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# JOURNAL OF SPACE LAW

A journal devoted to the legal problems arising  
out of human activities in outer space

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## THE 1986 CHALLENGER DISASTER: LEGAL RAMIFICATIONS

Paul G. Dembling\* and Richard C. Walters\*\*

The 1986 Challenger (Shuttle) Disaster, quite aside from the horror and personal tragedy it created, raised distinct legal ramifications which are worthy of analysis and comment. The Disaster deserves special study and attention in terms of the role it has, or might have, played in the continuing evolution of two theories or doctrines which govern the extent to which tort liability is imposed on the federal Government and the private concerns which work under contract to serve the Government's needs. The first is the so-called "*Feres* doctrine" and the second is the "Government contractor defense." As in most cases, a clear understanding of the operative facts is crucial to an appreciation of their legal import.

### *Background*

On January 28, 1986,<sup>1</sup> an explosion destroyed the Space Shuttle Challenger on its Flight 51-L seventy-three seconds after the liftoff from the Kennedy Space Center, Florida. Seven astronauts were killed. Among these were two military personnel, three employees of the National Aeronautics and Space Administration ("NASA"), and two non-Government civilians, one of whom was Christa McAuliffe, who was to be the "first teacher in space."

A report issued on June 6, 1986 by an independent commission appointed by President Reagan to investigate the accident (commonly known as the "Rogers Commission") concluded that the cause of the accident was a failure in the seal of the joint (the so-called "O-Ring") situated between two segments of the right Solid Rocket Motor ("SRM"). According to the report, hot gases escaped through a leak in the joint's seal and caused the explosion which had destroyed the Challenger. The joint failure, the Commission found, was due to a "faulty design unacceptably sensitive to a number of factors [including] temperature, physical

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<sup>1</sup> Ironically, the Apollo fire which caused the death of three astronauts (Grissom, Chaffee, and White) occurred on January 27, 1967.

dimensions, the character of materials, the effects of reusability, processing, and the reaction of the joint to dynamic loading."<sup>2</sup>

The Commission also determined that a contributing cause of the accident was NASA's decision to proceed with the launch notwithstanding unusually cold temperatures, which affected the joint's ability to seal itself, and despite warnings from engineers at Morton Thiokol, Inc. ("MTI"), the company which had designed and furnished the SRM in question. In its 1988 opinion, the United States District Court for the Northern District of Utah stated, in the lawsuit instituted by one of the MTI engineers who warned the company, as follows:

[The Commission concluded] that the process by which that [NASA] decision was reached within NASA's complex decision-making hierarchy was itself flawed. It found that engineers at MTI, including Roger Boisjoly, were concerned with the performance of the seals in SRM joints at the predicted temperatures. Prior flights launched at significantly warmer temperatures had experienced incomplete seals and minor gas escapes. The engineers made their concerns known to MTI management and to those NASA officials directly involved with the SRM aspect of the Shuttle Program. MTI management initially recommended to NASA officials that the launch be delayed until temperatures rose. Due to pressure from NASA, MTI management reversed its position and recommended that the launch proceed despite continuing objections from Boisjoly and others.

The Commission found that the NASA officials possessing knowledge of the engineers' concern and MTI's initial recommendation failed to pass that information to NASA officials above them in the launch decision hierarchy. Those who made the final decision of whether to launch never knew of the specific concerns with the function of the joint seals at the low launch temperature. In sum, the Commission concluded that the "decision to launch the Challenger was flawed. Those who made that decision were unaware of the initial written recommendation of the contractor advising against the launch at temperatures below 53 degrees Fahrenheit and the continuous opposition of the engineers at Thiokol after the management reversed

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<sup>2</sup> I Rogers Commission Report 72. See *Boisjoly v. Morton Thiokol, Inc.*, 706 F. Supp. 795, 798 (N.D. Utah 1988).

its position . . . . If the decision makers had known all of the facts, it is highly unlikely that they would have decided to launch 51-L on January 28, 1986.<sup>3</sup>

*The Claims*

If it had been established that the Challenger explosion had resulted in damage to foreign nationals or foreign-owned property, liability of the U.S. Government might have arisen both under the 1967 Treaty on Principles Governing the Activities of the United States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies (referred to as the "Outer Space Treaty")<sup>4</sup> and the 1972 Convention On International Liability for Damage Caused By Space Objects (referred to as the "Liability Convention").<sup>5</sup> By the same token, the Liability Convention expressly exempts from its coverage not only damage sustained by "nationals of the launching State" but also damage sustained by "foreign nationals during such time as they are participating in the operation of [the] space object . . . or during such time as they are in the immediate vicinity of a planned launching or recovery area as the result of an invitation by [the] launching State."<sup>6</sup>

Although there was one rather remarkable claim for damage to a foreign vessel, that claim was filed with NASA under the Federal Tort Claims Act ("FTCA"), and neither international treaty was invoked. Moreover, neither causation nor actual damage was found in that case.<sup>7</sup>

<sup>3</sup> Boisjoly, 706 F. Supp. at 799 (citing I Rogers Commission Report 82).

<sup>4</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, *done* January 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205. Article VII of the Outer Space Treaty reads in pertinent part: "Each State Party to the Treaty that launches or procures the launching of an object into outer space . . . is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts . . ."

<sup>5</sup> Convention on International Liability for Damage Caused by Space Objects, *done* Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187. Paragraph I of Article VIII of the Liability Convention states: "1. A State which suffers damage, or whose natural or juridical persons suffer damage, may present to a launching State a claim for compensation for such damage."

<sup>6</sup> *Id.* Art. VII.

<sup>7</sup> The claim in question was asserted by John Kipalni, a Brazilian boat owner, who alleged that, as he was motoring in his boat along the coast of South Carolina near the Georgia border, falling debris from the Challenger sunk his boat and killed his son who was below deck. He stated that he managed to row to shore, and that he was confronted by NASA officials at the famous South of the Border restaurant/motel complex, where they purportedly offered to pay \$20,000 to him as a quick and unpublicized settlement. The FTCA claim was denied when NASA determined that it could not verify the truth of these assertions, and no suit was instituted by Kipalni before the applicable statute of limitations expired.

Another FTCA claim involved the owners of a United States fishing vessel whose fishing rights were curtailed by reason of the post-disaster salvage operation.<sup>8</sup>

Because the seven Challenger astronauts were all U.S. nationals, liability to their heirs for their deaths clearly fell outside the ambit of either the Outer Space Treaty or the Liability Convention. Any redress would have to be provided to them by the federal Government under the laws of this country.

Treatment of claims by such heirs would necessarily vary somewhat based upon differences in the status of each deceased astronaut. Deaths of the military astronauts would give rise to limited survivors' benefits in the form of life insurance under the Servicemen's Group Life Insurance program, as well as other benefits under the Veterans' Benefits Act.<sup>9</sup> Survivor benefits for the deceased NASA employees would be available under the Federal Employees Compensation Act ("FECA").<sup>10</sup> On the other hand, the FTCA expressly precludes recovery for death or injury to military personnel while "engaged in combat activities . . . during time of war,"<sup>11</sup> and the FECA specifically bars recovery under the FTCA for death or injury to civilian Government employees sustained during the performance of their duties.<sup>12</sup>

In the case of NASA, however, claims for damage, death, or bodily injury "resulting from the conduct of the Administration's functions" may still be entertained and paid, administratively, to both military and civilian Government employees, pursuant to the National Aeronautics and Space Act of 1958, as amended.<sup>13</sup> NASA is authorized thereunder to pay such claims up to \$25,000.<sup>14</sup> If a claim in excess of that amount is

<sup>8</sup> That claim, filed by Emma Sue Wolfe, was referred to the U.S. Air Force which had assumed responsibility for salvage operations. Wolfe claimed that limits established by the Air Force for salvage of debris from the Challenger prevented her from fishing for shrimp in the most fertile ocean areas and that her lost income resulted ultimately in the loss of her fishing boat (which purportedly had been repossessed). The Air Force denied the claim, and Wolfe did not pursue the matter further. The denial, it would appear, could be justified based on Wolfe's damage having been too remote (*i.e.*, not proximately caused by any Government negligence or breach of duty) or because both the NASA launch decision and Air Force decisions regarding establishment of salvage limits were within the "discretionary function" exception to FTCA coverage.

<sup>9</sup> The laws relating to veterans' benefits have been revised, codified, and enacted as Title 38, United States Code, Veterans' Benefits. The Servicemen's Group Life Insurance program appears at 38 U.S.C. § 765. *See generally* 38 U.S.C. §§ 765-779 (1988).

<sup>10</sup> 5 U.S.C. § 8102 (1988).

<sup>11</sup> 28 U.S.C. § 2680(j) (1988).

<sup>12</sup> 5 U.S.C. § 8116(c) (1988).

<sup>13</sup> 42 U.S.C. §§ 2451-2486 (1988) [hereinafter "NASA Act"].

<sup>14</sup> 42 U.S.C. § 2473(b)(13)(A) (1988).

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considered meritorious, further relief may be granted with NASA's recommendation, via special Congressional legislation.<sup>15</sup> Representatives of non-Government civilians, of course, are not precluded in any way from seeking and obtaining such administrative relief under the NASA Act.

The FTCA contemplates that tort claims against the federal Government be governed by the applicable state law where the Government "act or omission occurred" and provides in that regard that the United States is to be liable in tort "in the same manner and to the same extent as a private individual in like circumstances."<sup>16</sup> Although under state law, liability for damage caused by dangerous products that are put into the "stream of commerce" may give rise to absolute liability, without proof of negligence, *i.e.*, proof of breach of a duty of due care,<sup>17</sup> claims under the FTCA must assert and establish Government negligence.<sup>18</sup> Administrative claims under the NASA Act require the showing only of proximate cause arising from the NASA acts or omissions in order to permit their payment by NASA. Proof of negligence is unnecessary.<sup>19</sup> The FTCA excepts from its coverage claims for those Government acts or omissions which are "based upon the exercise or performance or the failure to exercise or perform a discretionary function or duty on the part of the Federal agency or an employee of the Government, whether or not the discretion involved be abused."<sup>20</sup> With the Challenger accident, although not tested in court, it would seem that notwithstanding any abuse by NASA in allowing the launch to proceed or in failing to maintain a proper system for decision-making which would assure fully-informed decisions by those authorized to permit or cancel launches, the decision by NASA in this case would fall within the scope of the "discretionary function" exception to the FTCA, and thus preclude recovery for any astronaut's heirs or survivors through that statute. The NASA Act contains no similar "discretionary function" exception to NASA's administrative claim processing authority. By the same token, any NASA decision to award compensation under that Act is itself discretionary.

Interestingly, none of the astronauts' representatives pursued administrative claims under the NASA Act. It is likely that this avenue of relief was by-passed because of the low dollar limitation imposed (\$25,000) before special legislation is needed. Four FTCA claims filed, respectively, by representatives of one military astronaut (U.S.A.F. Lt. Col. Ellison S. Onizuka), one civilian NASA employee (Francis S. Scobee) and two other civilians (Gregory B. Jarvis and S. Christa McAuliffe) were settled by the Justice Department for an aggregate amount of \$7,735,000.

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15 *Id.* at § 2473(b)(13)(B).

16 28 U.S.C. § 2674 (1988).

17 *See* *McPherson v. Buick Motor Co.*, 217 N.Y. 382, 111 N.E. 1050 (1916).

18 *Laird v. Nelms*, 406 U.S. 797 (1972).

19 NASA Act, 42 U.S.C. §§ 2451-2486.

20 28 U.S.C. § 2680 (1988).

Complete details of the individual claims have never been released,<sup>21</sup> but the Justice Department has disclosed that of the amounts paid, 60% (\$4,641,000) was contributed by MTI and 40% (\$3,094,000) by the Government. The settlement called for payments of at least \$750,000 per family and consisted of long-term tax free annuities. The four families were treated as a group. The Justice Department decided that it was not appropriate to treat the astronauts separately even though some members were entitled to automatic compensation under the Veterans' Benefits Act.<sup>22</sup>

Although the Government may have successfully resisted any FTCA claim based on the above-described "discretionary function" exception of the Act (as to all such claims) and, as explained below, the "*Feres* doctrine" (as to the claim of the military astronaut, Lt. Col. Onizuka), the Government has maintained that its 40% share of the settlements reflects the existence of these defenses. For reasons also explained below, MTI and the Government preferred to settle those cases rather than to litigate them.<sup>23</sup> (The *Smith* case, discussed separately herein, however, failed to settle -- at least as to Smith's claim against the Government -- and had to be resolved in court.) Representatives of one other astronaut, a NASA employee (Ronald E. McNair), settled solely with MTI for an undisclosed amount.

A newspaper report stated that "the father and brother of mission specialist Judith A. Resnik signed an agreement with shuttle contractor Morton Thiokol, Inc. for payments said to total \$1.5 million to \$2.5 million."<sup>24</sup> The article continues by stating that although the federal Government contributed to similar settlements [as described above] with four of the Challenger families in December 1986,

the attorney for the Resniks stated that the Department of Justice cut off negotiations with him . . . . The Justice Department spokeswoman, Amy Brown, confirmed that Government "has declined to participate in any further settlements with Challenger families other than the four that it negotiated on behalf of the National Aeronautics

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<sup>21</sup> A Freedom of Information Act ("FOIA") suit against the Justice Department instituted by NBC News to obtain documents regarding these settlements was eventually settled, with the Department of Justice's agreement to a partial release of information. Another FOIA suit, instituted against NASA by the New York Times, resulted in a court order to release cockpit tapes of the astronauts' voices which recorded their conversations just prior to the explosion.

<sup>22</sup> N.Y. Times, Mar. 8, 1988, at A-1.

<sup>23</sup> "According to papers filed in a FOIA suit, the Justice Department seeking to avert 'highly complex tort litigation' began meeting with some of the Challenger families in an effort to reach an overall settlement." Wash. Post, Feb. 19, 1988, at A-3.

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

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and Space Administration and Morton Thiokol in 1986."<sup>25</sup>

*The Smith Case and The "Feres Doctrine"*

Jane J. Smith, as executrix of the estate of her husband, Navy Commander Michael J. Smith (one of the military astronauts who perished in the Challenger Disaster), had filed an FTCA claim with NASA which was neither granted nor denied by NASA. That claim was not settled with the Justice Department before Mrs. Smith filed suit in the United States District Court for the Middle District of Florida, Orlando Division, against the Government, MTI, and Lawrence Mulloy (NASA's Rocket Booster program chief) for 1.5 billion dollars. In response to this lawsuit, the Government filed a motion to dismiss. The Court granted that motion and dismissed Smith's complaint as to the Government, based on application of the "Feres doctrine."<sup>26</sup> The Court likewise dismissed a separate count of the complaint which sought injunctive relief against both NASA and MTI aimed at halting further performance of MTI's SRM contract. It did so because Smith had failed sufficiently to allege facts that would establish her standing to maintain an action for such relief.<sup>27</sup> The U.S. Court of Appeals for the Eleventh Circuit affirmed these dismissals.<sup>28</sup> Smith's petition for a writ of *certiorari* was subsequently denied by the U.S. Supreme Court.<sup>29</sup> Smith's case against MTI was settled before the Eleventh Circuit decision was issued. U.S. District Judge Robert R. Merhige, Jr. made the settlement official on August 26, 1988 in Richmond, Virginia.<sup>30</sup>

The "Feres doctrine" is a "judicially created" exception to the waiver of sovereign immunity under the FTCA and was established initially in the eponymous 1950 decision, *Feres v. United States*.<sup>31</sup> There, the U.S. Supreme Court held that "the Government is not liable under the Federal Tort Claims Act for injuries to servicemen where the injuries arise out of or are in the course of activity incident to the service."<sup>32</sup> The "Feres doctrine" was extended by the Supreme Court in a 1977 decision, *Stencel Aero Engineering Corp. v. United States*,<sup>33</sup> which held that the Government will similarly not be liable to its contractors for contribution or indemnity where military personnel have realized recovery against contractors for

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*Id.*

26

Smith v. Morton Thiokol, Inc., 712 F. Supp. 893 (M.D. Fla. 1988).

27

*Id.* at 900.

28

Smith v. United States, 877 F.2d 40 (11th Cir. 1989).

29

Smith v. United States, 110 S. Ct. 1111 (Memo. Ord., Feb. 20, 1990).

30

Smith, 877 F.2d at 41.

31

Feres v. United States, 340 U.S. 135 (1950).

32

*Id.* at 146.

33

Stencel Aero Eng'g Corp. v. United States, 431 U.S. 666 (1977), *reh'g denied*, 434 U.S. 882 (1977).

injuries partially resulting from Government negligence. (Frequently, the "Feres doctrine" has been referred to as the "Feres-Stencel doctrine").

The District Court in *Smith* took pains to enumerate and explain the "three rationales" underlying the "Feres doctrine":

First, the distinctively federal character of the relationship between the Government and Armed Forces personnel necessitates a federal remedy that provides simple, certain, and uniform compensation, unaffected by the fortuity of the situs of the alleged negligence. Second, because those injured during the course of activity incident to service receive generous statutory veterans' disability and death benefits, it is unlikely that Congress intended to include them within the scope of FTCA coverage. Third, a suit based upon service-related activity involves the courts "in sensitive military affairs at the expense of military discipline and effectiveness." *Johnson*, 107 S. Ct. at 2063 (quoting *United States v. Shearer*, 473 U.S. 52, 59, 105 S.Ct. 3039, 3044, 87 L. Ed. 2d 38 (1985)). To determine whether a claim is barred by *Feres*, this court must consider all three rationales and apply each of them to the facts of this case. *Del Rio v. United States*, 833 F.2d 282, 286 (11th Cir. 1987). When a case falls within the bounds of *Feres*, the court has no jurisdiction to hear the case. *Stanley v. Central Intelligence Agency*, 639 F.2d 1146, 1157 (5th Cir. 1981); see *Atkinson v. United States*, 825 F.2d 202, 204 n.2 (9th Cir. 1987).<sup>34</sup>

Although acknowledging the unpopularity of the "Feres doctrine," the District Court in *Smith* felt bound by it, especially in light of the recent Supreme Court decision in *United States v. Johnson*,<sup>35</sup> which not only reaffirmed the "vitality" of the doctrine, but in so doing overturned an Eleventh Circuit decision in which the Court of Appeals had refused to apply it to a case involving negligence by a non-military Government employee (an FAA air traffic controller whose negligence allegedly resulted in the wrongful death of a Coast Guard helicopter pilot). Negligence by NASA (non-military) employees thus would not take the *Smith* case outside the ambit of the "Feres doctrine."

The "critical issue" identified by the Court in *Smith* was stated in terms of the first *Feres* "rationale," i.e., whether or not Commander Smith's participation as an astronaut in the Shuttle Program at the time of his

<sup>34</sup> *Smith*, 712 F. Supp. 893 (M.D. Fla. 1988).

<sup>35</sup> *United States v. Johnson*, 481 U.S. 681 (1987).

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death could be considered "performing activities incident to his federal service."<sup>36</sup> In making this determination, the Court applied a test set forth by the Fifth Circuit Court of Appeals in *Parker v. United States*.<sup>37</sup> The test calls for the consideration of three factors: (1) the duty status of the service member; (2) the place where the injury occurred; and (3) the activity in which the serviceman was engaged at the time of the injury.

While detailed to NASA (pursuant to the terms of a long-standing agreement between NASA and the military departments which had been affirmed in 1959 by President Eisenhower), although not subject to direct military orders and not required to perform regarding military duties, Commander Smith nevertheless retained his military rank and privileges (including veterans' benefits under the VBA) and remained subject to military policies and directives (at least to the extent they did not affect his NASA responsibilities).

The fact that Commander Smith's death did not occur on a military base, the Court found, would not "preclude application of the '*Feres* doctrine' to bar recovery under the FTCA."<sup>38</sup> Further, notwithstanding his not performing what might be regarded as normal military activities, the Court found Commander Smith's participation in the Shuttle Program to have been only by virtue of his "status as a member of the armed services" and as a result of his participation in a military program under which military personnel "are detailed to NASA to perform appropriate services."<sup>39</sup> In short, the Court found that the "three factor" test had been fully satisfied in Commander Smith's case. Thus, the Court found no difficulty in concluding that Commander Smith had been performing activities "incident to" his military service at the time of his death.

The Court found that the third of the previously enumerated three "rationales" underlying the "*Feres* doctrine" might not apply to Smith's situation, *i.e.*, the rationale that FTCA suits for negligent orders might undermine the "special relationship of the soldier to his superiors" and military "discipline."<sup>40</sup> This was because Commander Smith, at the time of his death, was under NASA control, and his death was not the result of negligent military orders. Nevertheless, because both other *Feres* rationales seemed to apply (Smith was performing activities "incident to his military service" and his dependents would "continue to receive Veteran's benefits"), the Court felt compelled to apply the doctrine and to rule that it lacked "subject matter jurisdiction" over Smith's FTCA claims against the United States.<sup>41</sup>

Under such circumstances, the Court concluded that it had no choice but to dismiss the Smith suit against the Government, barring

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<sup>36</sup> Smith, 712 F. Supp. at 895.

<sup>37</sup> *Parker v. United States*, 611 F.2d 1007 (5th Cir. 1980).

<sup>38</sup> Smith, 712 F. Supp. at 898.

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

<sup>40</sup> Smith, 712 F. Supp. at 899.

<sup>41</sup> *Id.* at 900.

recovery from the Government. Such a result stands in contrast to the substantial settlement which the other military astronaut (Onizuka) had realized from the Government. The rationale for this disparate and seemingly inequitable Government treatment has never been explained. Perhaps Mrs. Smith rejected the same type of Government settlement offer that had been accepted by Lt. Col. Onizuka's representatives. Perhaps the Smith settlement solely with MTI was equivalent in value to the joint settlement which others had attained with both MTI and the Government. In light of the parties' resistance to disclosure of any further specifics regarding these settlements, we can only speculate as to why Onizuka and Smith may have been treated differently.

In terms of the "vitality" of the "*Feres* doctrine" one might also be tempted to speculate as to whether the Supreme Court will continue to apply it as it did in *Johnson* and as it was applied in *Smith*. Significantly, *Johnson* was only decided by the narrowest of margins, with four of the nine Justices in dissent. Perhaps of even greater note is that it was Justice Scalia, who authored the dissenting opinion (in which he was joined by Justices Brennan, Marshall and Stevens). Commenting on the FTCA's waiver of sovereign immunity (under 28 U.S.C. § 1346 (b)), Justice Scalia observed:

Read as it is written, the language renders the United States liable to all persons, including servicemen, injured by the negligence of government employees. Other provisions of the Act set forth a number of exceptions, but none generally precludes FTCA suits brought by servicemen. One, in fact, excludes "[a]ny claim arising out of the *combatant activities* of the military or naval forces, or the Coast Guard, *during time of war*," § 2680(j) (emphasis added), demonstrating that Congress specifically considered, and provided what it thought needful for, the special requirements of the military. There was no proper basis for us to supplement - *i.e.*, revise - that congressional disposition.<sup>42</sup>

Justice Brennan has recently been replaced by Justice Souter. Like Justice Scalia, Justice Souter is also known as a strict constructionist. As such, he may well adopt the reasoning espoused in the Scalia dissent. Indeed, the introduction of Justice Souter into the Court may even work to create a majority on the Court that favors the imposition of limitations on the "*Feres* doctrine," and other doctrines that have resulted from "judicial legislation."

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<sup>42</sup> Johnson, 481 U.S. at 693 (Scalia, J., dissenting).

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MTI and the "Government Contractor Defense"

MTI is known to have settled claims relating to the deaths of all seven Challenger astronauts: two separately (McNair and Resnik), four together with the Government (Jarvis, Scobee, Onizuka and McAuliffe) and one during the course of litigation (Smith).

It is known that MTI chose not to litigate the merits of any of those claims. It is also known that at the time it achieved a settlement with Mrs. Smith, MTI was preparing to file or had already filed its own motion to dismiss which was based on the so-called "Government contractor defense." Some explanation of just what the defense consists of and how it might have been applied to the Challenger Disaster cases would be in order.

The defense had its origin in a 1940 United States Supreme Court decision, *Yearsley v. W.A. Ross Contracting Co.*,<sup>43</sup> in which the Court held that a contractor was acting as the Government's agent when constructing wet dikes on the Missouri River under a Government contract and, accordingly, could not be held liable for erosion to the Plaintiff's waterfront property which those dikes allegedly caused. Subsequent case decisions under which the "Government contractor defense" has evolved, rather than focusing on agency relationships with the Government, began to shield Government contractors from liability in order to preserve intact the FTCA's "discretionary function" exception. As articulated in 1965 by the United States District Court for the District of Connecticut:

To impose liability on the contractor would render the government's immunity for the consequence of acts in the performance of a 'discretionary function' meaningless . . . [i]f the contractor was held liable, contract prices to the government would be increased to cover the contractor's risk of loss from possible harmful effects of complying with decisions of [government] executive officers authorized to make policy judgements.<sup>44</sup>

More recently, however, it seemed that development of the "Government contractor defense" would be limited to cases involving private producers of military equipment and hardware, and injury to only military personnel. Indeed, the Ninth Circuit Court of Appeals in its 1983 *McKay* decision, stated that, as a prerequisite to using the "Government contractor defense," the contractor must establish, among other things, that the Government is

<sup>43</sup> *Yearsley v. W.A. Ross Contracting Co.*, 309 U.S. 18 (1940).

