> The policy

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<sup>77</sup> E. FINCH & A. MOORE, *supra* note 53, at 37.

<sup>78</sup> For a discussion of the history of space insurance, see *id.* at 37-42.

<sup>79</sup> *Id.* at 38.

<sup>80</sup> *Id.*

<sup>81</sup> *Id.*

<sup>82</sup> *Id.*

actually covered five launches.<sup>83</sup> The deductible was a one launch failure.<sup>84</sup> However, coverage was only for one loss in excess of the deductible.<sup>85</sup> In other words, the first loss was not covered while the second loss was.<sup>86</sup> Losses subsequent to the second failure were not covered.<sup>87</sup>

As underwriters and brokers gained experience and knowledge in risk management and space management became less an art and more a science, coverage underwritten increased in terms of total risk insured and premiums received. Further, additional exposures such as post-launch coverage became commonplace. At the present time, space insurance is both first party coverage and third party coverage.<sup>88</sup> The need for third party cover or liability insurance arises from the principles of strict liability governing the activities of launching states and the indemnity requirements Congress has enacted to protect NASA.<sup>89</sup> However, this insurance is a small part of the space insurance book in terms of premiums and risk covered.<sup>90</sup> On the other hand, first party coverage can be considered a combination of hull coverage and business interruption insurance. The hull coverage portion is segmented into two parts: pre-ignition hull cover and post-

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<sup>83</sup> *Id.*

<sup>84</sup> *Id.*

<sup>85</sup> *Id.*

<sup>86</sup> *Id.* Finch and Moore write:

The Intelsats F-2,3 and 4 were launched successfully. F-5 then failed due to a launch vehicle malfunction and the series was extended to include an additional spacecraft. To accommodate this additional launch, the policy was cancelled and rewritten to provide coverage for one failure (beyond the standard one-failure deductible) for the final three launch attempts. F-6 and F-7 were successfully placed in orbit, but F-8 failed to achieve synchronous orbit due to a malfunction of the apogee kick motor. This failure constituted the one-failure deductible, and therefore no loss payment was required from underwriters.

*Id.* at 39.

<sup>87</sup> *Id.*

<sup>88</sup> *See id.* at 43-44.

<sup>89</sup> NASA requires shuttle launch participants to obtain third party liability insurance in the amount of \$500,000,000. NASA indemnifies for losses above that amount. *Id.*

<sup>90</sup> *Id.* at 44.

ignition hull cover.<sup>91</sup> The former, like third party cover, is a small part of the book of space insurance underwritten by insurers.<sup>92</sup> However, post-ignition cover is the most significant book written in terms of premiums received and risk underwritten.<sup>93</sup> Next in terms of premiums and cover is the business interruption insurance, sometimes called satellite life insurance or cessation of operations coverage.<sup>94</sup> This coverage generally starts on the 181st day after launch, when the post-ignition hull coverage lapses, and continues for a policy period of generally one year.<sup>95</sup> The revenues received from satellite life insurance may someday exceed that received from post-ignition hull coverage, as the revenues received from satellite operation are expected to grow enormously in the next few decades.<sup>96</sup>

Despite the enormity of risk underwritten and revenues received, it is a definite understatement to say that the space insurance industry is not altogether healthy. The recent losses of Palapa, Westar, and Intelsat have resulted in payments of losses which approximate three times the amount of premiums taken in since 1965. One underwriter has estimated that three years without a loss are necessary to put space insurers back into a profit category.<sup>97</sup> It is not unexpected, then, that space insurance capacity has actually declined, despite projected record numbers of launches of communication satellites.<sup>98</sup> Moreover, the decline in capacity has occurred while premiums on post-ignition hull cover have increased from about 7%

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<sup>91</sup> *Id.* at 42-43.

<sup>92</sup> *Id.* at 43.

<sup>93</sup> *See id.*

<sup>94</sup> *Id.*

<sup>95</sup> *Id.*

<sup>96</sup> *See id.* at 42-44.

<sup>97</sup> Hughes, *How Does Private Enterprise Insure the Two Hundred Million Dollar Space Venture*, PROCEEDINGS OF THE AMERICAN BAR ASSOCIATION'S FORUM COMMITTEE ON AIR AND SPACE LAW, FIRST ANNUAL FORUM 8 (1984).

<sup>98</sup> *See* SPACE COMMERCE BULLETIN, Apr. 12, 1985, at 6. Industry experts estimate insurance capacity at 100 to 175 million dollars while four upcoming launches this year will carry three insurable satellites valued at 80 to 100 million dollars each. *Id.*

or 8% of risk insured to approximately 20%. Some market forecasters estimate that premiums will level at about 30% of risk insured.<sup>99</sup> This phenomenal increase in the cost of insurance may well have a deleterious effect on the number of satellite launches in the future.

Historically, a satellite insurer had little recourse against manufacturers or other parties when a loss occurred after launch. The satellite was considered lost even if it was not destroyed. Thus, no precise determination of the cause of the loss was possible. However, the recent successful recovery of the Palapa and Estar satellites by the Space Shuttle may have changed all of that. Information regarding the cause of a failure is potentially obtainable. Insureds and insurers may now have a real chance of asserting their rights against culpable manufacturers. However, the capability of recovery may well turn out to be a two-edged sword, forcing an insured or insurers to undertake recovery in order to mitigate their losses. To date no court has had an opportunity to consider such issues.

Similarly, the means of identifying the cause of failures have led insurers to assert new arguments regarding liability. Now, when subsequent launches are made using systems similar to those that have failed in the past, insurers are asserting that they should only be undertaken after proper testing has been conducted to fully understand the reasons for the failure. To do otherwise, it is suggested, might be a failure to show due diligence required by the insurance contract.<sup>100</sup> At the same time, it is posited that once a failure mode is identified by a manufacturer, the failure to properly test the system before subsequent launches may give rise to liability on the part of the manufacturer.<sup>101</sup> The legal basis for this latter argument is not entirely clear as the insurers do have the right to refuse

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<sup>99</sup> E. FINCH & A MOORE, *supra* note 53, at 42.

<sup>100</sup> See SPACE COMMITTEE BULLETIN, July 20, 1984, at 1.

<sup>101</sup> *Id.*

the risk or suitably rate it. However, this points out the novel issues which are being discussed.

#### CONCLUSION

It is clear that the rapid strides being taken in space technology undoubtedly will make the emergence of space law rapid and dynamic. As suggested above, the growth of space law is most likely to be in the area of commercial endeavor. Yet, space commerce by its very nature will give rise to many legal issues of international scope and concern.