<sup>44</sup> *Dolphin Gardens, Inc. v. United States*, 243 F. Supp. 824, 827 (D. Conn. 1965). See generally, Napoleon, *The Government Contractor Defense: Its Implications in the Wake of Boyle v. United Technologies Corporation*, 23 NAT'L CONT. MGMT. J., Fall 1989, at 65.

itself immune from liability by reason of the "*Feres* doctrine."<sup>45</sup> The doctrine, as previously explained, applies strictly to FTCA cases involving injury to military personnel sustained while performing activities "incident to" their service.

The Supreme Court, in its landmark decision in *Boyle v. United Technologies Corp.*<sup>46</sup> (notably authored by Justice Scalia), rejected *McKay's* reasoning in this regard, preferring to found any application of the "Government contractor defense" on the broad language of the FTCA's "discretionary function" exception rather than on the much narrower "*Feres* doctrine." In this sense, *Boyle* represents a return to the rationale of earlier case law revolving around the defense.

There is at least one post-*Boyle* decision that applies the defense to eliminate contractor tort liability for injury to non-military personnel.<sup>47</sup> Also, there is at least one decision in which the defense has been applied to damage arising from non-military equipment.<sup>48</sup> Thus, it is plain that the "Government contractor defense" can no longer be regarded as simply a defense contract phenomenon.

According to the Supreme Court in *Boyle*, liability cannot be imposed on a Government contractor, pursuant to state law, if a three-part test is met:

1. The United States approved reasonably precise specifications for the contractor;
2. The contractor's equipment conformed to those specifications; and
3. The supplier warned the United States about the dangers in the use of the equipment that were known to the supplier but not to the United States.<sup>49</sup>

Unlike earlier cases which indicated that the Government must itself "establish" the product specifications,<sup>50</sup> *Boyle* requires only Government "approval" of specifications, and later cases have interpreted this

<sup>45</sup> *McKay v. Rockwell Int'l Corp.*, 704 F.2d 444 (9th Cir. 1983).

<sup>46</sup> *Boyle v. United Technologies Corp.*, 487 U.S. 500 (1988), *cert. denied*, 497 U.S. 994 (1989), *reh'g denied*, 489 U.S. 1047 (1989).

<sup>47</sup> *Nicholson v. United Technologies Corp.*, 697 F. Supp. 598 (D. Conn. 1988) (defendant not liable for injury to federal Civil Service technician caused by explosion during repair of military helicopter landing gear).

<sup>48</sup> *Boruski v. United States*, 803 F.2d 1471 (7th Cir. 1986). *See also* *Burgess v. Colorado Serum Co.*, 772 F.2d 844 (11th Cir. 1985).

<sup>49</sup> *Boyle*, 487 U.S. at 511.

<sup>50</sup> *In re Agent Orange, Prod. Liab. Litig.*, 534 F. Supp. 1046, 1055 (E.D.N.Y. 1982).

"approval" requirement as including informal procedures encompassing "continuous back and forth" between the parties, as well as more formal expressions of approval.<sup>51</sup>

As to contractor proof of "compliance" with the specifications, the United States District Court for the Southern District of New York, in *Zinck v. ITT Corp.*<sup>52</sup> held that this second *Boyle* prerequisite was satisfied by unrefuted affidavits recounting "in great detail the inspection procedures employed by the Government to assure ITT's compliance with the contract."<sup>53</sup> A similar finding could not be made by the Fifth Circuit Court of Appeals in *Garner v. Santoro*,<sup>54</sup> when a subcontractor did not clearly demonstrate that tests on epoxy paint had been performed to determine compliance with contract requirements. Failure to adequately document performance and results of critical testing can thus be fatal to an assertion of the "Government contractor defense."<sup>55</sup>

Finally, as to the third *Boyle* prerequisite, the "duty to warn," post-*Boyle* decisions make clear that this duty comes into play only when the contractor has actual knowledge of the existence of danger,<sup>56</sup> and only when the Government itself has no knowledge.<sup>57</sup> The "duty to warn" may require more than a single warning, especially when the Government adopts measures in an attempt to avoid danger which the contractor knows may not prove effective.<sup>58</sup>

Applying *Boyle's* three-part test to MTI and the Challenger Disaster, it seems likely that the "Government contractor defense" would have been available to MTI had it chosen to assert it in court rather than resolving the above-described claims by means of substantial money settlements. First, even though MTI may have contracted to design the

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<sup>51</sup> See, e.g., *Smith v. Xerox Corp.*, 866 F.2d 135 (5th Cir. 1989); *but cf. Trevino v. General Dynamics Corp.*, 876 F.2d 1154 (5th Cir. 1989).

<sup>52</sup> *Zinck v. ITT Corp.*, 690 F. Supp. 1331 (S.D.N.Y. 1988).

<sup>53</sup> *Id.* at 1337.

<sup>54</sup> *Garner v. Santoro*, 865 F.2d 629 (5th Cir. 1989).

<sup>55</sup> See *Dempsey & Barsy, Government Contractor Liability for Design Defects After Boyle*, 19 PUB. CONT. L.J. 405, 420 (1990). See also, *Dembling & Hiestand, Public Exposure To Uncompensated Injury or Damage Arising Out of Government Procurement of Goods and Services*, PROGRAM MANAGER (Journal of the Defense Systems Management College) 9, 10, 11 (Mar.-Apr. 1989).

<sup>56</sup> *Trevino v. General Dynamics Corp.*, 865 F.2d 1474, 1487 (5th Cir. 1989).

<sup>57</sup> *Ramey v. Martin-Baker Aircraft Co., Ltd.*, 847 F.2d 946, 951 n.10 (4th Cir. 1989).

<sup>58</sup> See *Schwindt v. Cessna Aircraft Co.*, No. CV 485-472 (N.D. Ga. Aug. 31, 1988) (LEXIS 9886); *Dempsey & Barsy, supra* note 55, at 417-18. See also *Hiestand, The Boyle Rule: What Does It Mean?*, PUB. CONT. NEWSL., Fall 1990, at 3, which reviews how the *Boyle* rule has been construed in 19 subsequent cases by types of claims: design versus manufacturing defects, approval of specifications, failure to warn, "stock" products, supplier and subcontractor claims, performance contractor, military versus non-military products, civilian injuries, and catastrophic event.

SRMs and the ill-fated O-ring, there can be no doubt that its designs were thoroughly reviewed by NASA and that "approval" could have been established by reference to the intensive "back and forth" between contractor and Government representatives that invariably occurs in NASA procurements.

Similarly, with NASA contracts, it is rare that inspection, testing and evaluation is not scrupulously documented both by the contractor, as well as by NASA contracting personnel. Thus, establishment of "compliance" with specifications (the second *Boyle* prerequisite) should have proven to be no problem whatsoever for MTI.

Third, and finally, as evidenced by the Rogers Commission Report itself, MTI fully discharged any duty it may have had to warn the Government. Regardless of whether the Government itself had knowledge of the likely failure of the SRM joint, MTI engineers issued strong and repeated warnings of the dangers inherent in cold weather launches, and although the MTI management had retracted its initial recommendation to delay launch of the Challenger until temperatures were more favorable, that retraction was found to have been made by MTI only under pressure from the Government.<sup>59</sup>

#### *Final Observations*

The "*Feres* doctrine" and the "Government contractor defense" are generally thought of in the context of accidental deaths and injuries caused by faulty operation of defense-related equipment (*i.e.*, tanks, airplanes, ships, *etc.*) on land, sea and air. The Challenger Disaster, however, and the claims that emanated from it demonstrate that such legal theories may extend as well to incidents involving manned or unmanned vehicles or satellites while operating in or on the way to or from outer space. The fact that both the Government and MTI chose to settle Challenger-related claims for millions of dollars rather than to rely on those theories may well have been a function of the spectacular nature of the Challenger Disaster and of their desire not to appear inhumane while under such close and widespread scrutiny.

Certainly, if those involved in settling the Challenger claims were questioned about the hundreds of armed service personnel and others who are injured or who die annually, and whose claims are routinely denied based on *Feres*, *Boyle*, and their progeny,<sup>60</sup> they could not provide a convincing rationale for their disparate treatment of the Challenger Disaster victims.

Perhaps the resolution of this dilemma can only be achieved by re-evaluating the legal bases and policy considerations underlying both the

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<sup>59</sup> See Boisjoly, 706 F. Supp. at 799.

<sup>60</sup> See Gusman, *Rethinking Boyle v. United Technologies Corp. Government Contractor Defense: Judicial Preemption of the Doctrine of Separation of Powers?* 39 AM. U.L. REV. 391 (1990).

"*Feres* doctrine" and the "Government contractor defense." To that task, we commend the Supreme Court and its newest Justice. Whether those theories will eventually be overturned or in any way significantly modified has yet to be seen.

## THE COMMERCIAL DEVELOPMENT OF SPACE: THE NEED FOR NEW TREATIES\*

Bin Cheng\*\*

### *Introduction*

Ten years and six days after man first reached outer space, the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies<sup>1</sup> -- to give the 1967 Outer Space Treaty its full title -- entered into force on 10 October 1967. The intention of the United Nations, to which goes the credit of securing agreement on this treaty, was that it should establish a legal framework for man's exploration and use<sup>2</sup> of outer space, a framework to be supplemented by subsequent agreements as man's exploration and use of outer space further develops. So far, four more treaties have been concluded through the United Nations, namely, the 1968 Agreement on the Rescue of Astronauts and the Return of Objects Launched into Outer Space (Astronauts Agreement),<sup>3</sup> the 1972 Convention on International Liability

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<sup>1</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies, done Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205 (entered into force Oct. 10, 1967) [hereinafter "Outer Space Treaty"].

<sup>2</sup> The term "use" is here used in its broad meaning as to include "exploitation," although theoretically it is possible, as the Moon Treaty has perhaps done, to distinguish between exploration, use and exploitation. See Bourély, *La commercialisation des activités spatiales: aspects juridiques*, 37 ANNALES DE L'UNIVERSITE DES SCIENCES SOCIALES DE TOULOUSE 43, 53 (1989).

<sup>3</sup> Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched Into Outer Space, done Apr. 22, 1968, 19 U.S.T. 7570, T.I.A.S. No. 6599, 672 U.N.T.S. 119 (entered into force Dec. 3, 1968).

for Damage Caused by Space Objects (Liability Convention),<sup>4</sup> the 1975 Convention on Registration of Objects Launched into Outer Space (Registration Convention)<sup>5</sup> and the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (the Moon Treaty).<sup>6</sup> In addition, the United Nations' General Assembly has since the last-mentioned treaty adopted *inter alia* two resolutions relating to the use of outer space, to wit, the 1982 resolution 37/92 on Principles Governing the Use by States of Artificial Earth Satellites for International Direct Broadcasting<sup>7</sup> and the 1986 resolution 41/65 on Remote Sensing.<sup>8</sup> At the same time, there are a number of multilateral and bilateral treaties relating to outer space concluded outside the United Nations, such as the treaties establishing the International Telecommunications Organization (INTELSAT),<sup>9</sup> the International Maritime Satellite Organization (INMARSAT)<sup>10</sup> and the European Space Agency (ESA),<sup>11</sup> and those between the Soviet Union and the United States on co-operation in space.<sup>12</sup> Participation in some of the multilateral treaties are open to more or less all States and certain international organizations; in others, it may be limited to specific groups or parties, such as the 1988 Inter-Governmental Agreement (IGA) on the Permanent Manned Civil Space Station among the

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<sup>4</sup> Convention on International Liability for Damage Caused by Space Objects, done Mar. 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762, 961 U.N.T.S. 187 (entered into force Sept. 1, 1972) [hereinafter "Liability Convention"].

<sup>5</sup> Convention on the Registration of Objects Launched Into Outer Space, opened for signature Jan. 14, 1975, 28 U.S.T. 695, T.I.A.S. No. 8480, 1023 U.N.T.S. 15 (entered into force Sept. 15, 1979) [hereinafter "Registration Convention"].

<sup>6</sup> Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, adopted by the U.N. Gen. Assembly 5 Dec. 5, 1979, opened for signature 18 Dec. 1979, U.N. Doc. A/RES/34/68 (1979) (entered into force 11 July 1984) [hereinafter "Moon Treaty"].

<sup>7</sup> Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, G.A. Res. 37/92 (1982).

<sup>8</sup> Principles Relating to Remote Sensing of the Earth From Outer Space, U.N. Doc. A/RES/41/65 (1985).

<sup>9</sup> International Telecommunications Satellite Organization (INTELSAT) Agreement, With Annexes, done Aug. 20, 1971, 23 U.S.T. 3813, T.I.A.S. No. 7532 (entered into force Feb. 12, 1973.).

<sup>10</sup> Convention on the International Maritime Satellite Organization (INMARSAT), With Annex, done Sept. 3, 1976, 31 U.S.T. 1, T.I.A.S. No. 9605 (entered into force Jul. 16, 1979).

<sup>11</sup> Convention for the Establishment of a European Space Agency, done May 30, 1975 (entered into force Oct. 30, 1980). The text of the Final Act of the Conference of Plenipotentiaries for the Establishment of a European Space Agency and the text of the Convention appear at 14 I.L.M. 855 & 864 (1975).

<sup>12</sup> One of the most recent agreements is the Agreement on Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes, signed April 15, 1987, and appears at 26 I.L.M. 622 (1987).

governments of the United States of America, member States of ESA, Japan, and Canada.<sup>13</sup>

International society and international law have no centralized legislature with power to promulgate rules binding on States. Contrary to a widely-held fallacy, general international law (otherwise known as customary international law) has been applicable to outer space from the very beginning, at least insofar as relations between States are concerned.<sup>14</sup> However, general international law as applied to outer space provides only the basic ground rules, which need to be supplemented with additional and detailed norms as the need arises. In the absence of an international legislature, treaties fulfill the role of contracts and, imperfectly, that of legislation in domestic law. As the 1969 Vienna Convention on the Law of Treaties<sup>15</sup> makes it clear in its Articles 34 and 38, treaties are legally binding only on those who have agreed to them, although this does not mean that treaty provisions cannot evolve into rules of general international law when and if so recognised by the generality of States.<sup>16</sup> At the moment, the surest and most effective way of creating legally binding rules applicable in space is through treaties.

Although many human endeavours are undertaken for their own sake, such as the scaling of the Everest, man's entry into outer space was not only accompanied by unprecedented excitement but also attended by great expectations. As the Preamble to the Outer Space Treaty says, it opened "great prospects."<sup>17</sup>

While outer space's military potential will always remain uppermost in the priorities of governments, its commercial prospects surely cannot be far behind. Indeed, more than ten years before man's entry into space, Arthur C. Clarke, in his seminal article on Extra-Terrestrial Relays<sup>18</sup> was already pointing to the possibility of what has now turned out to be one of the biggest industries in outer space. The pace of commercial development in outer space is such that less than twenty years after Clarke's article and at least two years before the Outer Space Treaty was adopted by the United States General Assembly, an

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<sup>13</sup> Agreement Among the Government of the United States of America, Governments of Member States of the European Space Agency, the Government of Japan, and the Government of Canada on Cooperation in the Detailed Design, Development, Operation, and Utilization of the Permanently Manned Civil Space Station, signed Sept. 29, 1988 (*not in force* as of this issue) [hereinafter "IGA"]. See also *infra* note 58.

<sup>14</sup> See Cheng, *The Extra-Terrestrial Application of International Law*, 18 CURRENT LEG. PROBLEMS 132 (1965).

<sup>15</sup> Vienna Convention on the Law of Treaties, done May 23, 1969, 1155 U.N.T.S. 331 (*entered into force* Jan. 27, 1980), 8 I.L.M. 679 (1969).

<sup>16</sup> *Id.* at arts. 34 & 38. See also *infra* note 22.

<sup>17</sup> Outer Space Treaty, *supra* note 1, at Preamble.

<sup>18</sup> Clarke, *Extra-Terrestrial Relays*, WIRELESS WORLD 305 (1945).

international treaty was signed<sup>19</sup> by no fewer than 45 countries setting up a Global Commercial Communications Satellite System, the International Telecommunications Satellite Consortium, which is the predecessor of the present International Telecommunications Organization, both known as INTELSAT. INTELSAT currently has well over 100 member States.<sup>20</sup>

The experience of INTELSAT teaches us that the commercial development of outer space is likely in many cases to be an international effort which, moreover, has to be fitted into the international legal framework that is now gradually being built up through either the United Nations or the practice of States, beginning, as we have seen, especially with the Outer Space Treaty. The purpose of this paper is to examine what, if any, further treaties may now be required - or urgently required - in view of present and future commercial developments in outer space.

#### *Relevance of International Law for Commercial Space Activities*

International law, including international treaties, is of particular significance for commercial activities in space on account of the basic international legal framework established by the Outer Space Treaty for the exploration and use of outer space. From this point of view, the most relevant provision is its Article VI, which provides:

States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States

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<sup>19</sup> Agreement Establishing Interim Arrangements for a Global Commercial Communications Satellite System and Special Agreement, done Aug. 20, 1964, 15 U.S.T. 1705, T.I.A.S. No. 5646, 514 U.N.T.S. 25 (entered into force Aug. 20, 1964). See also Cheng, *Communications Satellites*, 24 CURRENT LEG. PROBLEMS 211 (1971).

<sup>20</sup> See UNITED STATES DEPARTMENT OF STATE TREATIES IN FORCE 375 (1990).

Parties to the Treaty participating in such organization.<sup>21</sup>

Some may claim, probably not without justification, that this article has already passed, through general acceptance, from being a mere treaty provision binding only upon the parties into the realm of general international law binding on all States.<sup>22</sup> In any event, under Article VI, unlike in any other field of commercial activities, all commercial national activities in outer space (which, following the Treaty, will here always be used to include the moon and other celestial bodies, unless otherwise stated), whether carried on, as the Treaty says, by governmental agencies or non-governmental entities, either directly or through international organizations, are, as among the contracting States, insofar as responsibility towards one another, including one another's nationals, is concerned, to be treated as activities of the State, for which the State bears direct State responsibility.<sup>23</sup> This means that contracting States have a critical interest in regulating, as well as, under the Outer Space Treaty, a duty to control and supervise private national space activities in order to be sure that these activities conform to their obligations under the Outer Space Treaty, international law, and the Charter of the United Nations.<sup>24</sup> It means also that the simplest way of regulating commercial space activities internationally is by means of international law, including treaties. Furthermore, this means that all those involved in commercial space activities need to be directly concerned and fully conversant with all the relevant rules of international space law, including all the pertinent treaties.

#### *Where Begins Outer Space?* <sup>25</sup>

We talk of space law and of outer space, but where does outer space begin? Ever since the beginning of the space age, this question has been asked. However, for reasons best known to itself, but probably through self-interest as the leading space power, the United States has consistently refused even to have the subject discussed. In its stance, it is assisted by the so-called "functionalist school" of international space lawyers who

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<sup>21</sup> Outer Space Treaty, *supra* note 1, at art. VI.

<sup>22</sup> On the metamorphosis of treaty provisions into rules of general international law, see Cheng, *Custom: The Future of General State Practice in a Divided World*, in *THE STRUCTURE AND PROCESS OF INTERNATIONAL LAW* 513, 532-33 (R. St. J. Macdonald & D.M. Johnston eds. 1983).

<sup>23</sup> See Cheng, *Space Activities, Responsibility and Liability For*, in *ENCYCLOPEDIA OF PUBLIC INTERNATIONAL LAW* 299 (R. Bernhardt ed. Inst. 11 1989).

<sup>24</sup> See U.N. CHARTER. See also Outer Space Treaty, *supra* note 1, at art. III.

<sup>25</sup> See Cheng, *The Legal Regime of Airspace and Outer Space: The Boundary Problem-Functionalism Versus Spatialism: The Major Premises*, 5 *ANNALS AIR & SPACE L.* 323 (1980).

believe that all one has to do is to regulate space activities. According to them, one need not, or even should not, try to define where outer space begins, as is advocated by the so-called spatialists who believe that the boundary question between national airspace and outer space should be settled as a matter of priority.

The functionalists' argument is in reality based on false premises; for, insofar as international law is concerned, the initial and most fundamental level of classification is spatial (to avoid the issue and call it zonal is merely to play with words) which precedes, and in fact determines, any functional classification whether an activity is lawful or not lawful. International law, first of all, divides the world into three traditional categories of territory, namely: (i) national territory, over which States exercise complete and exclusive sovereignty, (ii) *territorium nullius*, or "no-man's land," i.e., territory which belongs to no State and which is capable of being appropriated by States under the rules of international law, and (iii) *territorium extra commercium*, or "territory outside commerce," i.e., territory which belongs to no State and is, under international law, not subject to appropriation by States or their nationals, though its resources are. The High Seas are the prime example of *territorium extra commercium*. Article II of the Outer Space Treaty has now added outer space, including the moon and other celestial bodies, to this category.<sup>26</sup> Lately, a fourth category has been created by treaty, namely, (iv) territory that constitutes a "common heritage of mankind" where neither the area itself nor its resources may be individually appropriated by States or their nationals for their own benefit. The Moon Treaty was the first multilateral treaty to give recognition to this new category by declaring the moon and other celestial bodies within the solar system other than the Earth the common heritage of mankind.<sup>27</sup>

The legality of an act under international law depends in many instances not upon the nature of the act itself but upon where it takes place. This is because, whereas, on the one hand, within the territory of a State, the legal presumption is that a State is entitled to regulate everything that goes on within it and the legality of an act depends ultimately upon the law of that State; on the other hand, in all the other categories of territory, the presumption is against any State having such a right except over its nationals, and ships, aircraft and spacecraft of its own registry. The presumption is in fact in favour of freedom of activity by all States and their nationals, unless there is a rule of international law against it. Take for instance military reconnaissance conducted by aircraft of State A of military installation in State B - the question is not whether military reconnaissance is functionally a permitted activity under international law. The answer depends on where it takes place. On the one hand, from State A, from above no-man's land, from above the High Seas

<sup>26</sup> Outer Space Treaty, *supra* note 1, at art. II.

<sup>27</sup> See Moon Treaty, *supra* note 6, at art. 11, para. 1. See also Cheng, *The Moon Treaty*, 33 CURRENT LEG. PROBLEMS 213 (1980).

and from what may be a common heritage of mankind, it would all be lawful. It becomes unlawful, on the other hand, only if conducted without authorization inside the territory of State B.<sup>28</sup> The position of space activities is not greatly dissimilar.

What the functionalists are advocating is, in effect, to brush aside the rule and existence of sovereignty over national airspace in favour of space activities. For non-space powers to embrace it is to renounce part of their territorial sovereignty in favour of other States' space activities. However, even for space powers, the acceptance of such a doctrine can be an act of highly short-sighted complacency; for in claiming that their space objects have a right to operate freely in foreign airspace, they would also be renouncing a part of their sovereignty over their own airspace. Reciprocity is the cornerstone of international law. The tables can easily be turned one day, and the space activities of other States in one's own airspace may prove highly intrusive. When that happens, States that now embrace functionalism or an arrogant policy of "you-don't-need-to-know" may well rue their erstwhile craftiness and complacency.

That space powers would like to have a more or less free hand in the airspace of other States for their space activities is, however, not confined only to those who embrace functionalism. The Soviet Union which, after some initial vacillation converted to spatialism, in its working paper put forward in 1987,<sup>29</sup> while proposing the definition by treaty of a boundary between airspace and outer space not exceeding 100 (110) kilometres above sea level, added that space objects of States shall retain the right to fly over the territory of other States at altitudes lower than 100 (110) kilometres above sea level for the purpose of reaching orbit or returning to Earth in the territory of the launching State.<sup>30</sup>

The Soviet Union is correct in seeing the logical and legal necessity that there must be a clear and definite, albeit not necessarily definitive and inalterable, boundary between airspace and outer space defined by treaty. It is, however, not quite straightforward when it tries to suggest that there exists already a legal right of passage for space objects ("shall retain the right"), under general international law, through the airspace of other States "for the purpose of reaching orbit or returning to earth." There is no evidence that such a right exists. Indeed, what guarantee is there that, if a South Korean space object on its return to Earth tomorrow were to fly through Soviet airspace, by a coincidence, successively over both the Kamchatka Peninsula and the Sakhalin Island along more or less the same route as that of Korean Air Lines' ill-fated flight KE007 on the

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28 See Cheng, *supra* note 25, at 346-50.

29 See U.N. Doc. A/C.105/C.2/L.121 (reissued vers. Mar. 28, 1979).

30 *Id.* See also Cheng, *supra* note 25, at 326.

fateful night of 31 August-1 September 1983, it would be accorded safe passage?<sup>31</sup>.

#### *Need To Delimit Airspace*

In any event, all these merely go to show that, if commercial space flights were to develop, it is essential that the question of boundary between airspace and outer space should be clearly defined by a treaty, as well as the position of space objects which, either by design or by accident, find themselves in or in transit through foreign airspace. From this point of view, the Soviet proposal of 100 or alternatively 110 kilometres is probably very close to the existing position under general international law in accordance with current State practice which regards all satellites so far in orbit to be in outer space.<sup>32</sup> However, just as in the case of the territorial sea, the maximum breadth of which is now accepted in the 1982 United Nations Convention on the Law of the Sea (Law of Sea Convention) as 12 nautical miles<sup>33</sup> instead of the customary three, there is nothing in law to prevent the generality of States from agreeing now to either a higher or a lower limit than 100 (110) kilometres, or, having agreed to one now, from subsequently agreeing to raise or lower it. The main thing for those contemplating entry into the commercial development of space is the need for some assurance of at least a modicum of certainty in the law. The danger for them of the major space powers wishing to keep all the options open by refusing to make clear where their territorial airspace, over which they have, in law, absolute control, ends - and where outer space, over which legally they have absolutely no such right, begins - lies in such powers abruptly deciding on an alternative option. One may suddenly find one day that one's spacecraft is impounded or even destroyed for allegedly trespassing in another State's national airspace. These kind of things have happened before with maritime frontiers. Certainty is essential.

#### *Need To Regularize Status Of Space Objects In Foreign Airspace*

Once a boundary has been fixed, assuming the height is such that space objects - on their way to, and their return from, outer space - may occasionally have to fly through other States' airspace, then from the standpoint of space flights, it would obviously be desirable if the position

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<sup>31</sup> See Cheng, *The Destruction of KAL Flight KE007, and Article 3bis of the Chicago Convention*, in AIRWORTHY: LIBER AMICORUM HONOURING PROFESSOR DR. I.H. PH. DIEDERIKS-VERSCHOOR 49 (J. Storm van's Gravesande & A. van der Veen Vonk eds. 1985).

<sup>32</sup> Cheng, *supra* note 25, at 350.

<sup>33</sup> United Nations Convention on the Law of the Sea, *opened for signature* Dec. 10, 1982, U.N. Doc. A/CONF.62/122. The 1982 Convention is not yet in force, but many of its provisions have already been recognized as stating rules of current general international law.

of space objects in foreign airspace were at the same time to be clearly defined. By analogy with air law and the law of the sea, various options exist. The starting point is that States exercise complete and exclusive sovereignty over the airspace above their territory<sup>34</sup> with the result that no foreign objects may fly through it without the permission of the subjacent State. However, in air law, after distinguishing between civil and State aircraft,<sup>35</sup> States have been fairly liberal in granting transit rights to foreign civil aircraft. The grant is made in either bilateral or multilateral treaties, without treating it as a matter of right under general international law. In the law of the sea, merchant ships have traditionally enjoyed a legal right of innocent passage through foreign territorial seas, a right which appears to have now been extended to all ships, if not already by the 1958 Geneva Convention on the Territorial Sea,<sup>36</sup> then definitely by the United Nations Convention on the Law of the Sea,<sup>37</sup> even though the Law of the Sea Convention has yet to come into force.<sup>38</sup> This right of innocent passage does not, however, apply to aircraft, civil or military. But as a result of a great deal of horse-trading, the Law of the Sea Convention, even though it is itself not yet in force, has probably already helped to introduce into general international law a new rule, that of a right of transit passage through straits used for international navigation,<sup>39</sup> and a right of archipelagic sea lanes passage,<sup>40</sup> for "all ships and aircraft," whether civil or military, subject to only minimal control by the coastal State or States.

The 1979 Soviet proposal, in its third paragraph, appears to be fishing for the recognition by treaty of a right under general international law similar to the rather unfettered "right of transit passage" for space objects to transit foreign airspace, which will, therefore, need no further consent from the territorial State.<sup>41</sup> It is questionable whether the

<sup>34</sup> See Chicago Convention on International Civil Aviation, art. 1, done Dec. 7, 1944, 61 Stat. 1180, T.I.A.S. No. 1591, 3 Bevans 944, 15 U.N.T.S. 295 (entered into force Apr. 4, 1947) [hereinafter "Chicago Convention"]. There is sometimes a notion that this article states a rule exclusively for the purpose of aviation or air law; see e.g., H.C. VAN TRAA-ENGELMAN, COMMERCIAL UTILIZATION OF OUTER SPACE - LEGAL ASPECTS 38 (1989). Both the history and the wording of the article make it clear that the contracting States are merely stating a rule of general international law. See B.CHENG, THE LAW OF INTERNATIONAL AIR TRANSPORT 120 (1962).

<sup>35</sup> Chicago Convention, *supra* note 34, at art. 3.

<sup>36</sup> Geneva Convention on the Territorial Sea and Contiguous Zone, signed Apr. 29, 1958, 15 U.S.T. 1606, T.I.A.S. No. 5639, 516 U.N.T.S. 205 (entered into force Sept. 10, 1964).

<sup>37</sup> Law of the Sea Convention, *supra* note 33, at art. 17. The title of pt. II, sec. 3(A) contains a reference to "all ships."

<sup>38</sup> See *supra* note 33.

<sup>39</sup> *Id.* at pt. III, sec. 2, art. 37-44

<sup>40</sup> *Id.* at art. 53-54.

<sup>41</sup> See *supra* note 29.

generality of States will be agreeable to such a solution. What may be achievable is a multilateral agreement similar in nature, though not necessarily in detail, to the International Air Services Transit Agreement or Article 5 of the Chicago Convention on International Civil Aviation, both of 1944, in air law.<sup>42</sup> In such a treaty, States can grant one another the right of (innocent) passage for their (civil) space objects and those of their nationals on their way to outer space (or only when to "earth orbit and beyond" as Article II of the Registration Convention says), and on their return to Earth.<sup>43</sup> The exercise of this right can be subjected to specific limitations and conditions, such as compliance with international law and regulations, and being civil space objects engaged in activities exclusively for peaceful (*i.e.*, non-military) purposes. Such a right would be particularly useful in the case of aerospace craft, or in certain circumstances even the shuttle, but it can also be of benefit to other types of spacecraft. In the absence of a multilateral treaty, such a right would have to be secured bilaterally.

#### *Urgent Need To Clarify A Number Of Other Terms And Concepts*

What has just been said raises questions regarding at least two concepts which, from the standpoint of commercial development, are among those that are in urgent need of clarification. One is the meaning of peaceful purposes, the other that of space object. Others include a number of points arising from Article VI of the Outer Space Treaty, especially when read in conjunction with related instruments, such as the Liability Convention and the Registration Convention. F.K. Nielsen, the American Commissioner on the Mexican-United States General Claims Commission (1923), once said:

An inaccurate use of terminology may sometimes be of but little importance, and discussion of it may be merely a quibble. But accuracy of expression becomes important when it appears that inaccuracy is due to a confusion of thought in the understanding or application of proper rules or principles of law.<sup>44</sup>

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<sup>42</sup> International Air Services Transit Agreement, done Dec. 7, 1944, 59 Stat. 1693, T.I.A.S. No. 487, 84 U.N.T.S. 389 (*entered into force upon acceptance*); Chicago Convention, *supra* note 34, at art. 5. See also Cheng, *supra* note 34, at 193 & 291.

<sup>43</sup> Registration Convention, *supra* note 5, at art. II.

<sup>44</sup> International Fisheries Co. Case (U.S. v. United Mexican States), Opinions of Commissioners 207, at 265-66 (U.S. - Mexican Gen. Claims Comm. 1931); U.N. Rep. Int'l Arb. Awards 691, 731.

*Peaceful Purposes*<sup>45</sup>

Nowhere is what has just been said more apposite than with regard to the word "peaceful" in the Outer Space Treaty. In numerous treaties relating to nuclear energy<sup>46</sup> and more particularly in the 1959 Antarctic Treaty<sup>47</sup> (which was very much on the minds of those who drew up the Outer Space Treaty, especially its Article I),<sup>48</sup> the word "peaceful" is used in contradistinction to "military." At the time the Outer Space Treaty was being discussed, there was much clamour that outer space should only be used for "peaceful", *i.e.*, non-military purposes. The then only two space powers both played to the gallery by claiming that all their space activities, including the most important one at the time, namely, military reconnaissance, were "peaceful." On the one hand, the Soviet Union, used to controlling the media -- at least at home -- and distorting facts, simply denied that it ever engaged in such internationally "illegal" activity as spying on anyone, especially not from outer space, even though it was obviously indulging in such activity. Its satellites were all said to be for "scientific research." The Soviet Union stated that only the Americans were guilty of "spying" from space and that they must be stopped at once. On the other hand, the United States which, since the days of President Eisenhower's abortive "Open Sky" Plan, has been euphemistically dubbing U-2 and similar flights over others' territories as mere "aerial surveillance" for "peaceful purposes," cheerfully distorts the term "peaceful" to mean any activity that is "non-aggressive." These tactics enabled both the Soviet Union and the United States blithely to maintain to the world that all their military reconnaissance satellites were satellites used exclusively "for peaceful purposes." Now that the Soviet Union admits, albeit implicitly, to using reconnaissance satellites, its position is somewhat ambiguous. However, the rest of the world, in a supreme mixture of Machiavellian worldliness and naive self-deception, has ever since made believe that outer space is now being used only for peaceful purposes.

But those who drafted the Outer Space Treaty were not so naive and they were much more careful with their words. Contrary to the pronouncements of many a politician and even eminent commentator, the Outer Space Treaty nowhere lays down a legal obligation upon its contracting parties to use the whole of outer space only for "peaceful purposes." Some have referred to the Preamble.<sup>49</sup> However, leaving aside

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45 See also Cheng, *The Legal Status of Outer Space and Relevant Issues: Delimitation of Outer Space and Definition Of Peaceful Uses*, 11 J. SPACE L. 89 (1983).

46 Cheng, *International Co-operation and Control: From Atoms to Space*, 15 CURRENT LEG. PROBLEMS 226 (1962).

47 Treaty on Antarctica, signed Dec. 1, 1959, 12 U.S.T. 794, T.I.A.S. No. 4780, 402 U.N.T.S. 71 (entered into force June 23, 1961).

48 Outer Space Treaty, *supra* note 1, at art. 1.

49 *Id.* at Preamble.

the question whether the preamble of a treaty can have such a far-reaching effect, all that the Preamble says is how nice it would be to explore outer space for peaceful purposes. It does not say that outer space may be used only for "peaceful purposes." The only provision in the Outer Space Treaty which limits the use of any part of outer space to "exclusively . . . peaceful purposes" is to be found in the second paragraph of Article IV, but, in very explicit terms, it applies only to "the moon and other celestial bodies."<sup>50</sup> A simple comparison of the two paragraphs of Article IV, and a careful examination of the history and wording of the Outer Space Treaty will show that this restriction does not apply to paragraph 1; hence, the restriction does not apply to the empty space between all the celestial bodies (unfortunately the Outer Space Treaty has deprived us of a simple description of this vast area). In paragraph 1, the only obligation is not to leave any nuclear weapons or other kinds of weapons of mass destruction lying around in outer space either in Earth orbit or "in any other manner."<sup>51</sup> Otherwise, contracting States are perfectly free to have in this vast void any type and any number of military space objects, including reconnaissance and communications satellites, as well as any kind of defensive or even offensive weapons, provided that they are neither nuclear nor weapons of mass destruction.

However, prompted - it would appear - by an initial misreading of the Outer Space Treaty and the erroneous belief that the restriction of use for "exclusively peaceful purposes" extends not only to the moon and other celestial bodies, but also to the whole of outer space between such celestial bodies, and flying in the face of the international acceptance of the word "peaceful" as evidenced by the nuclear energy treaties, the Antarctic Treaty and in fact the clear wording of the Outer Space Treaty itself, the United States insists that "peaceful" in Article IV, paragraph 2 means not "non-military," but "non-aggressive."<sup>52</sup> The simple fact that the United States' interpretation has the effect of making the first sentence of Article IV, paragraph 2 of the Outer Space Treaty meaningless and redundant shows that it cannot be correct. The Soviet Union opposes it. Friends and allies of the United States - some having been bullied or duped into accepting the United States' interpretation - mostly suffer it in silence, sorrow and despair.

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<sup>50</sup> *Id.* at art. IV, para. 2.

<sup>51</sup> *Id.* at art. IV, para. 1.

<sup>52</sup> A not uninteresting parallel is the way in which the words "States" and "nation" have acquired in the United States meanings different from, and almost opposite to, their original and current international acceptance. The *E pluribus unum* aspiration and notion of one "nation" has over the years been, so to speak, secularized to devote simply what the rest of the world would call a "State," while the term "State" carries a somewhat vague connotation of being merely a component part of a "nation" with a different set of laws and zip code or perhaps just where one lives or has a house.

This is not the place to go further into the subject,<sup>53</sup> except to say that clarification of the meaning of this term, and of the scope of its application in outer space, by means of an international agreement is of vital importance to future commercial development in outer space. In the absence of such clarification, one can easily find that what one is geared up to do, is actually doing, or has just done is out of the blue branded as a violation of the law because it is not "for peaceful purposes." The State or States responsible under Article VI of the Space Treaty would also be immediately involved and made responsible for this "violation."<sup>54</sup> In this connection, reference may be made to the first sentence of Article 1 and the last sentence of Article 14, paragraph 1 of the 1988 Agreement between the United States of America, member States of the European Space Agency, Japan, and Canada on a Permanently Manned Civil Space Station:<sup>55</sup>

Article 1. Object and Scope. 1. The object of this agreement is to establish a long-term international cooperative framework among the Partners . . . for the detailed design, development, operation, and utilization of a permanently manned civil Space Station for peaceful purposes, in accordance with international law. . . .<sup>56</sup>

Article 14. Evolution. 1. . . . The Space Station together with its additions of evolutionary capability shall remain a civil station, and its operation and utilization shall be for peaceful purposes, in accordance with international law.<sup>57</sup>

It will be observed that here at least the partners of the United States in this joint venture have succeeded, albeit in perhaps a somewhat roundabout way, in making it clear that by "peaceful purposes" they mean civil, *i.e.*, non-military, projects, even if the United States may still have some

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53 See also Cheng, *supra* note 45.

54 Outer Space Treaty, *supra* note 1, at art. VI.

55 IGA, *supra* note 13, at art. 14, para. 1.

56 *Id.* at art. 1.

57 *Id.* at art. 14.

reservation on the subject.<sup>58</sup> A general and more explicit agreement on the subject is urgently required.

*Status of Space Objects*<sup>59</sup>

Another term or group of terms which require clarification, definition and standardization are "space objects" and related expressions and notions. The various treaties at present speak, seemingly without much discrimination, of space vehicles, spacecraft, space objects, man-made space objects, objects launched into outer space and so forth. In addition, references have also been made to satellites, artificial satellites, and particularly in relation to the moon and celestial bodies, installations, constructions, vehicles, equipment, facilities and so forth.

Unless these and related terms and notions are urgently clarified and defined, and their usage standardized, much confusion will arise. It will be difficult both for the regulators to regulate and for those who have to comply with the regulations to comply. The matter is further complicated by the fact that, since territorial sovereignty has been banned from outer space<sup>60</sup> and, with it, territorial jurisdiction, the overriding jurisdiction in outer space now is quasi-territorial jurisdiction.<sup>61</sup> Under Article VIII of the Space Treaty, this quasi-territorial jurisdiction

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<sup>58</sup> In an Exchange of Notes dated 19/20 September 1988 between the Chief U.S. Negotiator and the Head of the European Governments' Delegation to the International Space Station Negotiations, the latter confirmed as correct the former's "automatic reservation" that not only "the United States has the right to use its elements, as well as its allocations of resources derived from the Space Station infrastructure, for national security purposes," but also "[w]ith respect to such uses of these elements and resources, the decision whether they may be carried out under the Agreement will be made by the United States." But the latter also added that: "I should like to confirm that, with respect to the use of elements of the permanently manned civil Space Station provided by Europe, the European Partner will be guided by Article II of the Convention establishing the European Space Agency". (Text reproduced in ESA, PROCEEDINGS OF THE COLLOQUIUM ON MANNED SPACE STATIONS - LEGAL ISSUES 145-46 (1990)). Article II of the ESA Convention states very clearly: "The purpose of the Agency shall be to provide for and to promote, for exclusively peaceful purposes, co-operation among European States in space research and technology and their space applications, with a view to their being used for scientific purposes and for operational space applications systems . . ."

<sup>59</sup> See also Cheng, *Spacecraft, Satellites and Space Objects*, in *ENCYCLOPEDIA OF PUBLIC INTERNATIONAL LAW* 309 (R. Bernhardt ed. Inst. 11 1989).

<sup>60</sup> Outer Space Treaty, *supra* note 1, at art. II, which states: "Outer space, including the moon and other celestial bodies, is not subject to national appropriation by the claim of sovereignty, by means of use or occupation, or by any other means of use or occupation, or by any other means." See also Cheng, *The 1967 Space Treaty*, 95 *JOURNAL DU DROIT INTERNATIONAL* 532, 564 (1968).

<sup>61</sup> On State jurisdiction in outer space, see further Cheng, *supra* note 14.

appears to be anchored on the registration of a space object.<sup>62</sup> Article VIII of the Space Treaty 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 an object, and over any personnel thereof, while in outer space or on a celestial body. Ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the earth. Such objects or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to the State Party, which shall, upon request, furnish identifying data prior to their return.<sup>63</sup>

Assuming that "space object" is the most comprehensive term which includes "spacecraft," "space vehicles," and "artificial satellites," the first question that requires elucidation is "What is a space object, and when does an object begin and cease, if ever, to qualify as a space object?"

The Registration Convention in its Article II only requires space objects "launched into earth orbit or beyond" to be registered.<sup>64</sup> No doubt on this basis, the Swedish Space Activities Act of 1982,<sup>65</sup> for example, does not consider the launching of sounding rockets as a space activity. Is a sounding rocket, which may well go up to 500 kilometres above the surface of the Earth, nevertheless a space object? Does it benefit from the Astronauts Agreement? On the international level, is its launching nonetheless a national activity in outer space, for which the "national" State bears international responsibility under Article VI of the Outer Space Treaty? Does the sounding rocket come under the Outer Space Treaty's Article VII on the liability of the launching State for damage caused by objects launched "into outer space?" Is it subject to the Liability Convention, which simply refers to "space object?" Is being launched "into outer space" the decisive criterion? Or "into earth orbit and beyond?" Where is outer space any way? One comes back to the problem of delimitation of outer space. In any event, the wording of Article II of the Registration Convention, in requiring only space objects "launched into earth orbit or beyond" to be registered, does not appear to preclude

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<sup>62</sup> Outer Space Treaty, *supra* note 1, at art. VIII.

<sup>63</sup> *Id.*

<sup>64</sup> Registration Convention, *supra* note 5, at art. II.

<sup>65</sup> Swedish Space Activities Act of 1982 (1982:963). The Act is supplemented by a decree, Decree on Space Activities (1982:1069). See Reifarh, *Nationale Weltraum Gesetze in Europa*, 36 ZEITSCHRIFT FÜR LUFT- UND WELTRAUMRECHT 11 (1987).

that there may be space objects which are not launched into Earth orbit or beyond. They simply need not be registered.<sup>66</sup>

A not entirely dissimilar but much more thorny problem is that of ballistic missiles which are aimed at targets in outer space or which traverse outer space in order to reach targets on Earth. As has been mentioned before, in the field of aviation, the International Civil Aviation Convention frankly and modestly limits itself to international civil aviation, leaving aircraft used in military, customs and police services severely alone.<sup>67</sup> Up to a point, one is still in the rather euphoric honeymoon period of space exploration and use, and one likes to foster and wallow in the myth that outer space is being used by everyone only for "peaceful purposes," notwithstanding all the military hardware that are already there or that may hereafter be sent up there; for they are, after all -- ours at least --, all "non-aggressive." Do they all come under the various United Nations treaties on outer space? The fact that no military space object seems so far to have found its way into the United Nations register can of course be interpreted in many different ways. It is, however, interesting to observe that the United States accepts that military space objects are not excluded from the Liability Convention.<sup>68</sup> Moreover, what is the status of shuttles and aerospace craft when they are in airspace? Then there is the enormous problem of debris in outer space. When, if ever, does a space object or fragment of a space object cease to be a space object -- an object "launched into space?" What is the interrelationship between registration, ownership, liability, and jurisdiction in regard to debris? Can space objects become *res derelictae* through the State of registry formally de-registering them, if they are registered objects? Can such abandonment and de-registration have any effect on the launching State's liability? Can one encourage prompt registration, and at the same time help solve the quandary over ownership of disused space objects and other junk in outer space, by declaring that all objects which have not been registered with the United Nations within so many days, weeks or months of their launch are to be treated like stray dogs without a licence that can be disposed of by anyone, without prejudice, however, to the launching State's liability for any damage which such objects may cause to third parties. Whether or not States have the will to go this far, it is evident that, for the sake of all the parties concerned, the notion and status of "space object" need urgently to be clearly defined.

#### *Space Objects And Jurisdiction*

The question of jurisdiction in relation to space objects is no clearer. Article VIII of the Space Treaty, as we have seen, appears to

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<sup>66</sup> See Registration Convention, *supra* note 5, at arts. II & IV.

<sup>67</sup> Chicago Convention, *supra* note 34, at art. 3.

<sup>68</sup> S.REP. No. 92-38, 92d Cong., 2d Sess. (1972). See also Cheng, *supra* note 23, at 301.

attach jurisdiction to registration.<sup>69</sup> However, it also speaks of the State of registry "retaining" jurisdiction and control over the space object "while [it is] in outer space or on a celestial body,"<sup>70</sup> suggesting that such jurisdiction and control exist both before it enters outer space and, in view especially of Article VIII's second and third sentences, after its return to Earth.<sup>71</sup> However, presumably, an object does not become a space object, at the earliest, until it is launched or is at least being prepared for launching into outer space. Its status as a space object, at present, certainly does not appear to date from either national or United Nations registration, as, notwithstanding calls for this to be done, the Registration Convention does not really require that registration be made prior to launching,<sup>72</sup> and, in practice, registration with the United Nations is often long delayed.

But does Article VIII of the Space Treaty nevertheless have the effect of making jurisdiction dependent on registration? In this regard, it may be pointed out that, although the rules of registration of space objects were finally agreed upon in 1975,<sup>73</sup> in the intervening years, two other treaties concerned with outer space concluded under the auspices of the United Nations eschewed any reference to registration. The Astronauts Agreement speaks only of the "launching authority,"<sup>74</sup> whilst the Liability Convention only of the "launching State."<sup>75</sup> The former defines the "launching authority" as either the State or an appropriate international organization "responsible for launching" the space object,<sup>76</sup> whereas the latter is more explicit in defining a "launching State" as a State (or appropriate international organization) which launches or procures the launching of a space object, or one from whose territory or facility a space object is launched.<sup>77</sup> In other words, in a given launch, there can be four separate States or organizations all falling within the definition of the "launching State." For example, if State A requests State B to launch one of State A's satellites from a facility owned by State C located in State D, all four States (States A, B, C and D) will be launching States for that launch, and all four States will be jointly and severally liable for any damage caused by that space object.<sup>78</sup>

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69 Outer Space Treaty, *supra* note 1, at art. VIII. *See supra* text to note 63.

70 *Id.*

71 *Id.*

72 *Cf.* Registration Convention, *supra* note 5, at art. II & IV. *See supra* text to note 66.

73 Registration Convention, *supra* note 5.

74 Astronauts Agreement, *supra* note 3.

75 Liability Convention, *supra* note 4.

76 Astronauts Agreement, *supra* note 3, at art. 6.

77 Liability Convention, *supra* note 4, at arts. I, para. c & XXII.

78 *See* Liability Convention, *supra* note 4, at arts. II & V. *Cf.* Outer Space Treaty, *supra* note 1, at art. VII.

Now, does the term "launching authority" in the Astronauts Agreement have the same meaning as "launching State" in the Liability Convention? It may be observed that, while Article VIII of the Outer Space Treaty says that ownership is not affected by space objects having been launched into outer space,<sup>79</sup> on the one hand, Article VIII prescribes that strayed space objects found should be returned to the State of registry,<sup>80</sup> whereas, on the other hand, the Astronauts Agreement provides that they should be, upon request, returned to the launching authority or held at the disposal of its representatives.<sup>81</sup> No mention is made of either the owner or his national State. In any event, there is need to straighten out the discrepancy between the two treaties. Now that the Registration Convention has been fairly widely accepted, probably there is no more inhibition in making the State of registry the principal or even sole connecting factor, apart from the matters of international responsibility and international liability.

In fact, there is probably much to be said for going back to the traditional concept of nationality in space law which would create a direct and visible link between registration and jurisdiction; for at the moment, notwithstanding Article VIII of the Outer Space Treaty, registration and jurisdiction are not always tied together as stated in that article. This is especially true when space objects are being launched jointly by several States either directly or indirectly, through or together with an international organization. Article II of the Registration Convention seemingly permits the States concerned, after registering the space object with one of them, to conclude "appropriate agreements" among them "on jurisdiction and control over the space object and over any personnel thereof."<sup>82</sup> All that they are asked to do is to "bear . . . in mind the provisions of Article VIII" of the Outer Space Treaty.<sup>83</sup> Although Article II of the Registration Convention appears to have the merit of affording the States concerned the maximum of flexibility in the matter, it may well be open to question whether, in the light of Article VIII of the Outer Space Treaty, once an object has been registered, States have any discretion to alter the link between registration and jurisdiction. If, in practice, Article VIII is to be so interpreted as to permit States unfettered discretion to make alternative arrangements, uncertainty in any concrete case is bound to arise as to which State actually enjoys jurisdiction and control over a space object, with all the attending consequences, such as which State's law is applicable to it and on board. This is particularly so since the Registration Convention does not even require such arrangements to be reported to the United Nations and recorded in its register. In this connection, the view which has been expressed by the United Nations

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79 Outer Space Treaty, *supra* note 1, at art. VIII.

80 *Id.*

81 Astronauts Agreement, *supra* note 3, at art. 5, para. 3.

82 Registration Convention, *supra* note 5, at art. II.

83 *Id.*

General Counsel to the European Space Agency that similar arrangements may be made by international organizations, for jurisdiction and control over space objects registered with them to be exercised by one of their members or any of the States with which such organizations may have jointly launched a given space object,<sup>84</sup> will inevitably lead to further erosion of the rule that jurisdiction and registration go hand in hand.<sup>85</sup> Notwithstanding some of the problems connected with the concept of nationality in aviation and shipping and the important role played by international organizations in the exploration and use of outer space, it does appear that there is much to be said for a new arrangement introducing the concept of nationality to space law in order to tie jurisdiction and control over space objects to registration and to remove the many uncertainties which now exist in this field.

Such a move is useful in other ways. At present, neither Article VIII of the Outer Space Treaty nor the Moon Treaty is very helpful over the status of objects on celestial bodies, including constructions, installations, equipment, facilities, vehicles, and stations, manned or unmanned. Both treaties dwell on ownership being unchanged. The Moon Treaty seemingly even links jurisdiction and control to ownership.<sup>86</sup> This creates uncertainty and is probably contrary to Article VIII of the Outer Space Treaty. If the experience with the shuttle is any guide, while payloads which remain on board in outer space are not separately registered, those which are going to be separated from the shuttle are individually registered.<sup>87</sup> Clarification of when a space object needs to be registered and endowed with nationality together with all the attending consequences, and when it need not be, should prove of great practical importance to all those intending to be involved in commercial development in outer space;

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<sup>84</sup> The author is grateful to Monsieur G. Lafferranderie, Legal Advisor of the European Space Agency, for the text of the letter of 19 September 1973 from Mr. E. Suy, the Legal Counsel of the United Nations, to the Agency's Deputy Director in charge of International Affairs Mr H. Kaltenecker, regarding the application of the Registration Convention to international intergovernmental organizations, in which the former stated *inter alia*:

Where an international intergovernmental organization launches a space object jointly with one or more States, the provisions of paragraph 2 of Article II are relevant. In other words, the organization and the States may enter into appropriate agreement on jurisdiction and control over the space object and over any personnel thereof, if it is decided that the organization should register the space object.

<sup>85</sup> Outer Space Treaty, *supra* note 1, at art. VIII.

<sup>86</sup> Moon Treaty, *supra* note 6, at art. 12, para. 1.

<sup>87</sup> Cf. Lafferranderie, *L'application, par l'Agence Spatiale Européenne, de la Convention sur l'immatriculation des objets lancés dans l'espace extra-atmosphérique*, 11 ANNALS AIR & SPACEL. 229 (1986); Lafferranderie, *La Station Spatiale*, in DROIT DE L'ESPACE 1467, 172 n. 29 (Dutheil de la Rochère ed. 1988).

for *inter alia* jurisdiction is directly related to the question which system of law is applicable. At present, the situation leaves a great deal of uncertainty in the regulatory regime, uncertainly which can present unnecessary risks for those concerned.

*Who Is Responsible For Whom And What Under Article VI?*

The introduction of the familiar concept of nationality may also help to clarify the operation of Article VI of the Outer Space Treaty which makes the contracting States internationally responsible for "national activities in outer space." Differences of opinion appear to have arisen over the interpretation of whose activities, apart from those carried on by a State's own agencies, constitute "national activities" and consequently require "authorization and continuing supervision" in accordance with Article VI.<sup>88</sup> While both the United States<sup>89</sup> and Sweden,<sup>90</sup> in their space legislation, extend their control and supervision to all space activities within their territory, as well as those of their nationals outside the country, the United Kingdom in its Outer Space Act 1986,<sup>91</sup> basing itself on the rather complacent belief that foreigners are unlikely to engage in space activities in the United Kingdom and probably also on what can only be regarded as a slip of the pen in Article IX of the Outer Space Treaty which refers only to "nationals," applies such control only to space activities of United Kingdom nationals, wherever they may be.<sup>92</sup>

International agreement is necessary in order to clarify and unify the notion of "national activities" and who is "the appropriate State" responsible for "authorization and continuing supervision" under Article VI of the Space Treaty. Otherwise, it can be very confusing and risky for those who wish to engage in commercial development in space. From the standpoint of the latter, it would, of course, be desirable if there were only one State and one authority involved. However, from the standpoint of the rest of the world and that of the governments concerned, especially in the light of the Liability Convention which renders all the States involved in the launch of a space object liable for any damage which it may cause,<sup>93</sup> it

<sup>88</sup> Outer Space Treaty, *supra* note 1, at art. VI. See also Bittlinger, *Private Activities: Questions of International Responsibility*, 30 PROC. COLLOQ. L. OUTER SPACE 191 (1987); Tatsuzawa, *The Regulation of Commercial Space Activities by the Non-Governmental Entities of Space Law*, 31 PROC. COLLOQ. L. OUTER SPACE 341 (1988).

<sup>89</sup> Commercial Space Launch Act, 49 U.S.C. app. sec. 601 (1988).

<sup>90</sup> Swedish Space Activities Act of 1982, *supra* note 65.

<sup>91</sup> Outer Space Act 1986, 1986 c. 38.

<sup>92</sup> *Id.* at sec. 2; *cf.* note 96. See also Cheng, *Whose Parking Space Is It Anyway?, Mapping Out A Legal Minefield in the Celestial Outlands*, THE TIMES HIGHER ED. SUPP., May 30, 1986, at 14.

<sup>93</sup> See Liability Convention, *supra* note 4, at arts. II & V, and text to *supra* note 78.

would be in the interest of any State that may be held internationally responsible or liable that it has a say in controlling such activities.

The position is clearer if one has a proper understanding of the rules governing State jurisdiction. There are basically two elements to State jurisdiction and three different types. The three types of State jurisdiction are: (i) "territorial" jurisdiction which is what a State exercises over its territory; (ii) "quasi-territorial" jurisdiction over its ships, aircraft and space objects wherever they may be; and (iii) "personal" jurisdiction over its nationals, again wherever they may be. Each type of jurisdiction has two elements: (i) "jurisdiction," which is the power of a State to legislate and to make both territorial and extra-territorial judicial pronouncements, if necessary *in absentia*, but not actually to establish a tribunal or otherwise enforce its judicial authority, including the enforcement of judgments, and (ii) "jurisdiction," namely, the power actually and physically to implement, enforce and carry out laws, judgments and sentences. Now, whereas jurisdiction of different types of State jurisdiction can co-exist so that a person can simultaneously be under his own national law, the law of the flag-State of the ship he happens to be on, and the law of the country where the ship happens to be moored, there is a definite hierarchy in jurisdiction so that, in case of conflict, territorial jurisdiction overrides quasi-territorial and personal jurisdictions, while quasi-territorial jurisdiction overrides personal jurisdiction.

Since responsibility must perforce go hand in hand with control, all the States having jurisdiction should logically be held internationally responsible, but at any given time and place, insofar as non-governmental activities are concerned, the only State actually to be held responsible should be the State exercising the overriding jurisdiction. This would be (i) the territorial State if the activity occurs within the territory of a State, (ii) the flag-State or State of registry if it occurs on board a ship, an aircraft or a spacecraft outside the territory of any State, and (iii) the national State if the activity is carried on by a national, whether an individual or a corporate person, in no-man's land or on board a stateless ship, aircraft or spacecraft outside the territory of any State. However, to the extent to which other States have concurrent jurisdiction over the activity, even though for the moment their jurisdiction may be overridden by that of another, they really should also have an international responsibility for "assuring that national activities are carried out in conformity with the" Outer Space Treaty, with international law, and with any other specific international obligations. This is because their own jurisdiction can or may subsequently, either in the course of events or by deliberate action, become the operative one. This can happen, for instance, when the ship of a State's registry on which the activity takes place moves from a foreign harbour onto the High Seas or when the foreign State where its nationals have been carrying on such activities grants the request to have them expelled or extradited. When their jurisdiction becomes or can be made effective, then their responsibility will also operate. Without this residuary responsibility, the burden of supervision and control can be

easily evaded by resorting to flags of convenience or "responsibility havens." The result is that, under Article VI of the Outer Space Treaty, notwithstanding the use of the definite article in it, far from there being only one "appropriate State" having an interest in subjecting a given space activity to authorization and continuing supervision, there may be several "appropriate" States.

From the standpoint of those concerned with the commercial development in space, the position is obviously complicated, cumbersome, and highly unsatisfactory, inasmuch as, in certain cases, authorization may have to be obtained from more than one State. In fact, in addition to the States which have just been mentioned, the State from whose "facility" a space object is being launched may also wish to exercise control over the activity in view of its liability under the Liability Convention for any damage which the object may cause. Moreover, on account of Article VI of the Outer Space Treaty, the national State of the owner of a space object or of a facility may also be at risk, even when the space object is launched, or the facility operated, by another State or nationals of another States from or in a foreign country.<sup>94</sup> One way of alleviating the lot of private parties that wish to engage in activities in space and at the same time simplifying the task of the various governments involved would be for the governments concerned or likely to be concerned either bilaterally or multilaterally to come to some agreement whereby at least administratively the licensing process can be handled through a single State. As among the contracting States themselves, some arrangements regarding liability, with at least certain parties being held harmless, could no doubt also be made. In this regard, a leaf may perhaps be taken from the International Civil Aviation Convention, under Article 83*bis* of which member States of the International Civil Aviation Organization (ICAO) are allowed by agreement to transfer certain functions and duties they have under the Convention as States of registry to other member States when one of their aircraft has been leased, chartered or interchanged to an operator of the latter.<sup>95</sup> The United Kingdom Outer Space Act 1986, in its section 3(2)(b), in fact envisages some such possibility when it provides:

(2) A licence is not required --

(a) ...

(b) for activities in respect of which it is certified by Order in Council that arrangements have been made between the United Kingdom and another country to secure compliance with the international obligations of the United Kingdom.<sup>96</sup>

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<sup>94</sup> Outer Space Treaty, *supra* note 1, at art. VI. See also text to *supra* note 78.

<sup>95</sup> Chicago Convention, *supra* note 35, at art. 83*bis*.

<sup>96</sup> United Kingdom Outer Space Act, *supra* note 91, at sec. 3 (2)(b).

Under Article 83*bis* of the International Civil Aviation Convention, once such an arrangement has been notified to and published by the ICAO Council or been directly communicated to the other contracting State(s) concerned, the State of registry is relieved of its responsibility in respect of the duties and functions transferred.<sup>97</sup> It is to be questioned whether States would be prepared to go so far in any similar arrangement relating to Article VI of the Outer Space Treaty. In any event, any such arrangement can only be a measure of convenience and facilitation among the contracting parties, with the effects limited strictly to themselves. They cannot affect the rights and duties of third States without their consent, a long established rule of international law, since unequivocally confirmed in Article 34 of the Vienna Convention on the Law of Treaties.<sup>98</sup>

Among such a welter of States, if the introduction of the concept of nationality to space objects can, as in the case of aircraft and the generality of ships, ensure a direct connection between registration, nationality and jurisdiction, and, coupled with a system of compulsory entry of this information in the various registers, thereby create some certainty and transparency as to which State is actually exercising jurisdiction and control over which object, or which element in a complex of space objects, it would doubtless be a boon to all concerned.

While clarifying the notion of "national" in the phrase "national activities in outer space," it would be useful at the same time to elucidate the meaning of the second half of the phrase, namely, "activities in outer space," as well as the extent of a State's responsibility. This question has been raised, for instance, particularly in relation to remote sensing and the problem of the subsequent processing, interpretation and dissemination of the data which take place on this planet rather than "in outer space." The United Nations General Assembly resolution 41/65 adopted in 1986 defines the term "remote sensing activities" in such a way as to encompass the whole cycle of operations, including the dissemination of the processed data.<sup>99</sup> However, the resolution is far from clear regarding the extent of States' responsibility. In fact, its Principle XIV, while recalling Article VI of the Outer Space Treaty, merely says that "States operating remote sensing satellites shall bear international responsibility for *their* activities,"<sup>100</sup> even though it goes on to say later on:

[i]rrespective of whether such activities are carried out by governmental or non-governmental entities or through international organizations to which such States are parties. This principle is without

97 Chicago Convention, *supra* note 35, at art. 83*bis*.

98 Vienna Convention on the Law of Treaties, *supra* note 15, at art. 34.

99 Principles on Remote Sensing, *supra* note 8, at princ. 1.

100 *Id.* at princ. XIV. Emphasis added.

prejudice to the applicability of the norms of international law on State responsibility for remote sensing activities.<sup>101</sup>

The wording of Principle XIV lends itself to the possible interpretation that it construes Article VI of the Space Treaty, when applied to compliance for the resolution, as holding a State responsible merely for its *own* activities, whether or not carried out directly by itself, and not for its *national* activities as the term is generally understood, such as remote sensing activities of private entities under its effective jurisdiction. It would seem that it is referring State responsibility for the latter activities to general international law rather than to Article VI of the Outer Space Treaty. This impression is reinforced by the resolution's Principle XII which limits the, what may be called, equitable interest of a sensed State to "have access to the available analysed information concerning the territory under its jurisdiction" "on a non-discriminatory basis and on reasonable cost terms" merely to information "in the possession of any State participating in remote sensing activities."<sup>102</sup> This interest does not seem, therefore, to extend to information in the hands of nationals of a State, especially when the State did not itself participate in gathering, processing or analysing the original data. However, in relation to remote sensing, it may be well argued that the expression "activities in outer space" in Article VI of the Outer Space Treaty includes also the natural and logical consequences of such activities, whether such consequences occur in outer space or on Earth. Consequently, whether the above construction of Article VI of the Outer Space Treaty by the resolution is correct is open to question.

The problem is probably even more complex in the case of direct broadcasting satellites. Does the responsibility assumed by States under Article VI extend to the content of broadcasts made by private concerns under their jurisdiction, at least to the same extent as if the broadcasts were made by the States themselves, or are States merely obliged to ensure that the broadcasting activity is carried out in accordance with international law and pertinent international agreements?<sup>103</sup> Also does it extend to, for instance, private claims for breach of copyrights and neighbouring rights? The same kind of questions apply *mutatis mutandis* to other private and commercial activities in outer space, such as the manufacturing industry, salvage claims and so forth.

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101 *Id.*

102 *Id.* at princ. XII.

103 *See also* M.N. TAISHOFF, STATE RESPONSIBILITY AND THE DIRECT BROADCAST SATELLITE (1987). Taishoff does not appear, however, to distinguish clearly the responsibility of States under Article VI of the Outer Space Treaty from their liability under its Article VII and the Liability Convention. *See e.g.*, page 175 in particular.

*Extension Of National Laws To Space*

Speaking of copyrights and private claims, one is reminded of the urgent need to persuade all the States concerned to take the necessary steps to extend the relevant parts of their national laws to outer space. As is well known, Article II of the Outer Space Treaty provides that outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.<sup>104</sup> What this means is that there is no territorial sovereignty or territorial jurisdiction in outer space. Consequently, following what has been said previously regarding State jurisdiction, the only jurisdictions permitted in outer space are the quasi-territorial ones of States of registry of space objects and the personal ones of national States or individuals or corporations. This being the case, since, if the experience of air law is any guide, the laws, especially criminal laws, of most countries are essentially territorial in nature applicable only within their national territories, it may be necessary by treaty, paradoxical as it may seem, to commit States to extend their laws to their spacecraft and other space objects when they are outside national territory, especially in outer space, and possibly also to their nationals when in outer space.

An example in air law in this direction is the 1963 Tokyo Convention on Offences and Certain Other Acts on Board Aircraft.<sup>105</sup> For the purpose of furthering commercial development in outer space, it will be necessary to urge and, if possible, to bind States to extend not only their criminal law, but also the scope of their laws on, for instance, intellectual and industrial property to works, products, and inventions produced in outer space. The United States has already taken a lead in this direction.<sup>106</sup> A treaty somewhat along the lines of the Tokyo Convention may be necessary. Other areas where an international effort to encourage the extension of national laws to outer space would be highly desirable may well include taxation, employer's liability, safety regulations, product

<sup>104</sup> Outer Space Treaty, *supra* note 1, at art. II and note 60.

<sup>105</sup> Convention on Offences and Certain Other Acts Committed on Board Aircraft, done Sept. 14, 1963, 20 U.S.T. 2941, T.I.A.S. No. 6768, 704 U.N.T.S. 219 (entered into force Dec. 4, 1969).

<sup>106</sup> See 18 U.S.C. sec. 7(6) & 7(7). The United States has extended its jurisdiction in 1981 to "[a]ny vehicle used or designed for flight or navigation in space and on the registry of the United States pursuant to the [Outer Space Treaty and Registration Convention], while that vehicle is in flight" and in 1984 to "[a]ny place outside the jurisdiction of any nation with respect to an offense by or against a national of the United States." See also Dann, *The Future Role of Municipal Law in Regulating Space Related Activities*, in *SPACE LAW: VIEWS OF THE FUTURE* 125, 131 (T.L. Zwaan ed. 1988); Lafferranderie, *The United States Proposed Patent in Space Legislation-An International Perspective*, 18 J. SPACE L. 1 (1990); Gorove, *The Growth of Domestic Space Law: A U.S. Example*, 18 J. SPACE L. 99 (1990).

liability, experiments on live animals, and so forth. However, as one commentator has quite rightly remarked, unification of substantive law by treaty may not always be desirable inasmuch as such efforts, even when they succeed, can easily, like the Warsaw system of international carriage by air, lead to the fossilization of the highest common factor in the different national laws.<sup>107</sup> However, an international treaty that would resolve potential problems of private international law relating to activities in outer space<sup>108</sup> would be of obvious attraction to future commercial development. Moreover, in the wake of the news that the Soviet astronauts brought back in August 1990 23 pure crystals grown in outer space, each worth \$1 million,<sup>109</sup> no doubt an international agreement, following the lead set by the United States federal statute in 1982, to allow items from outer space duty free entry,<sup>110</sup> would be warmly welcomed by those thinking of similar enterprises.

*Dispute Settlement, International Civil Space Organization And An International Regime for the Moon*

There remain a number of areas where international agreements would be desirable from the standpoint of commercial development in outer space. In the first place, apart from the Liability Convention, none of the other treaties on outer space concluded under the auspices of the United Nations contains a proper dispute settlement procedure. Various organizations have been working on the subject.<sup>111</sup> Mention may, for instance, be made of the highly comprehensive First Draft of a Convention on the subject drawn up by the International Law Association Space Law Committee under the rapporteurship of Professor K.-H. Böckstiegel.<sup>112</sup>

During the negotiations of the Moon Treaty, proposals were made for the establishment of an international space authority,<sup>113</sup> and for a number of years, the Soviet Union has been advocating the setting up of a World Space Organization.<sup>114</sup> As to the Moon Treaty, it is really a political

<sup>107</sup> Dann, *supra* note 106, at 131-32; Cheng, *Sixty Years of the Warsaw Convention: Airline Liability at the Crossroads*, 38 ZEITSCHRIFT FÜR LUFT- UND WELTRAUMRECHT 319, 319-20 (1989).

<sup>108</sup> DeSaussure, *An Integrated Legal System for Space*, 6 J. SPACE L. 179, 191 (1978).

<sup>109</sup> THE TIMES (London), Aug. 10, 1990, at 20, cols. 1-2.

<sup>110</sup> Dula, *Material Processing as a Subject of Space Law*, 28 PROC. COLLOQ. L. OUTER SPACE 224-227 (1985).

<sup>111</sup> See van Traa-Engelman, *supra* note 34, at 251 & 260. note 14.

<sup>112</sup> For the text of the first draft, see INTERNATIONAL LAW ASSOCIATION, REPORT OF THE 61ST CONFERENCE HELD IN PARIS, 1984, at 334, 376 (1985). The final draft has so far not yet been presented.

<sup>113</sup> U.N. Doc. A/AC. 105/C. 2/SR. 190, at 42 (1972); U.N. Doc. A/AC. 105/PV.169, at 31-35 (1976).

<sup>114</sup> U.N. Doc. A/41/470, at 34-38 (1986).

document, with a hotchpotch of provisions mostly culled from previous treaties. Whether it will ever gain sufficient support from the main space powers to turn its basic principles into rules of general international law is still an open question. As among its contracting States, it has done little for commercial exploitation of the Moon and other celestial bodies. In the first place, it has placed restrictions on exploitation and at least raised doubt whether there is a moratorium on exploitation. Secondly, it has cast a long shadow over any enterprise on celestial bodies by postulating the future existence of an unknown international regime yet to be established which will take over the management of their natural resources as soon as their exploitation "is about to become feasible."<sup>115</sup> If we are to have an international regime, perhaps it would be desirable to have it sooner than later. However, whether in the form of inter-governmental or non-governmental entities, it is certain there will be in the years to come an increasing number of international commercial agencies or consortia involved in the exploration, use, and exploitation of outer space. From this point of view, the many co-operative arrangements that already exist, such as INTELSAT and INMARSAT, can no doubt all provide useful pointers as to how such operations may be undertaken.

Looking further afield, it may be said that the establishment of an international space organization will only be a matter of time. In view now of the United States' seeming acceptance, albeit with some reservation, of the term "civil," the organization could perhaps be called the "International Civil Space Organization" and would be devoted solely to international co-operation in the exploration and use, including commercial exploitation, of outer space for truly peaceful (*i.e.*, non-military) purposes, along perhaps the lines of the International Civil Aviation Organization or the International Maritime Organization.

#### *Conditions Governing International Rule-Making*

In a survey I made in 1986 of the development of international law in the light of the history of air and space law since their inception, I arrived at the conclusion that there were three essential conditions governing the successful making of rules of international law, including the successful conclusion of treaties.<sup>116</sup> These conditions are:

1. Perceived needs on the part of the States concerned;
2. Propitious political climate;
3. Due representation of the dominant section of international society having special concern in the subject matter.<sup>117</sup>

<sup>115</sup> Moon Treaty, *supra* note 6, at art. 11, para. 5. See also Cheng, *supra* note 27.

<sup>116</sup> Cheng, *The Contribution of Air and Space Law to the Development of International Law*, 39 CURRENT LEG. PROBLEMS 181 (1986).

<sup>117</sup> *Id.* at 196.

Insofar as the last point is concerned, it is interesting to observe that a commentator from the Soviet Union, where the principle of equality of States is often harped upon whenever it is in the Soviet interest to do so, recently remarked that "[f]rom a policy perspective, of particular importance is the fact that any attempt to establish a new space order can only be successful if it is based on a realistic assessment of existing power structures within the international community."<sup>118</sup> Both in the negotiation of the various treaties that we have suggested and in the actual structure of any International Civil Space Organization that may be set up, this point needs to be carefully taken into account, while bearing fully in mind the aspirations and needs of the developing countries, and the desirability of involving them to a much greater extent than hitherto in space activities.<sup>119</sup> As regards a propitious political climate, the Berlin Wall has now dramatically fallen and we are at the moment witnessing the warmest relationship between the two major space powers and between countries within what used to be called the Eastern and Western blocs. The barometer reads "Fair-set." As the saying goes, one should make hay while the sun shines. Finally, we have, I hope, seen in this survey why, as commercial development in outer space gathers pace, there is a need, and, in many cases, an urgent need, for the new international agreements we have discussed. It is earnestly to be hoped that our perception in the matter fall not on deaf ears, but will be shared by all the powers that be.

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<sup>118</sup> Danilenko, *The Progressive Development of Space Law: New Opportunities and Restraints*, in *SPACE LAW: VIEWS OF THE FUTURE* 102 (T.L. Zwaan ed. 1988).

<sup>119</sup> Cf. Böckstiegel, *Prologue*, in *SPACE LAW: VIEWS OF THE FUTURE* 1, 2 (T.L. Zwaan ed. 1988); Diederiks-Verschoor, *Implications of Commercial Activities in Outer Space, Especially for the Developing Countries*, 17 *J. SPACE L.* 115 (1989); Gaggero, *Developing Countries and Space*, 5 *SPACE POL'Y* 107 (1989); Gorove, *Space Commercialization: Roles of Developing Countries*, 17 *J. SPACE L.* 66 (1989).

## EVENTS OF INTEREST

### A. PAST EVENTS

#### *Reports*

#### *Space Stations: Problems of Jurisdiction and Conflicts of Law*

The Aviation and Space Law Section of the Association of American Law Schools organized a program on "Space Stations: Problems of Jurisdiction and Conflicts of Law" during the Association's annual meeting on January 5, 1991 in Washington, D.C.

In opening the discussion *Prof. Michael S. Straubel*, of Valparaiso University, briefly described the currently planned configuration of the proposed U.S./International Space Station and some of the environmental hazards that its crew is expected to face. He noted that three memoranda of understanding and an Intergovernmental Agreement (IGA) have been executed. He pointed to the Agreement's provisions on jurisdiction (Art. 5), code of conduct (Art. 11), cross-waiver of liability (Art. 16), intellectual property (Art. 21) and criminal jurisdiction (Art. 22). He also raised a hypothetical problem involving a Frenchman's forceful detention in the ESA-furnished module by the commander because of the former's strange behavior and possible danger to the station.

Following *Straubel's* introduction, the General Counsel of NASA, *Mr. Edward Frankle*, took the floor. Speaking in his personal capacity, he noted that the Space Station is a fairly modest endeavor with four to eight people on board, rendering it highly unlikely that legal problems likely to be faced with a larger settlement on the moon would be encountered. He referred to relevant statutory provisions, including 18 U.S.C. sec. 7 which deals with the special maritime and territorial jurisdiction of the United States. In 1981, as a part of the NASA Authorization Act (Public Law 97-96) jurisdiction was expanded to space vehicles, that is any vehicle that comes from Earth and carries people and so it would also apply to the Space Station. Another section, (18 U.S.C. sec. 799) makes violation of a NASA regulation a misdemeanor. It is punishable by a year in jail and up to \$5000 fine. That provision was contained in the original Space Act at Section 304(c) and is the method by which NASA would enforce its code of conduct and the authority of the commander. Another provision applicable to the hypothetical is a NASA regulation dealing with the authority of the STS Commander which appears in the Code of Federal Regulations (14 CFR sec. 1214.7). Point 702 of those regulations gives authority and responsibility to the commander. It states he has authority over all persons on board the Shuttle and also has the responsibility for insuring the health and safety of the people on board as well as the safety of the vehicle. Point 704 provides that a violation of those regulations, and in violation of a direct order of the STS commander, would be punishable

under 18 U.S.C. sec. 799. So, there is in place now, irrespective of Space Station provisions, a set of regulations which permits the shuttle commander to do what he or she feels is necessary in order to protect the public health and safety, and makes violation of an order of that commander a crime within the United States.

As to the IGA, which is not a treaty requiring ratification by the Senate but an executive agreement, *Frankle* referred to Article 22 by which partners retain criminal jurisdiction over their own flight elements and their personnel. In addition, the United States also has criminal jurisdiction over any activity which endangers the safety of station or crew. *Frankle* noted that this whole section was quite controversial during the negotiations, and it turned out not to be possible to create a simple black line rule for both criminal and civil jurisdictions. Under the Agreement, before the U.S. may exercise criminal jurisdiction over any foreign person, it is required to consult with the Partner State and cannot prosecute unless one of two things happens: first, the Partner State concurs in the United States prosecution; second, if it does not concur, the only time the United States could prosecute is if the United States fails to get an assurance from the foreign Partner State that it would prosecute under its law, as it would for any similar offense committed in its territory. This arrangement reflects something that goes through all agreements and is predicated not on the need to have certainty in the law, like we have on Earth, but on the need, in small endeavors, such as the Space Station, to get a consensus and have a working relationship between the partners and the people. When governments are just engaged in government programs, they will continue to have very small numbers of people involved who tend to be hand-picked elites of their own countries, and there will be much less likely instances of serious crime. Only when companies carry their efforts into space and increase the number of people there, is there a likelihood of need for laws reflecting the same type of scenarios that are encountered sometimes on Earth.

With respect to the hypothetical, *Frankle* felt that if an astronaut from another country acted strangely and the station commander had any kind of reasonable belief that there could be a danger, he would certainly have authority to go into the other module and, if necessary, restrain the other astronaut and send him home. This, in itself, would not be an arrest. The people in space, including the station commanders, are not expected to have arrest or police authority. There would be no requirement for probable cause or anything of that nature. Whether a prosecutable criminal offense had occurred would be a decision to be taken by people here on Earth.

Moving on into the commercial area, *Frankle* stated that concerns may arise about the protection of intellectual property, possible patent infringement and similar problems. In 1981, an attempt was made to resolve some of these issues and, as a result, the Space Act was revised to expand the "temporary presence doctrine." According to that doctrine if a piece of equipment is moving through the United States on a vessel of a foreign country or on an airplane, that is not going to be a violation of

special property laws, as long as the country, whose ship it is on, gives a reciprocal protection to U.S. vessels. That law was expanded to include space vehicles and equipment brought into this country for launch into space so that industry working in space can at least be assured that they are not going to be sued for possible patent infringement. Also, as a part of the implementation of IGA, an "Inventions in Outer Space" legislation (35 U.S.C. sec.105) was recently enacted. It was the only piece of affirmative law that the United States needed to have passed in order to bring into force the IGA. It basically provides that any invention made, used or sold in outer space, on a space object or component thereof, under the jurisdiction or control of the United States, shall be considered to be made, used, or sold within the United States, except with respect to any space object or component thereof that is specifically identified and otherwise provided for by an international agreement to which the United States is a party, or with respect to any space object or component thereof that is carried on the registry of a foreign State. If a vehicle in space is under the jurisdiction or control of the United States, U.S. patent law will apply, with two exceptions: (1) if an international agreement to which the United States is a party provides otherwise, or (2) if the vehicle or object is under the registration of another country (unless there is an international agreement between the United States and the State of registry providing otherwise). This provision solved one of the biggest problem that existed for companies wanting to do work and develop products and equipment in space.

Elaborating specifically on the intellectual property section (Art. 21), *Frankle* observed that it is the only other section which talks about applicable law in the IGA and makes an activity occurring in or on a flight element deemed to have occurred only in the territory of the Partner State of that element's registry for the purposes of intellectual property law. It provides a locus for that activity and is essentially territorial. It also states that the patent secrecy laws will not be applied to keep nonnationals from filing in another Partner State. It is that second provision which made it necessary to have 35 U.S.C. sec.105 passed because under U.S. patent law with a "first to invent rule," the activity occurring in a foreign jurisdiction does not count as inventive activity. Thus, a person who files first in a foreign jurisdiction, or fails to wait for six months after filing in the United States for a foreign patent, cannot get a U.S. patent. The purpose of that is to allow the patent to determine if there is some reason to keep the invention secret. The Inventions in Outer Space Act provides an exemption to that and permits an applicant, even though the activity occurred in a United States module by a nonnational, to file both in the foreign jurisdiction first and also file in the United States without having to wait for six months. This law was needed because many businesses were not going to invest in any activity in space unless they were certain that they were going to get the fruits of their investments. Since these activities were very expensive, they wanted certainty with respect to this issue, even though it was fairly clear, that was the way in which the law was going and probably would develop on its own.

The realization of the need for working toward consensus and avoiding disputes and not trying to resolve things clearly and academically before the issues arise, is also reflected in the provision dealing with cross-waiver which intends to promote activities in space. The cross-waiver limits claims by any person involved in space activity and encourages the use of the station so people will not be afraid that in case they make a mistake or do something on the station, or on the way to the station, they are going to be sued for damage to either the station or its property. The provision waives claims against any other Partner State or related entity, including the contractors and subcontractors of the Partner State and the employees of either of them, no matter what happens. For instance, if a person in the ESA module is working on an experiment which short-circuits and destroys pieces of equipment belonging to other people, no suit will lie because the intention is to encourage people to work on experiments. Even if the experiment destroys the module, there is no claim for the value of the module. However, the cross-waiver does not apply to any claim between a Partner State and its own related entities. As a result, any contractual remedies with contractors and subcontractors remain unaffected. Also, the cross-waiver does not apply to claims of natural persons for injury or death. Thus, if a person destroys some equipment and, at the same time, badly injures or kills another, the estate will be able to sue. This is so because it would be unfair to make people who participate in a space flight give up their rights to compensation for injury or death. The only other exception to the waiver is for willful misconduct. If a person willfully destroys an apparatus in order to get the invention or development first, there would be liability for intellectual property claims which are covered under Article 22.

Before concluding, *Frankle* also referred briefly to the Memorandum of Understanding which implements the IGA. He noted that Article 11 speaks about the Space Station crew and establishes a code of conduct to be developed by NASA with the involvement of all the partners. Article 8, which deals with the management aspects of the Space Station program primarily related to operations and utilization, sets up a Multilateral Coordination Board consisting of all partners and the heads of all participating agencies. The board must approve the code of conduct before it can be implemented. It is expressly stated that the board expects, at all times, to operate by consensus. However, if no consensus can be reached, the U.S. member, the Associate Administrator for Space Station, can make the decision for the board. It is very clear that this authority is expected never or very rarely to be exercised. The fact that there can be disputes is understood and, in Article 18, there is a provision about consultation and the settlement of disputes. However, it is not a judicial or a binding type of process that is foreseen or established. It basically states that if there is a dispute that cannot be resolved by the many boards and panels that are created, the parties will negotiate up through the program and the political chains to resolve whatever issue arises. There are no binding mechanisms in any place in any of the Memoranda of Understanding or the IGA and that is intentional. The United

States has been consistently opposed to binding mechanisms, such as arbitration, in any of its international agreements and to having disputes settled by one set of courts over another. Disputes are usually resolved by negotiation in the political process and that is expected to continue.

In conclusion, *Frankle* noted that the applicable laws are defined for the criminal and intellectual property areas. They are generally territorial but the expectation, especially in the criminal field, is to have them rarely invoked. The civil jurisdiction is not defined though there was an effort to do that during the Space Station negotiations but agreement was never reached. The negotiations reached the point of diminishing returns and it was felt that those kinds of problems were many years away. Under the circumstances, it would not have been meaningful to delay the signing of an agreement for that reason. The structure of the whole agreement is such that the opportunity for major legal difficulties is somewhat limited because of the number of people, the way they are selected, and the type of activities they are engaged in.

During the discussion following *Mr. Frankle's* presentation *Prof. Stephen Gorove* drew attention to an area where there is a possible conflict. He stated that criminal jurisdiction in the IGA is based on two principles: territoriality and nationality because both the State whose national commits a crime as well as the State on whose module the crime is committed have concurrent jurisdictions. For instance, if a Japanese national commits a crime on the U.S. manned base, which does not endanger the safety of the station or crew, Japan would have jurisdiction over its national, and at the same time, the United States would have jurisdiction because the crime was committed on the U.S. manned base. This scenario is not addressed in the IGA. The question is how will this conflict be resolved? The possibilities of negotiation consultation and so forth, are envisaged but if there is no agreement, there is a likelihood that primary jurisdiction would lie in the State who has custody of the offender and secondary jurisdiction would be in the other State. In response, *Mr. Frankle* remarked that if, for instance, a European astronaut assaulted a Canadian astronaut in a U.S. habitation module, it was possible that the station commander would restrain the European astronaut and that he would be brought to the United States. In such a case, it is not clear whose law would apply and arguments could arise. The United States may attempt to apply U. S. law and, at the same time, if the European country stated they would prosecute him, presumably they would use their own law. Very possibly, there could develop situations where several laws would apply: it would depend on the circumstances and it would be a diplomatic issue.

The next speaker, *Mr. Stephane Lessard* of the the Montreal law firm of Ogilvy-Renault, gave a non-U.S. perspective on some of these issues. He noted that in commitment to the other partners, Canada is slated to build a Mobile Servicing System (MSS), which is a mobile robot able to do many things, such as assemble the Station initially, as well as help maneuver payloads and dock the Shuttle. There were various goals for each partner when entering into the negotiations. For Europe, the goal has been

independence in space or an independent space capability. Canada's participation in the Space Station program was not motivated by a desire to achieve independence in space. The trend has been in the opposite direction. Canada saw its participation in the program as a good investment in science, allowing pursuance of its existing interest in artificial intelligence and space robotics. For Canada, the Station is the largest international technology development program ever undertaken. It is not necessarily a U.S. driven program with token participation by the others but a genuine partnership, a joint venture with provisions for sharing returns.

As to the character of the Space Station, the IGA provides that each partner shall have the final say whether on its own module or flight element it will be permitted to carry on a particular activity. There is also a provision to the effect that the use of infrastructure resource may not be prevented. For example, if Canada objected to the use of its own contribution, the MSS, for a particular activity, it could still not prevent any user from using the MSS. As a result, there would be negotiations and discussions to arrive at some sort of agreement. Short of that, there is a particular provision which allows Canada not just to pull out, because that is an option for all partners, but to pull out with adequate compensation. While nobody anticipates that this would happen, nonetheless, it is there in the agreement.

As to extraterritoriality, Canada's position has been not to extend its jurisdiction outside the borders of its territory, in the absence of certain specific exceptions, such as, for instance, hijackings, protection of embassies and embassy personnel, and possibly protection of Arctic waters. *Lessard* felt that the United States has seemed to be more assertive in its use of various arguments to extend its national laws outside its own territory. While there was an understanding that the United States was contributing a large amount of money and a major part of the hardware, Canada did not wish to see American law apply to the entire station, including the free flying modules. Under the eventual compromise provided for in Article 5.1 of the IGA, each partner registers its flight elements (which are listed in the annex to the agreement) in accordance with the Registration Convention and, under Article 5.2 each partner retains jurisdiction and control over the elements that it registers. This quasi-territorial approach is a general principle.

In connection with possible disputes, *Lessard* referred to the cross-waiver provision recalling that it would not apply to claims of natural persons with respect to injury or death. There would be a problem in determining which law to apply in case of civil liability. The plaintiffs may claim that their law should apply, while the defendants may claim otherwise. The absence of conflict of law rules does not imply that there should have been such rules but it is a further - though perhaps not a very likely - example of an area where disputes may arise.

With respect to intellectual property, again the quasi-territorial approach is retained. The fact that national laws may apply under the IGA does not necessarily mean that they would. In Canada, it is necessary to

have a review of national laws to make sure that they are specifically extended to the Space Station. There is some argument as to whether a review is necessary but lawyers are undertaking an analysis of intellectual property laws, the criminal code and other pieces of legislation to see if they would likely apply on the Space Station and determine if further amendments are necessary.

As to the treatment of data and goods in transit, discussed in Article 12 of the IGA, the transportation system - the base line launch and return - will be mixed. For the manned base and the U.S. platform, the U.S. shuttle system will be used but provision is also made for the use of European and Japanese systems for their own purposes. Canada was concerned about a payload in transit to the station being examined by whoever is providing the launch service. While it was not a major point since there is a considerable exchange of information among the partners, it was still an expressed concern that was addressed in Article 18.1 to the effect that each Partner State shall facilitate movement of persons and goods in and out of its territory. More specifically, Article 20 provides that each Partner State shall allow expeditious transit of data and goods of the other partners. In addition to expeditiousness, Article 12.1 of the MOU also provides that each partner will respect proprietary rights in, and the confidentiality of, appropriately marked data and goods to be transported to the Space Station. That is a better guarantee than what is provided in the IGA and is satisfactory to Canada.

*Mr. Lessard* explained that in a project involving high technology and multinational contributions to a single piece of hardware, there is a need for exchanges of data and information as well as of products and even goods. In this connection, Article 19 of the IGA provides basically that, in respect of exchanges between the partners or their cooperating agencies, each partner is to handle expeditiously any request for data or goods of the other partner. This includes company to company exchanges as well. Other exchanges of data and goods are to be governed by national laws and that appears to be also satisfactory for Canada.

There are certain restrictions on the disclosure of data. The furnishing partner may give notice to the receiving partner to the effect that for export control, proprietary rights, or classified information purposes, the disclosure of furnished data or goods is to be restricted. There is also a provision in Article 13 and Article 4.4 of the MOU stipulating that there shall be exchanges of information in the design and development phase. That is very appropriate in a project of this kind and very necessary.

In conclusion, *Lessard* stated that there were many other areas of concern. For instance, with respect to dispute settlement, Canada was in favor of a more binding arbitration mechanism but the IGA provides for discussions at the multilayer level, so if lower layer officials cannot reach an agreement on a dispute, it will move up the political ladder to higher officials in the hierarchy. In general, Canada is very satisfied with the agreement notwithstanding the fact that there are a lot of grey areas and vacuums in respect of conflict of laws. Of course, there is always the

possibility of pulling out, but nobody in Canada is thinking about that as even being likely. Canada believes that consensus and consultations will work out. In view of the investments, there is a desire to move on to the next project and there is a great amount of interest in projects, like the human exploration initiative and the colonization of the moon and eventually Mars.

The last speaker, *Prof. Ralph G. Steinhardt* from the National Law Center of George Washington University pointed out that it is plainly a mistake to assume that the agreement endorses some municipal approach to jurisdiction or choice of law. He felt that the agreement offers a checkerboard approach to jurisdictional arrangements, a mode of operation that sacrifices doctrinal purity in the name of rough pragmatism. There are obviously entirely respectable reasons for refusing to endorse a municipal approach to jurisdictional issues. In the resolution of these issues lies some essential protection for what are perceived to be basic national interests and investments. This is apparent from the Rome Resolution of '85 which states that a fundamental objective of European participation is European responsibility for the design, development, exploitation and evolution of identifiable elements of the Space Station, together with the responsibility for their management. The current regime in the agreement obviously has the diplomatic advantage of protecting those interests in making the agreement happen. The checkerboard approach also has the advantage of solving only those problems that require a solution ahead of time, relying on a kind of evolutionary good faith for the articulation of solutions to problems that are not yet identified, or that are not yet ripe for resolution. That makes decent historical sense. The experience of the United States under the First Restatement of Conflicts suggests that any attempt to articulate jurisdictional rules ahead of time, especially on the basis of territoriality, is doomed to failure.

At the same time, the evolutionary approach has some predictable disadvantages. One of them is entrepreneurial. There is some evidence that private investment is discouraged by uncertainty in the legal regime governing States, in general, and governing the Space Station, in particular. The incremental effect of legal uncertainty must be marginal, possibly negligible. Apart from the entrepreneurial disadvantages, the evolutionary approach leaves inevitable gaps, some of which are easy to identify. In criminal law, there are no substitute rules under the agreement though there is, among other provisions, the conditional waiver of primary criminal jurisdiction. So too, with respect to cross-waivers of liability, the current litigation between INTELSAT and Martin-Marietta may reveal that those provisions are not as ironclad as they may first appear. Also in civil procedure, the question arises how private litigants will conduct pretrial discovery at all in those cases that are not foreclosed by crosswaivers. While the Agreement goes a long way to establish the circumstances under which a particular State's property law will govern, it appears uncertain that those provisions will foreclose litigation on the issue. It appears equally uncertain that the Agreement, by itself, will distinguish areas of predominantly federal concern from areas of

predominantly state concern. This is a source of potential confusion that Congress can and should clarify through legislation.

Finally *Mr. Steinhardt* observed that any rule or set of rules which maintain the fiction that the Space Station project is not essentially an international joint venture cannot survive, in the long term. The operation of the Space Station cannot, in the end, simply be tagged onto terrestrial notions of jurisdiction and sovereignty. Especially, if seen through the perspective of decades, the traditional notions of sovereignty are under attack in many forms in contemporary international law. In a sense, the IGA reflects a willingness to forgo some measure of sovereignty, the fixation on borders and territoriality, all for the sake of exploiting *res communis*. But the Agreement is unlikely to mark some end point in that process and, if so, the kind of borders that are presumed by this Agreement, though obviously essential to the creation of the Agreement, will be viewed in the next thirty years as a somewhat obsolete relic of a more formalistic and State-centered era.

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*United Nations Scientific and Technical Subcommittee on Outer Space Holds Annual Meeting in New York*

The Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) held its twenty-eighth session at United Nations Headquarters in New York from 19 February to 1 March 1991.

During the two-week session, the Subcommittee considered various questions relating to international cooperation in outer space activities, including the special theme for this year's session: the use of remote sensing for prospecting mineral and ground-water resources and for monitoring biological resources, with an emphasis on agriculture, stressing the needs of developing countries.

The Subcommittee continued its review of the United Nations Programme on Space Applications and of the implementation of the recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82). It also considered other remote-sensing questions, the use of nuclear power sources in outer space, the geostationary orbit and space communications, and space activities relating to the earth's environment. During the course of the meeting, Member States reviewed their national activities in the fields of space transportation, astronomy, planetary exploration and life sciences and space medicine.

The Ukraine took part in the work of the session as a new COPUOS member, filling the seat left vacant by the reunification of Germany. Membership in the Committee, therefore, remained at 53, with the same regional distribution.

United Nations Programme on Space Applications

One of the practical steps taken towards ensuring that all countries have access to the benefits of space technology is the United Nations Space Applications Programme, organized by the United Nations Expert on Space Applications of the Outer Space Affairs Division. The Programme continues to offer training courses, workshops, meetings of experts and seminars on the applications of space technology in various fields for people from developing countries. The Programme also administers fellowships for long-term education offered by Member States and provides technical advice to developing countries. The activities of the Programme support the development of indigenous space capabilities in developing countries.

The Subcommittee reviewed the implementation of the 1991 Programme, now underway, which includes a Workshop on Space Science in India, a Workshop on Microwave Remote Sensing in Maspalomas (Canary Islands, Spain), a Training Course on Geological Remote Sensing in Germany, a Training Course on Remote Sensing for Environmental Assessment and Monitoring in the United States, a Seminar on Remote Sensing for Decision Makers in Kenya, a Workshop on the Applications of Space Technology to Combat Natural Disasters in China, a Training Course on Remote Sensing for Agrometeorology and Hydrology in Peru, and a Workshop on Space Technologies for Development in Canada. The Subcommittee approved the proposed programme for 1992 including meetings in the United States, Kenya, Sweden, USSR, Italy and China.

The Subcommittee expressed its appreciation for the contributions of Member States that had made these activities possible. However, the Subcommittee also expressed concern over the limited financial resources available for the Programme and appealed to States to support the Programme.

The Subcommittee also reviewed the activities of the Outer Space Affairs Division and its Programme on Space Applications concerning technical advisory services, the international space information service, coordination of space activities in the United Nations system, promotion of regional and international cooperation, and technical studies.

Remote Sensing

Remote sensing remained an uncontroversial topic as it has been since the adoption in 1986 of a set of "principles relating to remote sensing of the Earth from space". Many delegations stressed the important role that satellite remote sensing could play in managing natural resources and monitoring the environment. Countries operating remote sensing satellite systems reaffirmed their determination to continue development of their remote sensing and environmental satellite technology and to make their satellite data available on a public, nondiscriminatory basis to users

around the world. The Subcommittee recognized the need for continuing free access to data from operational meteorological satellites.

The Subcommittee reiterated the need to provide assistance to meet the needs of developing countries in the field of remote sensing and to promote cooperation between satellite operators and ground station operators to ensure the compatibility and complementarity of existing and future remote sensing systems.

The Subcommittee took note of the technical study prepared by the Secretariat on the use of satellite remote sensing as part of measures for flood monitoring and control.

#### Use of Nuclear Power Sources in Outer Space

The Subcommittee continued its discussion concerning safety criteria for the use of nuclear power sources in outer space. At its 1991 session, the Subcommittee had reached agreement on a set of scientific and technical criteria for the safe use of nuclear power sources in outer space, which provided the basis for agreement in the Legal Subcommittee on a draft principle on the question as part of a prospective set of legal principles on the use of nuclear power sources in space. At this session, however, the United States called for a reconsideration of the agreed scientific and technical criteria. Other delegations preferred not to reopen negotiations on the scientific and technical criteria, noting that another draft principle provided for subsequent review and revision. No agreement was reached on the question, and discussions were expected to continue in the Legal Subcommittee and the Committee itself.

The Subcommittee also discussed the problem of possible collisions of space debris with space objects carrying nuclear power sources resulting in faster than expected re-entry of radioactive material into the atmosphere. The Subcommittee called on the Member States to conduct further studies on the question.

#### Geostationary Orbit and Space Communications

The Subcommittee continued its consideration of the geostationary orbit without making any progress towards resolving the different views on the subject. A number of developing countries argued that existing coordination procedures were not adequate to ensure access to the orbit by all countries in view of the prospect of saturation of the limited capacity of the orbit. They felt that a special regime for the orbit was required in order to ensure that the developing countries would have access to the orbit for their communication satellites when necessary. A number of developed countries argued that the coordinating procedures were being adequately handled by the International Telecommunication Union and that there was no need for a new regime. They felt that developments in communication satellite technology would help to ensure that all countries had adequate access to satellite communications. The equatorial countries continued to

call for recognition of their particular situation. There was no significant progress towards consensus on these issues.

#### Space Science

The Subcommittee heard reports on a variety of activities conducted by Member States in the field of space science, including life sciences, planetary exploration and astronomy.

A number of Member States presented information on advances in medical knowledge and treatment that had resulted from studies of human physiology under the microgravity conditions of space. New medical instruments had been developed for use during human space flight, and experiments in the processing of pharmaceuticals in microgravity were being conducted. Remote sensing technology was being used in the study of the epidemiology of vector-borne diseases, and communication satellites were being used to make expert medical knowledge available in remote locations.

In the field of planetary exploration, the Subcommittee heard progress reports on three missions now underway: the Magellan radar mapping of Venus, the Galileo probe on its complex trajectory to Jupiter, and the Ulysses spacecraft en route to the first observations of the polar regions of the Sun.

In the field of satellite astronomy, the Subcommittee noted that the launching of the Hubble space telescope, the Rosat X-ray observatory and the Gamma-1 and Granat astrophysical observatories had given scientists powerful new tools for their investigations of the universe and that a number of other space observatories were being planned.

Delegates praised the high degree of international cooperation in these programmes and the wide availability of scientific data from space. They called for further cooperation to enable all countries to participate in space research, including in planned missions to Mars and Saturn and future space-based astronomical observatories.

#### Environmental Monitoring and International Space Year

The use of space technology for environmental monitoring and the need to protect the space environment has been a subject of increasing attention in the Subcommittee in recent years. The Subcommittee heard progress reports on the International Geosphere Biosphere Programme, the Mission to Planet Earth programme and a variety of national programmes. It was agreed that the special theme for the 1992 session would be: "Space technology and protection of the Earth's environment: development of endogenous capabilities, in particular in the developing countries and in the context of International Space Year."

The Subcommittee reviewed the plans for the participation of the United Nations in International Space Year (ISY) - 1992, in which environmental monitoring is to be a major theme. Noting that United Nations ISY activities needed to be funded from voluntary contributions by

Member States, the Subcommittee expressed its appreciation to those States and organizations that had already made commitments and called on other States to support these activities.

A number of delegations expressed concern over the accumulation of space debris and proposed that the question be placed on the agenda of the Subcommittee. Other delegations, however, felt that more studies on the issue needed to be done at the national level before international discussions would be productive.

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*The Legal Subcommittee of COPUOS Convenes its Thirtieth Session with Hope of Progress in the Codification of Space Law*

Under the Chairmanship of Mr. Vaclav Mikulka of Czechoslovakia, the Committee on Peaceful Uses of Outer Space (COPUOS) Legal Subcommittee held its thirtieth session in United Nations Headquarters in New York from 25 March to 12 April 1991. Through the re-establishment of its working groups, the Subcommittee continued its consideration of principles on nuclear power sources, agenda item 3, under the chairmanship of Hans Winkler (Austria); on the definition and delimitation of outer space and the use of the geostationary orbit, agenda item 4, under the chairmanship of Estanislao Zawels (Argentina); and, on the principle that outer space should benefit all States, agenda item 5, under the chairmanship of Raimundo Gonzales (Chile). In opening the session, the chairman stressed the importance of the progressive codification of international space law. Despite this appeal, the Legal Subcommittee's achievements were exemplified through its cooperative efforts and negotiations in both its formal and informal sessions and in the production of its working papers rather than in the codification of space law.

For agenda item 4, matters relating to the definition and delimitation of outer space and to the character and utilization of the geostationary orbit, including consideration of ways and means to ensure the rational equitable use of the geostationary orbit without prejudice to the role of the International Telecommunication Union, the working group divided its agenda between definition and delimitation of airspace and outer space and the question of geostationary orbit as it has done at its previous sessions. For the issue on definition and delimitation of airspace and outer space, the same views were reiterated: (1) that it was a practical and legal necessity to define the legal boundaries between the two and (2) that there was no need for establishing a juridical boundary between airspace and outer space. Due to the fact that the Legal Subcommittee has focused on this item for more than two decades, the United States proposed that the working group consider dropping the issue from its agenda and

utilize the time for other items because little progress had been achieved on the item and there was little likelihood in producing tangible results. As an approach to breaking the deadlock, the Soviet Union proposed that the working group elaborate international legal rules regulating the flights of aerospace systems that would function in both air space and outer space. The Soviet Union stated that it was prepared to submit a working paper containing specific draft provisions regulating the utilization of aerospace systems at the next session.

For the second aspect of agenda item 4, the question of the use of the geostationary orbit, a "working non-paper" was circulated which some members of the Group of 77 prepared. Basically, the "non-working paper" outlined that the geostationary orbit is a limited natural resource, must be used exclusively for peaceful purposes, and required a special legal regime. Also, the paper stated that all States should have equitable access and that when there were two claims for the same orbital position, and one of the countries already had access to the orbit, preference should be given to the developing country or the country which did not have access. In response to the non-working paper, the International Telecommunication Union (ITU) observer expressed that the views in the paper overlapped with procedures already accepted at the 1988 Space WARC and therefore closer coordination with the ITU was required.

The working group for agenda item 5, consideration of the legal aspects related to the application of the principle that the exploration and utilization of outer space should be carried out for the benefit and in the interest of all States, taking into account the needs of developing countries (created at the twenty-ninth session) convened for the first time. Delegates focused on the basis for this agenda item on Article 1 of the 1967 Outer Space Treaty that instructs States that the exploration and utilization of outer space should benefit all countries. For some delegates, particularly representatives from developing countries, this agenda item should address the need for all countries to have equal access to outer space benefits, including the use of space technology and applications.

On the last day of the working group's session, Argentina, Brazil, Chile, Mexico, Nigeria, Pakistan, the Philippines, Uruguay and Venezuela circulated a working paper that expressed that the work of item 5 should not represent a mere repetition of Article 1 of the Outer Space Treaty but rather provide specific mechanisms for strengthening the principle of international cooperation through the legal rules. Generally, this paper extrapolated some of the ideas the Nigerian delegation proposed at the twenty-ninth session, including proposals that States with space capabilities bear a special responsibility in promoting international cooperation in outer space science and technology and that all States should have access to the knowledge and application derived from space exploration. One of the proposals submitted in the Nigerian statement for a special space fund or a "space peace corps" did not appear in this paper. Due to the fact, however, that this paper was circulated at the end of the meeting, delegates agreed to re-consider it more thoroughly at the next session.

The working group on agenda item 3, the elaboration of draft principles relevant to the use of nuclear power sources in outer space, with the aim of finalizing the draft set of principles convened to reach consensus on remaining Principles 2, 4, 8, 9, 11 and 12. In opening the working group, the Chairman appealed for the delegates to reach a final consensus on the principles to which they had generally agreed at the twenty-ninth session. The delegates, however, agreed to eliminate Principle 11, Relations to Other Treaties. Basically, the delegates could not achieve any consensus because of differences over the definition of specific terms, such as the term launching State and whether more than one definition was required depending on the conditions or whether the term as applied in the Liability Convention was still appropriate for nuclear power sources (NPS).

For Principles 2, Notification of the Presence on Board a Space Object of a Nuclear Power Source, and 4, Safety Assessment, Canada, France, Germany and Sweden submitted a working paper. This paper proposed to amalgamate the provisions in these principles into one principle, Principle 4, Safety Assessment. Some of the delegates expressed their concern about combining the two principles without further clarification. The Brazilian delegation, for example, expressed that some definition problems resulting from the amalgamation included a need for a clearer definition of launching State that would correspond to different situations and conditions for liability and responsibility, *e.g.*, responsibility and jurisdiction for the procuring State, for the manufacturing State and for the launching State. Also, the Brazilian delegation stated that the two concepts were not identical and that *safety assessment*, which relates to a product or group of products does not necessarily incorporate the notion of previous *notification*, which relates to an event, well defined in time and space. Therefore, Brazil suggested that the title of Principle 4 change to Safety Assessment and Notification of the Presence on Board a Space Object of a Nuclear Power Source. In response, some delegations, particularly those who submitted the working paper, expressed that the amalgamation included a detailing of the contents of prior notification as well as promoted transparency and confidence building.

Although the working group had reached consensus on Principle 7, Assistance to States, the Mexican delegation, supported by Canada, proposed that previous paragraph 1.5 of Principle 3 could be added to paragraph 2(a) of a draft Principle 7 that deals with assistance in identifying the location of impact of NPS, for the detection of re-entered material and for the carrying-out of retrieval or clean-up operations. It appears that the working group will incorporate these recommendations into Principle 7.

For Principles 8 and 9, Responsibility and Liability and Compensation, respectively, a working paper was submitted by Canada, China, Czechoslovakia, France, Germany, Italy, the Netherlands, Sweden, and the United Kingdom of Great Britain and Northern Ireland. The delegates did not reach a consensus on these principles. Most of the debate

focused on whether an expanded scope of the definition of launching State contained in the 1972 Liability Convention was appropriate.

Although the working group had already achieved consensus on Principle 3, Guidelines and Criteria of Safe Use, the United States submitted a working paper based on a previous paper submitted at the Scientific and Technical Subcommittee. In summary, the United States proposed to revisit certain provisions of Principle 3, including deletion of the preamble, because no other principle had a preamble; replacement of the word "should" for "shall" to make the principle more consistent with the non-binding recommendatory nature of the principle; a replacement of the word "foreseeable" with the word "credible" to limit the universe of hypothetical accident scenarios; and a modification of the dose limits of radiation exposure to the limit as low as reasonably achievable. Some of the delegates remarked on their disappointment in the United States "revisit" to Principle 3 because it was a principle which had already received consensus. For some delegates this process of "revisiting" may inhibit the finalization of the principles for some time.

Although some delegates believed a consensus could be reached for Principle 12, Revision, other delegates were of the view that they could not agree on a time frame for revision until all the principles were completed.

The delegates also addressed the issue of venue and the duration of the meeting. For some delegates, including the United Kingdom and the United States, it would be more efficient in terms of financial resources and conference services for the venue to stay the same, only in New York, rather than the present policy of alternating between New York and Geneva and to limit the duration of the meeting from three weeks to two weeks. Other delegations, including the Soviet Union and France, however, preferred the present policy and did not find any evidence of cost efficiency. Also, for the developing countries, maintaining the three week duration was important to ensure that all items received adequate consideration.

The Subcommittee ended its thirtieth session on 12 April 1990. This coincided with the thirtieth anniversary of the first flight of man into outer space by Yuri Gagarin. The delegates paid tribute to this achievement.

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#### *The Spaceplane and the Law*

The international colloquium on Spaceplane and the Law, held in Paris on May 14 and 15, 1991, was organized by the French Society for Air and Space Law, with the help of the European Space Agency, the French Civil Aviation Authority, the Centre National d'Etudes Spatiales (CNES) and Air France, and had ICAO, Eurocontrol and the French Ministries of Foreign Affairs, Transport, PTT and Research as its patrons. The

colloquium was attended by some 100 participants from France and abroad. The purpose of the colloquium was to create awareness of the legal problems that may arise when spaceplanes become reality, and to propose solutions to those problems. After the opening words of the President of the French Society for Air and Space Law, *Dr. M. Bourély*, opening addresses were held by the Director General of ESA, the Director General of the French Aviation Authority, and high representatives from CNES and Air France.

The first part of the colloquium was chaired by *Mr. Bignier* (formerly of ESA) and served to give the participants an idea about the state of the art concerning the various projects for spaceplanes presently being developed by ESA (Hermes), the United Kingdom (HOTOL), Germany, (Sänger), Japan (HOPE), the USA (NASP) and France. The US speaker was unfortunately not present, so the audience could not learn about the progress of NASP, maybe the most advanced of all spaceplanes.

Hermes was presented by *Mr. Simon* of CNES, which initiated Hermes in 1976. The project was presented to ESA in 1985, and accepted in 1987. The purpose of Hermes is to create the possibility of an autonomous mission of up to 28 days. Hermes is to be launched by Ariane 5. Almost all European space industries are involved.

HOTOL's objective, according to *Mr. Parkinson* of British Aerospace, is to reduce the present cost of launches (\$5 to 15 million per ton launched) by 20%. HOTOL will take off and land horizontally, will be 'single stage to orbit' (SSTO), unmanned and autonomous, although a manned version is also possible. It will be launched from a trolley, and re-entry will be similar to that of the shuttle. In 1989, the USSR Antonov 225 heavy-lift aircraft was presented at Le Bourget, and the Soviets and British started negotiations about the Antonov air-launching HOTOL. This project is now called Interim-HOTOL, and is very similar to the original project. Separation of HOTOL will start when Antonov is at about 9 km altitude. The launch site is a conventional runway.

*Dr. Hauck* of MBB/Deutsche Aerospace explained the "CASE" for Sänger:

- Cost; it is to be reusable and take off from European airfields;
- Autonomy/Accessibility; it is to be independent from the US and to be operated from Europe;
- Safety; and
- Environment; it will produce limited pollution and noise.

Sänger is the reference concept for the German Hypersonics Technology Programme. It is supposed to be launched and land in Europe, and the purpose is to Europeanize the project. Norway and Sweden have already concluded MoU's with Germany, and negotiations are taking place with Belgium and Austria.

HOPE is the Japanese project, and was presented by *Mr. Suzuki* of the Paris NASDA Office. HOPE will be launched horizontally by a rocket from the Tanegashima space center. It is unmanned, fully automatic and reusable, and will be operational in 2000. It will be able to function 4

days independently in orbit. The development phase will start in 1 or 2 years, and international cooperation is being sought.

France also carries out studies in this field, be it mainly for military purposes, as explained by *Mr. Debout*. The 4-year project is called Programme de recherche et de technologie sur la propulsion hypersonique avancée (Prepha), and aims to have a military transatmospheric vehicle by 2020, and possibly a civil version for the transportation of passengers at a later date.

*Prof. Detter de Lupis* (Sweden) raised the question whether there was any coordination between all these projects, and it became clear that although many spoke of cooperation, no real coordination exists at this time.

*Prof. Vereshchetin* (USSR) observed that from the presentations it appeared that all projects will (initially) only serve for space transportation, and not for transportation of passengers from a point on earth to another point on earth via space. The speakers confirmed this and said that at present there is no market for such very expensive transportation.

Upon the question whether the representatives regarded their project as a space object or as an aircraft, the answers were as follows:

- Hermes is a manned space object;
- Sängers lower stage is an aircraft and its upper stage a spaceplane, whereas the whole should be considered a space transportation system;
- when HOTOL returns it is a spacecraft, and it is significant that both the air and space divisions of British Aerospace work on the project;
- HOPE should rather be seen as a space object, not falling under air law rules;
- the French project's status should be determined according to the missions it fulfils.

In the session on conditions of use, the first scheduled speaker on the programme was *Mr. Frankle* of NASA, who was to speak about the Shuttle. Unfortunately he could not come, so the chairman of the session, *Prof. Böckstiegel* (Germany), presented his paper. *Mr. Frankle* considered the Shuttle as the first spaceplane. In the past, the US was skeptical about the need for a delimitation of air and outer space, and *Mr. Frankle* did not think the spaceplane would create such a need now. The experience of the US with law-making (Space Station, Shuttle) taught them that premature law-making raises more questions than it answers. The role of lawyers is to solve real and immediate problems.

*Mr. de Montlivault* (Veritas, France) spoke about registration and certification of spaceplanes, and gave an overview of the respective air and space law provisions. To answer the question whether these rules apply to the spaceplane, several points must be considered. First, there is no boundary between air and space. Second, the Shuttle has been defined as a spacecraft. Further, Hermes should be considered as a spacecraft during its orbital flight, but as an aircraft during landing and transportation. If not defined as a state aircraft, it will have to apply for an airworthiness

certificate, or, if it is defined as a prototype, for a flight permit. Sanger and Interim-HOTOL's first stages are aircraft, whereas their second stages are spacecraft. NASP on the contrary, is a hybrid vehicle because it is "SSTO", so both air and space law apply. As far as space law is concerned, there is a Convention for the registration of objects launched into outer space. Thus ESA should register Hermes, and should do so at each flight. Space law has no certification rules. The approach *Mr. de Montlivault* proposed was to promote a rigorous self certification at contractor level, and to have the work of the contractors verified by an independent organism.

The next speaker, *Mr. Rappaport*, a Paris attorney, was to discuss the flight personnel of the spacecraft, but he was absent.

*Mr. Lambert*, Director General of the French Air Navigation, spoke about air navigation rules. He observed that if the take off of the spaceplane is horizontal, normal runways will have to be reserved for considerable amounts of time as precision is difficult to obtain because of their limited maneuverability. Landing will be like a glider and again the plane will be hardly maneuverable. Thus, already overcrowded runways must be reserved for substantial periods of time to allow the spaceplane to take off and land safely. It would be better to reserve some airspace for the spaceplanes. But if these flights become routine in the future, it may be preferable to create special spaceports to accommodate these vehicles. Navigation rules will have to be adapted to this new means of transport, but it will not be easy.

*Mr. Frantzen* of the French Civil Aviation Authority explained that aircraft are very sociable and versatile. It is not certain whether spaceplanes will also have these characteristics. He discussed Annex 6 to the Chicago Convention in detail, and was of the opinion that notably the rules about the crew are very different. In air law, the commander has the ultimate power on board, whereas on a space object, the commander always obeys the ground station; the Flight Director is on the ground. *Mr. Frantzen* did not believe that both air and space should apply to the spaceplane, depending on where it is.

The last speaker in this session was *Dr. Vereshchetin* from the USSR Institute of State and Law, who gave an excellent overview of space law in view of the spaceplane. Spaceplanes can fly both in air and in outer space, and use both aeronautical and space technology. The various spaceplanes are so different that one cannot apply one and the same legal regime to all of them. A regime must be applied according to the following criteria: (1) purpose and function (earth-to-earth or earth-to-space); (2) technical configuration and capabilities (SSTO, 2-stage, cargo-type, horizontal, vertical, air launch, etc.); and (3) the medium where it predominantly operates. The first criterion is the most important one. Since the spaceplane operates predominantly in the air, air law should apply. A problem arises in the case of multipurpose missions. Common elements of all spaceplanes are that once they are up in space, they will stay there for more or less length of time, they are not just traversing space. During that time, they should be considered as space objects. Secondly, on their way

back, they fly more or less freely in (foreign) airspace and land conventionally, and in this respect they differ from space objects, who during their landing benefit from the right of innocent passage. One can hardly expect this rule to apply to spaceplanes; special agreements will be needed. As far as take-off is concerned, there is a wide diversity among the various projects, although they do have some things in common. Hermes and HOPE are both launched vertically, as rockets, so they are space objects during the first phase of passage through air space. If they take off horizontally, disregarding whether they are SSTO or two-stage, their legal qualification becomes a problem. They still may be a space object if they use foreign air space only for non-commercial transit. If they take off horizontally and are air launched by an aircraft, two different legal regimes apply. During take off until air launch it is an aircraft and has no right of innocent passage and must comply with air law requirements. After separation, the carrier remains an aircraft and the spaceplane is a space object until it lands. Nevertheless, some minor reservations and supplements to space law may be required. For instance, "launching state" may have to be redefined. In conclusion, *Dr. Vereshchetin* believed it may now become necessary to make a boundary between air and space and between air law and space law. He also maintained that the main criterion for deciding whether to apply air or space law should be the purpose of the mission. Further, he was of the opinion that the delimitation question would remain an issue, since States would not be willing to give up their sovereignty in this respect. In his view, the use of spaceplanes would not contribute to the formulation of a customary rule of innocent passage through foreign airspace without prior consent. On the contrary, frequent use of spaceplanes may even reverse this tendency. Finally, considering whether the time would come for a separate aerospace law next to air law and space law, his answer was yes in the sense that the regulation of the spaceplane may require supplementing space law with rules from air law and *vice versa*, but his answer was no in the sense that the main difference between air and space law, *e.g.* sovereignty, would remain.

The third part of the colloquium dealing with liability was to be chaired by *Prof. Diederiks-Verschoor* (The Netherlands), but since she was not fully recovered from a recent illness, *Dr. Vereshchetin* took over the chair and read the opening words of *Prof. Diederiks-Verschoor*. She would be an advocate of a demarcation between air and outer space, but since such a boundary would probably not be determined in the near future, she would rather adhere to the functionalist theory.

*Prof. Du Pontavice* (University of Paris II) talked about the determination of the operator. He said the operator should be subject to one single legal regime, and he favored to have a simple, clear regime. The space treaties do not provide any solution in this respect, since this is rather a problem of private law. The best solution is to combine air and space law to determine the operator: according to air law, a detailed national register of spaceplanes should be kept by each country, with the name of the owner and of the operator if he is not the same. But this air law rule must be supplemented with one from space law, to the extent that also

an international register should be kept by the UN. If the operator is not the owner of the spaceplane, air law determines that there is joint liability of both. The conclusion of *Prof. Du Pontavice* was that for the spaceplane as well there should be joint liability of the operator and the owner in respect of third parties on the ground, with the owner's right to seek indemnification from the operator.

*Mr. Webb* (Q.C., London) discussed the operator's liability towards passengers and third parties on the ground. He was of the opinion that the time is not ripe to determine who is liable, but only to determine who has jurisdiction. The space law treaties are not sufficiently wide to cover spaceplanes in this respect. In air law, the operator is liable under the Warsaw Convention, which gives a strict, limited liability. Its purpose was to protect the operator against large claims. If all necessary steps have been taken, there will be no liability, and no burden of proof on the operator. Furthermore, the choice of forum is left open. The problem of Warsaw today is that the limits are too low, so they are by-passed by all sorts of national regulations. The litigants will sue anyone on the fringes of the operation (manufacturers, Air Traffic Control, airport, *etc.*) in order to circumvent the limits of the Convention. If the spaceplane is not an aircraft, air law rules will not apply, but national laws will, *i.e.* the domestic principles of the chosen forum. In view of the failure of the Rome Convention, *Mr. Webb* did not expect a space convention for liability toward third parties. Instead, he suggested to at least make a step forward and establish a forum regime.

The next part of this session covered the liability of the manufacturer and insurance, and was chaired by *Mr. Braure* (Chargeurs, France). First, the liability of the manufacturer was dealt with by *Mr. Garnault* (attorney, France). He was of the opinion that lawyers would have to become more and more specialized, and that an arbitration tribunal for air and space claims should be created to settle these complicated claims.

*Mr. Clerc* (La Réunion Spatiale, France) explained the conditions of insurance which would cover the spaceplane, and he expected that the spaceplane would be insurable. He compared the spaceplane to the first Boeing or the first Concorde or satellites, which also were high-risk, uncertain new projects but nevertheless found an appropriate insurance cover. In most of these cases, an international consortium was formed with waivers of liability to protect the respective partners. A problem may exist in the mixed character of the spaceplane; two fundamentally different legal systems could apply to one object. But *Mr. Clerc* was of the opinion that the spaceplane is rather an aircraft than a space object. In his view, it is essential that the insurers be involved in the elaboration of the legal texts which they have to apply in practice.

*Judge Guillaume* of the International Court of Justice had the difficult task of summing up the conclusions of the conference, which he did in an admirable, clear and concise way. Concerning the spaceplane, he saw three main differences between air and space law. First, the status of the vehicle and its crew, second, the conditions of use, and third, the respective liability regimes. Concerning the status of the vehicle and the

crew, he discussed three points. First, the registration, which has fundamentally different requirements under the Chicago Convention and under the Registration Convention, mainly because under the latter marking is not required, and registration must take place at every launch. Second, the certification rules differ; under space law, no safety certificate is required. Third, he mentioned the crew; under the Chicago Convention, a license is required whereas no such requirement exists under the Rescue Agreement. The second difference concerned the conditions of use. In air law, permission is required to fly over another country, and in space law, there may even be a custom of free transit. The third difference concerned the liability regimes. The air law regime is very elaborate; liability of the operator is governed by the Warsaw Convention, and liability to third parties by the unsuccessful Rome Convention, and thus in fact by national laws. Collisions among aircraft are not regulated by international law but must be settled under national law. Actually, these two fields which are not regulated internationally by air law (collisions and damage to third parties) are the only ones regulated under international space law, which is mainly public law, and holds the state liable.

The final question is whether air law or space law or a whole new law should apply to the spaceplane. Technically, the projects are very diverse. Also the purpose and missions may differ. The territorial approach is not a useful criterion to solve this matter because there still is no boundary between air and space. The functional approach is better suited, so that the use of the vehicle should be decisive, although this leaves the problem of multiple purpose missions. Concerning regulation (registration, certification, etc.). *Judge Guillaume* was of the opinion that a solution can always be found, and he mentioned the example of the *Concorde*, which in fact "sold out" each time it flew within the US to comply with the regulations. The most complicated problem is liability. Since none of the two systems seems perfect, the ultimate solution in this respect would be to develop a new autonomous law for spaceplanes. Work on such a new legal regime should start with close cooperation among lawyers and technicians in this field.

*Tanja L. Masson-Zwaan*  
IISL Secretary

## Comments

### *Emerging Law in Outer Space - The Analogy of Maritime Salvage*

#### I

In a recent article appearing in a German newspaper, a commentator observed:

Millions of items of man-made space debris orbit the Earth at enormous speed and pose a growing risk of collision with manned and unmanned space missions. Nearly 7,000 items, including old satellites and burnt-out rocket stages are larger than tennis balls and have been spotted on radar screens by America's Norad air defense command . . . . Even chips of paint can cause damage as they hurtle through space at up to 60,000 kph. The risk of colliding with man-made space debris is much greater than the likelihood being hit by a meteorite.<sup>1</sup>

As this article indicates, debris from space objects (including components and boosters that are dropped off in launches, waste materials, disabled satellites, and pieces that have broken off the objects) are creating a serious hazard for the transit and uses of this arena. But there is also a security hazard: debris - in addition to being the source of interference with the legitimate uses of space - offers the possibility, at least, of concealing activities in space, creating a potential threat for others. Debris from public launchings belongs to the States that are the source of that debris, and the general rule is that until expressly abandoned the debris is owned by them. Finally, there is the problem of a public order for outer space. Such an order requires that States operate as participants in promoting amongst themselves the means of maintaining their security under the rule of law. But, up to the present time, States have failed to enter into agreements to relinquish their claims so that the

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<sup>1</sup> THE GERMAN TRIBUNE, Jan. 20, 1991, at 9. The article indicates that European space efforts are troubled by the debris, and have attempted, so far without complete success, to test the impacts of debris and the damage that may be caused. Much of the present work is in the development and improvement of protective shields. But these must be very thick, would be heavy and costly, and require redesign of the spacecraft's nose. Some of the designs call for as many as five separate walls, with a wall ranging between 40 and 60mm in thickness. Windows and fuel tanks need special protection. The author of the article speculated on the increased appearance of smaller particles of debris, suggesting that they might ultimately form an orbiting ring around the Earth similar to the rings of Saturn.

debris might be swept away by an international group or by the efforts of others.

The strategies for imposing public order are primarily two-fold. The appropriate strategy might conceivably come in whole or in part from the future practice of States, *i.e.*, they may make the necessary adjustments amongst themselves for handling the debris, dispossessing themselves of it, and disposing of it. Unquestionably, here, as elsewhere, the strategic perspectives of States active in outer space will be strategies entertained primarily to promote their own, often exclusive, interests. We can expect from past practice and attitudes that States will pursue strategies most likely to achieve their own interests.

The interests of States in space and in freeing themselves from debris arise from their current activities. Transit, unlimited sources of energy, and material resources beckon the entrepreneur, and identify the primary activities and interests at this time. The areas closest to the Earth command major attention because space objects and vehicles can reach this area at relatively low cost, and because they are more readily accessible to terrestrial activity.

The second strategy might be initiated through an agreement or treaty amongst States aimed at promoting public order. Although this would mean a more rapid accommodation among States, it can also mean that they might bog down in negotiations if their policies differ too substantially. But an undertaking among States by treaty might be aimed at reaching State-owned debris regardless of ownership through an international effort or organization. However, the debris from private launchings and satellites is accessible through private means, because these are not subject to the usual, and continuing, claims of sovereignty. Hence as to the private launchings there is the possibility of drawing upon the concept embodied in the maritime concept of salvage, and using that concept, and the elements of the law of finders to remove such objects.

While the removal of debris by private parties or by public groups is likely to prove costly, the technologies of salvage interchange with the technologies needed for activities in space in general, so that these costs can be reclaimed in part by the development of know-how. And, if debris becomes too serious a hazard, it will then be necessary to look for international funding, as with the oil spill agreements, to cover these costs, chargeable to each launch of a space object, with the fund maintained by an appropriate international organization.

In short, the appearance of space debris is the natural outcome of increased space activity. The growing number of activities in outer space - launching and orbiting the space vehicles and the possibility of accidents and harm creating the debris of mishap - are leading to a growing demand to regulate those activities and to provide protection to those who may be injured or hurt. But there are also activities that may involve satellites interfering with the legitimate orbits or paths of other satellites or affecting the way they function. Still others may fall out of control and lead to threats to others requiring immediate action by way of self-help or self-defense to abate the threat, or avoid severe damage. And beneath all

these concerns are the more ambiguous security concerns: if some satellites are malfunctioning and need to be removed from orbit, others may function very well and involve, among other things, the security interests and defense support activities of the State that owns them.

Pacing these growing activities involving public and private entities, there are growing demands that those who launch space objects must not only be responsible for the proper functioning of those objects and for their removal when they can no longer function, or where they interfere with others, but that they must also be prepared to pay damages or compensation in the event of an accident. Here, the expectation is that the damages will restore the parties affected to the *status quo ante*, and if this is not possible, that damages will be provided for full and adequate compensation. As examined in greater detail below, liability under existing international law (as established by treaty) arises whether the incident occurs in terrestrial air space - say an aircraft is hit, - or in outer space - where another space object is damaged or destroyed - or on Earth, where destruction or damage and demands for compensation may be substantial, particularly if human beings are injured or killed.

## II

In a proposal I have made elsewhere, I suggested that one approach that can gradually lead to strengthening law in outer space might be achieved by treaty undertakings of the space powers to adopt and require their citizens to adopt standard terms and conditions covering their activities into or in outer space. The treaty would contain the undertakings and related features; the annexes or supplements would convey the terms and conditions that they have agreed to. Such treaty undertakings would call upon the States, as treaty parties, to ensure that the terms and conditions are adopted under the appropriate municipal legislation. The terms and conditions would cover the major common problems involved in the activities of satellites. They would establish responsibility, standards to be applied, and so on. And they could provide for the handling of debris.

Standardized contracts bear the marks of how they are negotiated, but they will contain the hard core of what is expected of all who are engaged in activities in space. They can contain a reference to the applicable law or where it will be found. They can include standards for applying the law. Under this earlier proposal, I suggested that States would be adopting legislation, pursuant to treaties with others, to require the adoption of such standardized contracts. By adopting their own legislation, States would have the mechanism under their own control to fulfill their obligations, establish the enforcing mechanism through that law, and be able to have enforcement proceed through their own law.

This approach is used in the areas of trade and commerce, marine insurance, international lending, and so on. But its advantage for outer space is that it would establish needed law converted into municipal law, prescribed in parallel among States, even if not prescribed with exactitude,

and enforceable as "hard" law. Where an individual has a claim for damage arising from a space object, that individual would be enabled by the standard terms and conditions of the contract to seek relief or corrective action enforceable under municipal law and in the municipal courts. This would avoid the uncertainties and ambiguity of pursuing claims under international law, and also the inevitable problem that claimants are represented by their own States, and then at the discretion of such States in making such claims, settling them, and receiving the awards.

Accordingly, an enforceable right established in this way would help the individual claimant because he would not need to rely upon his government with regard to his claims. Under the traditional practice, the individual would need to call on his government, get it to bring suit involving the claim, put up with what the government does, for whatever reason, in negotiating or compromising the claim, and then receive as compensation from the government what might be far less than the claim. Even if the individual sued another private party, the claim would depend upon the applicable law and the vagaries of the claims process.

The current claims procedure applicable to claims brought against States under international law is based on the proposition that States have a duty to assume responsibilities and liabilities, including those [caused] by persons or entities who are under their "jurisdiction or control." But the current law is deficient with regard to how this claims procedure proceeds. These matters are left to the discretion of the States. The State cannot be compelled to negotiate the claim, nor for that matter to include the claim of the individual.

One of the problems that is involved in the activities involving satellites is that of accountability: attributing and securing relief through responsibility and liability for harm or damage. This problem is addressed but not fully alleviated by the international liability convention relating to damage arising from space objects.<sup>2</sup> The claims commission to be established under the Liability Convention has not yet been tried. The parties under the Liability Convention are the nation States, and the claims procedure and claims commission is designed to serve their direct interests.

If through the agreement of the involved States, the commission is established, and allowed to proceed, its decision will be recommendatory unless the parties agree that it is final and binding. The parties are to consider the decision of the commission in good faith, but the undertakings to consider, or to act in good faith, do not establish a legal rule or a legal obligation with regard to a particular form of action. If the commission proceeds, however, then, unlike the procedure involving claims settlement by diplomacy, the claims commission remains a voluntary framework, with no assurance that States will choose to invoke it or accept its awards or decisions. As a source of future law, it is weak because the decisions lack

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<sup>2</sup> Convention on International Liability for Damage Caused by Space Objects, done Mar. 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762, 961 U.N.T.S. 187.

precedential value, and because the outcomes are largely the outcomes of bargaining itself.

The Liability Convention also sets up rules for establishing liability (e.g., absolute liability for damage caused "on the surface of the earth or to aircraft in flight"), but in Article IX it makes the traditional diplomatic settlement of claims - that is, following the procedure mentioned above - the foremost procedure of those that the involved States are free to invoke. States, therefore, are likely to act through diplomatic negotiations rather than through the use of a claims commission.

The Liability Convention further provides that if no settlement is reached by the parties to the claim, they are to set up a claims commission at the request of any of them. But this is not a clear cut solution: a party can insist that the diplomatic settlement process is still in operation, or that the complaining party has been the source of obstruction to settlement and must return to the bargaining table, or that the settlement process was conditioned on that process being final (thus waiving any right to a claims commission under the treaty), or that ambiguities in the claim have arisen, and must first be resolved before it will be willing to move on to the claims commission.

Bargaining by diplomats has the advantage of providing an expeditious means for settlement, the secrecy sometimes needed for effective negotiations, and avoidance of domestic interference. It has been the traditional practice for the settlement of claims amongst governments. Because such negotiations are kept proprietary or private, they do not lead to precedents that might be adopted for a future settlement. But there are drawbacks. When settlement is managed in these channels, there is no way of checking the exercise of duress, or bargains, or new demands have developed, leading to suspension of the diplomats' negotiating process.

Moreover, the diplomatic procedures tend to be self-promoting. Many injured States are reluctant to resort to other procedures: there is always the possibility that in the future they will be on the other side. Moreover, if they refuse to proceed by diplomatic channels, the other side may simply complain that they have refused to proceed with bargaining in good faith, and therefore have not exhausted the "remedies" available to them for settlement. But there is a further disadvantage to the diplomatic approach. It does not tend to promote or provide constructive features for public order. There is the tendency instead for States to resort to diplomatic bargaining and negotiations because it operates through the familiar "sovereign" State principles that establish their relations among States based upon reciprocity and juridical equality. This approach thus reflects the competitive process among States.

Moreover, governments are reluctant to admit fault or responsibility and to pay compensation that suggests either of these. The contracts approach (that is, the adoption of the approach based upon standard terms, conditions and clauses in global space contracts) eliminates this uncertainty, so that incidents in outer space (that might be similar to those such as Chernobyl where no compensation was paid by the Soviet Union to claimants outside the Soviet Union) would be resolved by a

contract approach involving all the space powers. The contract need not spell out that the payment is for negligence or misconduct. Appropriately drafted, such a contract would avoid States "losing face," and make the harm and compensation an objective factor. And arrangements could even be made to provide for greater cooperation and assistance to the State suffering harm in return for its paying compensation or granting relief.

An incident in 1978 involving a Soviet nuclear-powered satellite offers us a recent example of recourse to the claims procedure involving a claim brought by the Canadian government to recover damages arising from the uncontrolled landing of the Soviet satellite.<sup>3</sup> The Canadian government sought to recover through diplomatic channels, but it also invoked the Liability Convention. The claim arose when the Soviet's COSMOS 954 lost its low-Earth orbit, went out of control, and on January 24, 1978 crashed on Canadian territory spreading approximately 65 kilograms of radioactive material. This material was scattered over an area the size of Austria. The Canadian government gave the Soviet Union its legal assessment of its claim, questions to be answered, and a demand to be compensated so that it could cover the costs to restore the damaged area to the condition which it existed prior to the occurrence.

Disputes arose between the two governments about charges for the search and removal effort. The Soviet Union insisted that such charges were not pertinent because they were not permitted to participate. The Canadians insisted that before permission be given to the Soviet request, certain questions concerning the object and its hazards should be first answered by the Soviet Union so that Canada would be informed about the full extent of the radioactive impact. But it is noteworthy that the settlement of this dispute took place solely through diplomatic channels, the first of the procedures proposed in the Liability Convention. The claims commission was not constituted. The amount reached in settlement was far less than that initially demanded by Canada.<sup>4</sup>

### III

New developments in the law suggest that there are other approaches that might be taken in resolving claims over objects in space. Let it be said at the outset that claims that involve satellites owned by governments will remain a problem unless the government in question is willing to forego its ownership or "sovereignty," but there is an indication that the launching and orbiting of satellites in the future may be conducted by private parties. And these parties cannot claim sovereign immunity to avoid suit or the payment of compensation.

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<sup>3</sup> *Canada's Claim Against the U.S.S.R. Arising out of the Cosmos 954 Incident and the Claim's Settlement; Statement of Claim*, Note No. FLA-268, Dept. External Affairs (Canada), Jan. 23, 1979.

<sup>4</sup> For a comprehensive review of this matter, see Hurwitz, *Reflection on the Cosmos 954 Incident*, in 32 PROC. COLLOQ. L. OUTER SPACE 348 (1990).

An approach differing from those imposed by the Liability Convention (the treaty route), and also differing from the "standardized contracts" approach, might be built upon the law that is now appearing with maritime salvage. This law contains the interplay of international law, though applied, interpreted and enforced through municipal tribunals of admiralty, domestic law made to assimilate international law, and general principles of law. Adopting this approach would require courts to adapt the general approach of such law to reach space debris. An illustration of the admiralty approach occurs in the action brought in a United States district court in Virginia that recently accepted *in rem* jurisdiction (*i.e.*, jurisdiction based on the "thing" or maritime wreck in this case before the Court).<sup>5</sup> Jurisdiction was asserted over "the unidentified, wrecked and abandoned sailing vessel, SS Central America." A brief summary of this case indicates the nature of the problem that arises in treasure and abandoned property claims on the High Seas, and sets the stage for considering a similar approach to outer space.

The wreck was found about 160 miles off Charleston, South Carolina in water one and half miles deep in an area where the Sargasso Sea and the Gulf Stream merge. The ship was estimated to have been carrying three tons of gold from the California gold fields, receiving its shipment at Aspenwall, Panama that had come by rail from the Pacific Coast of the Isthmus. The sinking occurred September 12, 1857, but through the efforts of the crew and ships nearby between 166 and 187 passengers were saved.

A number of salvors have recently laid claims to the wreck, able at this late date to reach it through new salvage technologies. These claims include those of a group that has located the wreck and is using robotic equipment and modern technologies to bring it to the surface, and also the claims of nine insurance companies representing 39 underwriters that had paid off insurance policies on the wreck, but are not presently involved in a salvage effort of their own. But others seeking to salvage or assert claims to the wreck have also been present in the general vicinity and they introduced their claims into the action. Only the plaintiff has been able to recover pieces of the wreck and its cargo and bring these pieces physically into the court. The United States Eastern District Court of Virginia, in which the claims and action have been brought, accepted the *in rem* jurisdiction asserted by the plaintiffs.

A variety of motions, appeals, and claims were filed between July 1987 and August 1990, leading ultimately to the District Court's judgment

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<sup>5</sup> Columbus-America Discovery Group v. Unidentified, Wrecked and Abandoned Sailing Vessel, S.S. CENTRAL AMERICA, 1989 A.M.C. 1955 (E.D. Va. June 30, 1989) (NO CIV. A. 87-363-N). It is notable that *in rem* jurisdiction could be established by a single piece of coal removed from the seabed, and introduced as coal from the sunken ship. See private correspondence from the attorney representing the claimants to salvage to the author of this paper - Richard T. Robol, in an unpublished paper intended for future publication, "The Emerging Law of Deep Ocean Discovery: An Overview."

of August 14, 1990.<sup>6</sup> The issues agreed to between the parties were whether the claimants were entitled to the wreck and its cargo under the "law of finds," or to the rights of salvage, in which payment is made from the wreck and cargo for the work or effort expended, and also whether the plaintiffs were entitled to be treated as the sole claimants ousting the claims of all others as to the wreck. Such matters were readily cognizable under the jurisdiction of the Court. Further issues raised in this matter include the question whether the property was lost or abandoned, whether invoking the law of salvage would provide a better deterrent to clashes among contending claimants, and whether for the purposes of the Court's *in rem* jurisdiction the plaintiffs have reduced the property to possession (*i.e.*, through continued working of the wreck, and the continued grasp of pieces of the wreck or its cargo). The Court also considered the issues as to which of the claimants were in a better position to assert their claims, and whether the insurance companies could establish their claims by contemporaneous newspaper accounts.

The Court held that the insurance companies, by their actions in destroying their own records concerning the disaster, had abandoned their claims. Reviewing American cases in admiralty on the matter of abandonment, the Court noted that abandonment includes both the relinquishment of efforts to pursue a claim, and an intent to relinquish them in the future. In its opinion, it noted that

'abandonment' means a yield to natural impulses, to withdraw protection, support or claim; to desert; to cease intending or attempting to perform; to terminate possession or protection. 'Abandonment' includes both the intention and the external act by which the intention is carried into effect; intention may and indeed often must be inferred from acts.<sup>7</sup>

When things are lost, however, the element of intent is no longer applicable: loss is involuntary. Ownership passes to the first who reduces property to possession. Salvage law calls for a theory that title can "never be lost."<sup>8</sup> With regard to possession and control of the property, the cases have indicated to treat the debris as if it were a "person" before the court, so that jurisdiction to adjudicate among contesting claims is then possible.

The Court's jurisdiction was broad, because it covered the sunken vessel, which amounts to the "debris field" created on the sea beds by the sunken vessel, referred to as the *res*, and leading to *in rem* jurisdiction over the vessel or debris, and it also covered the persons that up to now have shown an interest in claiming the wreck and artifacts. Such

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

<sup>7</sup> Columbus-America Discovery Group v. Unidentified, Wrecked and Abandoned Sailing Vessel, 742 F. Supp. 1327, 1335 (E.D. Va. 1990).

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

jurisdiction is asserted by municipal courts, such as those in the United States, reaching to extraterritorial claims - or claims beyond the traditional territorial jurisdiction of the Court. It is flexible, and flexibly applied, because it is applied by the courts, or by the interpretation of statutes. But with the growing practice of the cases, the precedents make it increasingly certain and clear as to its effectiveness.

This problem is interesting because the Court is claiming to prescribe and enforce the federal common law of the United States over activities and things found on the seabeds beneath the High Seas. It is widely recognized that courts have jurisdiction over persons or things within the territory of the State that has established them. They have more trouble asserting jurisdiction if the activities or things are outside their territorial jurisdiction.

What the Court did in this case, upon the advocacy of the attorneys involved, was to resort to an "emerging maritime doctrine" under which a salvor may not engage in salvage activities where those activities might despoil property or cultural artifacts of the seabed. If he does, he does not come into court "with clean hands." Cases of this kind tend to oscillate between those decided on the basis of the law of finds, where the party retrieving the debris or artifacts gains ownership, and other cases based on the law of salvage, where the original owner retains ownership, but is subject to a maritime lien enabling the salvor to claim compensation and a reward for his efforts.

Attorneys in the case argued that a new field of law - the law of deep ocean discovery - drawing upon both the law of finds and the law of salvage is being established so that adjudication, and the law evolving from adjudication, will develop as cases are brought to court.

The usual standards of admiralty court and law were applied in the treasure-trove case mentioned above. Thus such standards as those requiring reasonable pursuit of perfecting the claim and bringing it to land and so on were to be shown, but the Court found that in the *SS Central America Case* that these standards had all been met. It is evident that where parties go to the municipal courts of a number of countries the separate problem referred to as a problem for the Court to determine the proper law from a conflict of laws is raised, but conflict of laws issues have had a long period of hearing and development.

Cases such as this pave the way for the assertion of jurisdiction by the common law courts to cover incidents, events or activities in outer space. This would enable claims to be asserted over space debris or "space junk" of private parties in the United States federal courts, and perhaps by application of the same doctrine in the courts of other States. Of course, the *in rem* jurisdiction enables the court to determine which of contending claimants has the better claim.

The claim in outer space might develop differently in one respect, however, if the court assumes the power to adjudicate whether the satellite was malfunctioning, or was a threat, or engaged in reckless maneuvers or orbits. Moreover, with statutory developments such as some of those that

have appeared in the United States and other jurisdictions, foreign States may be denied their claim of sovereign immunity.

Putting aside assertion of immunity by a foreign State claiming the satellite, the claimant following the maritime salvage jurisprudence might make his claims to "debris" or to space objects that have broken down, and abandoned. Adjudication would afford relief from interference with the claim, and also help develop the law of salvage and the law of finds for outer space. How other States or their courts will react to all of this remains speculative, and in any event a problem for another commentary.

Depending upon the definition adopted for "debris" the jurisdiction asserted over space junk or satellites may include jurisdiction over satellites that are malfunctioning, or those threatening imminent harm or danger to functioning satellites, or to remove those that threaten harm or are threatening to return to Earth without other means to prevent their crash and the harm that may result. The court would then be in a position to adjudicate some of the issues formerly reviewed and resolved by diplomats. However, it is evident that when we turn to problems and cases that threaten a nation through the uncontrolled descent of satellites, we are raising problems of sovereign claims. The development of both policy and law regarding such problems may best be tackled through treaties and at the time of crisis through diplomacy and self-help where necessary.

States may resist interference because the satellites are engaged in defense support activities, or involved in activities supporting their security. So States may resist interference with their satellites even if harm was clearly an exception to the traditional rights of the States. This might have readily been done, and even treated as a form of self-defense, or calling for immediate measures of self-help and they may claim their rights to pre-empt the descending satellite because it would be too late to prevent harm if this were not done. However, to do so Canada would also have needed the means to reach the malfunctioning or descending satellite. This is a technological matter for all States to face in the future.

So far, it appears that the technologies for reaching malfunctioning satellites and either removing them from orbit or outer space, or from interfering with other properly functioning satellites are not well developed. At present, we have the shuttle, but it is limited in its current technologies to low-Earth orbits, and to maneuvers, and functions that would not enable it to handle these problems. But it might be recalled that the maritime salvage cases afforded an added plus to salvors drawing on the new technologies of salvage: their claims were recognized in part by the efforts they undertook to develop and apply such technologies.

The legal problem of space object retrieval and the handling of malfunctioning objects might be faced through the appropriate treaties. In the past, however, treaties have been difficult to negotiate, and negotiations have been time consuming. Moreover, many of the space treaties have not been concluded by a large number of States, and some, like the Moon

Treaty,<sup>8</sup> have not been ratified by the United States and others. But, as this article indicates, those treaties would be enhanced in part by including provisions clarifying the jurisdiction of States over the objects in space when the situations mentioned here arise. And they would also be enhanced by other provisions setting forth in standardized terms and conditions to be adopted by those engaged in space activities to regulate those activities, and by provisions in the treaties that overcome the problems of sovereignty when those problems also involve the probability of damage or harm to third parties.

*Harry Almond, Jr.\**

#### Case Law

*Transpace Carriers, Inc. v. United States*, 22 Cl. Ct. 80 (Nov. 21, 1990).

In this government contracts case, Transpace Carriers alleged that NASA breached its Preliminary Agreement, under which Transpace Carriers could have qualified to take over one of the launching programs currently operated by NASA. The complaint was filed after NASA transferred the program to another company. Transpace claimed that, except for the execution of a Definitive Commercialization Agreement, it was fully qualified to take over the Delta program. In claiming that the Commercialization Agreement was unreasonably withheld by NASA, Transpace demanded damages in the form of direct damages and lost profits. However, the United States Claims Court agreed with NASA, the defendant, in holding that Transpace failed to exhaust the administrative remedies which were mandated by the Preliminary Agreement and were not unavailable or inadequate. Accordingly, the complaint was dismissed without prejudice.

#### Short Accounts

*Satellite Communications in the European Community*

The European Community Directorate-General for Telecommunications, Informational Industries and Innovation published in November 1990 its Green Paper on Satellite Communications in the

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<sup>8</sup> Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, G.A. Res. 34/68, 34 U.N. GAOR Supp. (No. 46) at 77, U.N. Doc. A/34/76 (1979).

\* Professor of International Law, National Defense University; Adjunct Professor, Georgetown University, National Security Studies Program. This article does not necessarily reflect the policy of the United States Government.

European Community.<sup>1</sup> The Green Paper is intended to supplement the various telecommunication green papers and directives already issued, but unlike the others, focuses on satellite communications. The Green Paper was open for comments through April 1991 and now the Commission is assessing the proposals stipulated in the Green Paper in light of the comments. The Commission most likely will propose a directive on satellite communications based primarily on the Green Paper's suggestions and the received comments. Once a directive is proposed from the Commission, the European Council of Ministers will have to approve the directive, after consultation with the European Parliament and the Economic and Social Committee. At that stage, the directive would have to be implemented within each of the twelve European Community countries (normally, each State passes national legislation to implement a directive) by whatever deadline is set in the directive. Clearly, the Commission's hope is to have the Green Paper and directive provide the framework for a single European telecommunications market to be completed by the end of 1992. Recently, the ABA Section of International Law and Practice's Communications Committee has published a monograph summarizing that Green Paper, including the regulation of satellite communications in the European Community, and the effect of the Green Paper on each of the country's current regulations.<sup>2</sup> What follows is a brief overview of the Green Paper's proposals for the future regulation of satellite communications in the European Community taken, in part, from that monograph.

First, the Green Paper proposes liberalization of the space segment market, permitting satellite service providers (INTELSAT, EUTELSAT, BSB, etc.) to market their services directly to end-users. Currently, many of the European satellite service providers have a monopoly on the provision of some or all satellite services in their home Member States. Frequently, that is enjoyed by the INTELSAT or EUTELSAT signatory for each of the Member States. Second, the Green Paper proposes unrestricted access to the space segment capacity, which would enable users to purchase space segment capacity directly from the authorized satellite operators, without the intervention of the national INTELSAT or EUTELSAT signatory or the national telecommunications organization. Third, the Green Paper suggests that the ground segment be deregulated to make it easier to have receive-only, or transmit-receive earth stations. Fourth, the Green Paper recommends standardization of satellite equipment regulations and mutual recognition of type approvals. This proposal is in line with much of the rest of the European Community's legislation, attempting to create a unified market by making it easier for each country's products to be used

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<sup>1</sup> *Toward Europe-Wide Systems and Services--Green Paper on a Common Approach in the Field of Satellite Communications in the European Community*, COM(90) 490 Final (Nov. 20, 1990).

<sup>2</sup> Mostesher & Gallebert, *Regulation of Satellite Communications in the European Community*, [Mono. Ser. 1991/2] ABA Section of International Law and Practice, Communications Committee (Apr. 1991).

in other countries, and for each country's citizens to receive or offer services in other countries.

*Prof. Katherine M. Gorove*  
University of Mississippi Law Center

*The Moon and Mars Missions: Can International Law Meet the Challenge?*

The Space Law Interest Group of the American Society of International Law held its annual meeting on April 18, 1991, in Washington, D.C. The Group sponsored a panel on the "Moon and Mars Missions: Can International Law Meet the Challenge?"

After an introduction by the panel's chair, *Prof. Katherine Gorove*, *Dr. Carl Pilcher*, Special Assistant for Exploration to the NASA's Associate Administrator for Space Science Applications, gave a thorough summary of the Mission from Planet Earth Program, also known as the 1983 Space Exploration Initiative ("SEI"). After noting that there was a White House policy decision on SEI to make it to Mars before July 20, 2019, he discussed in some detail the technical and scientific challenges to the program. Challenges included (i) designing the spaceship to create artificial gravity (perhaps having it spin continuously); (ii) minimizing the major physiological changes resulting from microgravity exposure, such as bone mineral loss, muscle atrophy, and cardiac deconditioning; (iii) improving the predictability of solar flares, which can cause lethal amounts of radiation, (iv) inventing better methods of protection from radiation; and (v) studying the biological effects of galactic cosmic rays and validating the results on the ground, by flying biological organisms in space. *Dr. Pilcher* noted that although some of the problems, such as radiation problems, could be minimized if the trip to Mars were quicker (current time-table provides for about 9 months to a 1-year trip), a faster trip would require a new type of propulsion system or energy source, such as liquid hydrogen or nuclear thermal propulsion. These, in turn, could possibly lead to political problems, if opposition arises. After discussing the challenges faced, *Dr. Pilcher* pointed out the benefits to science from a voyage to Mars. Because of Mars' warmer and wetter past, Mars could have once had conditions similar to those on Earth. This could mean that at one time life could have formed on Mars, perhaps contemporaneously with its formation on Earth. In addition, he stressed that missions to the moon serve a purpose as well, particularly in studying the history of the Sun and the effects of collisions of celestial bodies, because the moon should have preserved the results.

*Dr. Carl Q. Christol*, Professor Emeritus of Political Science, University of Southern California, discussed the relevant legal challenges. He noted that many of the legal challenges that have arisen with the Space Station Agreement will arise with any joint efforts to the moon and Mars, including questions of jurisdiction and control, cross-waivers of liability, treatment of data on goods in transit, criminal jurisdiction, etc. Highlighting the relationship between the use of the space shuttle, the

aerospace plane, the space station and an understanding of the moon and Mars, *Dr. Christol* stressed the need for international cooperation. He suggested that if the cooperative base could be extended, making use of developing countries, as well as developed countries, new opportunities would exist for the wider sharing of space-derived benefits. For such efforts to work, agreement would have to be reached on multinational transfer of technology issues. In addition, *Dr. Christol* briefly discussed the various sources of law, international and municipal, that could well be available for application to space stations and missions to the moon and Mars. He suggested that it would be desirable to concentrate existing law or legal efforts by unifying and formalizing the most relevant principles and rules so that a clearly identifiable legal regime will exist to encourage space activities. He also predicted that a sharing of benefits from space will require the use of a governing structure which will affect the manner and extent to which sharing takes place. He noted that two different approaches to such a model would be possible. One, a corporate model, allows participants to invest with the expectation that the most favorably situated countries will invest larger sums than the developing countries. Benefits will be distributed on the basis of investment. INTELSAT represents this model. The other model, the administrative model, consists of all interested countries having an equal vote without the restrictions on sharing contemplated in the corporate approach. INMARSAT follows this design.

*Dr. Eilene M. Galloway*, an honorary director of the International Institute of Space Law, provided the commentary for the panel. She noted that all of the space treaties are based on the broad coverage of both exploration and uses of space, but that there is an underlying assumption in existing space law that every legal provision adopted for the moon also applies to, and is adequate for, "other celestial bodies." Another general element is that space law must be based upon a realistic and comprehensive knowledge of space science and technology, a linkage that has not yet been forged. She noted that the Moon/Mars missions bring to the forefront several legal issues: the relation of national to international law in situations involving the jurisdiction of the launching State over its space vehicles; the law that applies to international crews aboard manned spaceflights; international cooperation on commercial space endeavors; use of the moon to generate solar power for the earth; and the involvement of international institutions in the management of space operations. She stressed that the problems arising from space activities are multidisciplinary, so that international law alone cannot meet the challenge of their solution or mitigation. Rather, the "legal profession must keep in the forefront of advancing space science and technology."

A lively discussion ensued. Some of it focused on the Moon Agreement and its impending review in 1994 by the General Assembly. Mention was made that the question of review was only on the agenda of the General Assembly and not on the agenda of the Committee on Peaceful Uses of Outer Space (COPUOS) or its Legal Subcommittee. People attending the panel discussion expressed a desire to have the question of review of the

Moon Agreement placed on the agenda of one or both of those bodies. Mention was also made of concepts that could be drawn from either the Law of the Sea Treaty or the Antarctica Treaty. For example, the concept of contiguous zones in the Law of the Sea Treaty could be used as an analogy for creating security zones around space stations. In addition, someone suggested that concepts could be lifted from air law, perhaps the principles applicable to tortious acts on board airplanes. Some discussion also revolved around the structure of COPUOS and whether or not the structure is effective, and if not, whether it could be revamped. A major problem cited was that many representatives from the Member States of COPUOS constantly change, resulting in representatives with limited substantive knowledge of space law attending the meetings. *Dr. Galloway's* speech also generated debate, with some disagreeing over whether or not asteroids, celestial bodies, the moon, and Mars should be treated generally within one treaty or separately in different treaties. Some argued that because the environments of the moon and Mars are so different, separate treatment was essential; others strongly disagreed. Some queried whether a celestial body could be converted to something else in space, rendering it quite different from a "normal" celestial body.

*Prof. Katherine M. Gorove*  
University of Mississippi Law Center

*AIAA Legal Aspects of Aeronautics & Astronautics TC Annual Meeting, May 2, 1991*

The AIAA Legal Aspects Committee held its annual meeting in Washington, D.C., on May 2, 1991. The new chairman of the committee is *William D. English*, an attorney in Washington, long associated with the satellite industry and other commercial space applications. The committee heard presentations on the following subjects:

A status report by *Gerald Mussara*, Director, Space Industry Trade Policy, USTR, on the negotiations currently underway between the U.S. and Europe with respect to the establishment of fair rules of the road governing commercial space launch services. The negotiations are focused on matters relating to government supports, unfair practices, pricing principles, market access, including (from the European perspective only) access to government payloads, as well as other issues. The next round of negotiations is scheduled for July. The negotiators are also discussing what rules of the road would be appropriate for the non-market economy suppliers of commercial launch services, such as the Soviet Union. Some significant differences remain to be resolved.

A review by *Elaine David*, Counsel, Office of Commercial Space Transportation, on the current licensing policies and practices of the government in the area of commercial launch services. A new issue of particular interest is that relating to low

earth orbit satellite system operators in recovering satellites for purposes of maintenance and refueling, and the special legal problems such commercial recovery missions can entail.

*Paul Uhler* gave a report on the status of the Orbital Debris Study Group. An interim report has been prepared which will be recommended for publication by the AIAA this year. The report identifies a number of debris mitigating techniques in common use by both the launcher and satellite industries, and recommends that the appropriate governmental agencies, e.g., FCC, OCST, publish these in Notices of Inquiry as potential standards for comment. The interim report also surveys existing legal regimes, both domestic and international, to determine whether those regimes can be utilized to apply and enforce debris mitigating standards if and when adopted at the domestic and international levels. The conclusion is that existing agencies within the U.S. have the necessary authority, but no such capability exists at the international level.

*Pamela Meredith*, President of Space Conform, discussed the proposed follow-up activities of the Study Group, which include working with the appropriate U.S. agencies in the preparation of the proposed Notice of Inquiries and evaluating the responses, and developing recommendations with respect to an effective international approach, as well as appropriate international institutional arrangements, for the adoption and implementation of debris mitigating standards. The Group will also participate with other AIAA Technical Committees in the further identification and analysis and of appropriate debris mitigating techniques.

*Delbert Smith*, head of the telecommunications group at the law firm of Schnader, Harrison, Segal and Lewis, and his colleague, Stefan Lopatkiewicz, presented an imaginative and insightful analysis and critique of the policy of the U.S. with respect to "separate [from INTELSAT] satellite systems," and the conditions imposed upon their establishment and operation. Some interesting, and troublesome, anomalies were identified and discussed.

*Martin Menter*, IAF designated observer at the UNCOPUOS Legal Subcommittee, presented a report on the 30th Session held in NYC in March/April of this year. The report is covered in another section of this issue of the Journal.

The AIAA Legal Aspects TC closed its annual meeting with an agreement to establish a new Study Group on International Legal and Regulatory Issues Associated with Commercial Low Earth Orbit Satellite Systems. The new group will give particular attention to the need for "rules of the road" governing the international allocation and utilization of

low-Earth orbital paths. This and related issues are of particular importance, given the number of LEO satellite systems currently being proposed.

*William D. English, Esq.*  
Chairman, AIAA Legal TC

#### *Other Events*

The International Institute of Space Law organized a program on "Assessing the Space Insurance Field" on April 4, 1991 during the COPOUS Legal Subcommittee meeting in New York City. The program was chaired by *Dr. Martin Menter* and moderated by *Paul G. Dembling*, both of Washington, D.C.; the speakers included *Daniel E. Cassidy*, Insurance Consultant Washington, D.C.; *Kevin Madders*, Office of General Counsel, ESA; and *Robert Tirone*, Insurance Consultant, New York, N.Y.

The Seventh National Space Symposium, held April 9-12, 1991 in Colorado Springs, was addressed by many notable authorities in the civil, military, commercial, and international space fields. In the legal area *Edward R. Finch, Jr.*, General Counsel of the American International Petroleum Corp. and former special ambassador to the United Nations, drew attention to the growing concern created by space debris and indicated his intention of reintroducing an American Bar Association resolution urging preparation of an international convention to provide for the prevention of the creation of space debris to the greatest degree feasible and consistent with each country's national security.

The 10th Annual Classified Military Space Symposium dealing with "Peace and Security through Space" was held May 22 and 23, 1991 in Washington, D.C.

A Conference on the Law, Policy and Commerce of International Air Transport and Space Activities, organized by the Graduate Institute of European Studies, Tamkang University, Taipei, Taiwan and the International Institute of Air and Space Law, Leiden University, The Netherlands, took place May 26-31, 1991 in Taipei, Taiwan.

#### *Brief News*

Budget cuts are forcing U.S. Government officials to restructure the SP-100 space nuclear reactor program by dropping non-crucial experiments. Current proposals for cutting down the proposed space station would eliminate half of the space allotted for the astronaut complement thereby effectively reducing the number of astronauts that could be aboard the space station. They would also eliminate plans for a robot to help assemble the Space Station and maintain its operations . . . Because of Congressional limits on annual funding increases for space programs, NASA administrators assert that it may be at least 3 years before they will have the funds to implement new programs . . . Air Force officials are abandoning their plans for a space-based military surveillance system . . . The Office of Commercial Space Transportation of

the Department of Transportation is in the process of promulgating procedures to govern licensing for operators of commercial re-entry vehicles . . . The National Space Council has promulgated a policy requiring satellites owned by the U.S. Government to be launched on rockets produced by American companies. . . A special White House panel recommended that manned missions to the moon should resume in the years 2003 to 2005, and American astronauts should make their first visits to Mars in the years 2014 to 2016.

NASA's proposed Comet Rendezvous Asteroid Flyby (CRAF) mission is designed for probing the asteroid, Hamburga, and the comet, Kopff . . . Scientists are conducting experiments which attempt to extract oxygen from soil. This would allow future colonists in space to obtain their oxygen needs from the soil . . . Although several scientists still complain about the flaws of the Hubble Space Telescope, many others realize that Hubble's data has provided some valuable insights into the workings of the universe. . . Recent scientific studies indicate that ironically too much exertion in physical fitness activities may adversely affect astronauts when they go into orbit in outer space . . . On February 8, President Bush articulated guidelines to encourage the use of space for commercial purposes . . . Spaceport Florida Authority plans to launch its first commercial rockets in late Spring.

Payload Systems, Inc., expects to place a second set of experiments aboard MIR in the latter part of 1991 . . . Geostar Corporation, the satellite communications company, has filed for bankruptcy. . . The Advisory Committee on the Future of the United States Space Program has issued an 11-page report listing seventeen recommendations that the Committee feels would strengthen our space program . . . NASA officials have signed a compact with Canadian Space Agency officials to utilize Canada's Radarsat for use in conducting remote sensing of the Earth's polar regions. . . NASA eliminated six flights from its 1991 and 1992 space shuttle manifests. To stimulate space commercialization, it proposed that space commerce efforts be vested with a new government corporation . . . The FAA chief proposes a merger of the FAA and NASA. . . U.S. officials are promoting a plan which would allow the government to purchase the Soviet-made Topaz reactor to study ways for developing space nuclear power systems. . . A \$35 million Japanese TV satellite was lost when General Dynamics' second Commercial Atlas Centaur launch failed on April 18 1991.

The Soviet Union unveiled a ten year plan to use robotics on both the MIR space station and on spacecraft in Earth orbit . . . Possible Soviet participation in INTELSAT could result in a merger of INTELSAT and INTERSPUTNIK technology and communication capabilities . . . Analysts believe that a recently launched Soviet photo-reconnaissance satellite, replacing Cosmos 2120, will allow it to engage in espionage activities from space. Data from Biocosmos-9 biological experiments confirmed the theory that microgravity has a major influence on the development of biological cells . . . Soviet scientists say that they have experimental data indicating that humans can spend long periods of time in space if they adhere to a regular exercise program . . . Salyut 7 reentered

the earth's atmosphere on February 7, 1991, dispersing debris over Argentina . . . Western executives interested in tapping the Soviet aerospace market have become reticent due to the current unstable political and economic climate in the Soviet Union . . . Soviet journalists have begun competing for the highly coveted chance to visit the MIR space station. . . Space Commerce Corporation is expected to market the images obtained by the Soviet Almoz radar remote sensing satellite. . . The Soviet Union may replace the MIR space station by 1994.

Centre National d'Etudes Spatiales (CNES) officials are currently mounting an initiative to convince other European countries to engage with **France** in the development of a recoverable capsule which will be designed to carry almost a one ton payload into orbit. . . Aerospatiale has been scheduled by **Turkey's** postal service administration to manufacture the Turksat telecommunications satellite.

The deficit caused by re-unification of **Germany** may make further space program developments prohibitive but government officials are seeking a budget increase to add new components to their space program. They expect that in the future they will enter into more space projects with the Soviet Union thereby continuing the long history of Soviet and East German collaboration . . . The Rosat satellite has sent its first photographs of the galaxy cluster, Abell 2256, back to earth . . . As a result of unification, the Deutsche Agentur für Raumfahrt Angelegenheiten (DARA) is being reorganized to incorporate East German space agencies. . . **Sweden** has agreed to participate in German efforts to develop the Sänger hypersonic plane. . . European Space Agency officials announced that the consortium has granted it a 12.5 percent budget increase for fiscal 1991. . . The **European Community** recently released a report that details plans to deregulate its satellite market . . . After several years of planning, the **Canadian** government established the Canadian Space Agency to have responsibility for all of Canada's space initiatives in the public and semi-public arena.

**Japanese** space officials indicate that their country's contribution to the space station, Freedom, may be contingent upon resolution of political uncertainties concerning continued funding that have arisen since the U.S. budget crisis . . . The Japanese are still in the process of formulating a coherent and concise space policy. . . The Japanese Superbird A communications satellite has stopped operating and is unsalvageable. . . The Satellite Japan Corp. of Tokyo will be the third domestic satellite agency to receive government approval to launch a commercial satellite. . . Participants at the Japan International Aerospace Exhibition '91 expressed doubt that space materials processing will become a significant commercial space activity. . . Japanese space officials tendered a proposal for creation of an international consortium that would launch a multi-satellite system for Earth observation.

**Chinese** space officials report that the crux of their developing space program will be a commercial launch business. . . **South Korea** plans to launch its first satellite, Korsat, by 1993 . . . The **Taiwanese** government is developing a low Earth orbiting satellite to be launched by

1995. . . Satellite industry officials predict that Israel will launch a spy satellite in the very near future. . .The Australian government announced plans for selling its domestic satellite program, Aussat, to private individuals or corporations . . . Iceland has become the sixty-fourth country to join INMARSAT.

#### B. FORTHCOMING EVENTS

The 34th Colloquium on the Law of Outer Space will be held **October 8-12, 1991** in **Montreal** during the IAF Congress. Topics to be discussed include: (1) legal aspects of settlements on the moon and Mars; (2) definitional issues in space law (only invited papers with open discussion to follow); (3) legal implications of nuclear power for satellites; and (4) other legal subjects.

The 6th World Telecommunication Exhibit and Forum will be held **October 7-15, 1991** in **Geneva, Switzerland**.

**Space Commerce 1992** will be held **March 23-26, 1992** in **Montreux, Switzerland**.

## BOOK REVIEWS

*Commercial Utilization of Space, An International Comparison of Framework Conditions*, by Michael Harr and Rajiv Kohli (Battelle Press, 1990), pp. 162.

*Commercial Utilization of Space* is an analysis of the conditions for the commercial utilization of space for remote sensing and of microgravity in space. Within these two parts of the book, the authors examine the potential for utilization, the requirements for economic, legal and political considerations, the organizational and institutional infrastructure and then make a comparison of existing conditions in specific countries. They examine the space programs of West Germany, France, Italy, Great Britain, the European Space Agency, the United States and Japan with respect to institutions, budgets, research, private sector and other activities, and offer some comments.

Unfortunately, the coverage of legal issues in the book is sparse. Nonetheless, the study should be of use to lawyers needing technical information on space developments. The authors include graphs, charts, schematic diagrams and a list of related acronyms in their work.

*Changing Patterns of International Cooperation in Space*, by Joan Johnson-Freese (Orbit, 1990), pp. 122.

This brief volume by Johnson-Freese summarizes the history of international cooperation in three parts. In the first part, covering the period from 1958 to 1969, the author examines the scientific, technical, economic and political objectives and general U.S. guidelines for international cooperation in space activities. In addition to referring to what she calls "Early Peripheral Players in Space," including Canada, Japan, China and India, Johnson-Freese touches upon participation in international organizations.

In the second part of the book, covering the years 1970-84, the author mentions the Space Lab and Apollo-Soyuz projects and notes the new emphasis on commercial potential created by the Shuttle.

The third part of the book, dealing with the period after 1985, focuses on the changing environment of cooperation, as characterized by: Glasnost in the space arena; new programs and commercial challenges; space station negotiations; and a new model for international cooperation: the Inter-Agency Consultative Group.

In her conclusions, the author stresses several points, among them that: (1) technology is essential for a strong economic future; (2) cooperation in space should not be expected to lead to an improved political environment; (3) international cooperation is likely to occur not in national security oriented but in "low-politics" fields; (4) subordinating space programs to an annual budget process is inefficient

and will cost more money in the end; and (5) tying long-term goals to short-term projects would make them "more palatable" and "sustainable."

*World Guide to Commercial Launch Vehicles*, by Frank Sietzen, Jr. (Pasha Publications, Inc., 1991) pp. 306.

This book is a comparison of expendable rockets, their producers, and their closest competitors. The expendables include sounding rockets, small and intermediate small carriers, the Atlas system, the Ariane launcher family, the Long March 2E, large carriers, as well as liquid and solid rocket systems. Not only is the reader provided with a guide to launch vehicles on the current market, but also with practical information on such topics as launching from government spaceports, availability of launch pads, launch delays and scheduling, cost and performance, insurance, and commercial and government agreements.

Of special interest to the reader may be the inclusion in the appendices of the "International trade agreement between U.S. and P.R.C. for commercial launch services;" the "White House commercial space launch policy of 1990;" the "U.S. Dept of Transportation study of scheduling of commercial launch operations at U.S. ranges;" and a sample model of a "Department of the Air Force Commercialization Agreement."

*NASA Thesaurus (NASA SP-7064)* (Scientific and Technical Information Division, 1988).

This three-volume *NASA Thesaurus* contains the authorized subject terms by which documents in NASA's scientific and technical information database are indexed and retrieved. The first volume, Hierarchical Listing, lists all subject terms and certain database cross references now used. The second volume, Access Vocabulary, is a reference tool most resembling a thesaurus, by listing similar terms and other suggested search terms. Perhaps the most useful volume for legal research is the third volume, Definitions, which contains almost 3,200 definitions and 1,000 use references. The NASA THESAURUS is updated by the NASA THESAURUS SUPPLEMENT, a cumulative supplement published semiannually (until a new edition is issued).

As the space industry continues to grow, many new terms will be added which may complicate research in the field of space law. Fortunately, for the legal researcher, the NASA THESAURUS serves as a valuable aid in formulating research requests in computer databases, ensuring proper spellings, and comprehending the meanings of scientific and technical terms.

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## CURRENT DOCUMENTS

### I.

#### Senate Joint Resolution on the 1992 International Space Year\*

Whereas in 1985 Congress proposed an International Space Year (ISY) for 1992, commemorating the 500th anniversary of Columbia voyage to the New World and the 35th anniversary of the International Geophysical Year that ushered in the space age;

Whereas Congress also requested the President to ensure the ISY and to initiate interagency and international discussions for an ISY;

Whereas in 1986 President Reagan endorsed the ISY and reported to Congress that NASA had found worldwide support for an ISY in 1992, consisting of space activities coordinated on a global basis; and the President directed NASA to move the concept forward internationally and to lead an interagency effort to domestic activities;

Whereas NASA has exercised admirable leadership, through the Office of Space Science and Applications and the Division of International Relations, in establishing the Space Agency Forum on ISY (SAFISY) to coordinate ISY planning, with a current worldwide membership of 25 national space agencies or equivalent bodies;

Whereas SAFISY planning is accelerating, with particular emphasis on coordinating current and planned space agency activities so as to improve efficiency and maximize scientific and economic return on space investments; and

Whereas the ISY also is generating numerous educational activities, including classroom activities, films, television programs, that will greatly improve public understanding of the significance and potential of the space age: Now, therefore, be it

*Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, that it is the sense of the Congress that the President should --*

(1) reaffirm support for the ISY and invite foreign leaders to do the same;

(2) support the World Space Congress, to be convened in 1992, in its efforts to encourage cooperative space activities among nations in space science, space exploration, and the application of space technology;

(3) invite the American public to develop ISY activities that foster the global perspective of the ISY;

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\* The Senate Joint Resolution 75 passed the House June 12, 1990. Cong. Rec. at H3453. Public Law 101-339, July 31, 1990.

(4) direct NASA to continue to develop ISY activities through SAFISY, with a primary emphasis on Mission to Planet Earth, but also with a strong emphasis on the other space sciences, human exploration, education, and developing nations applications; and

(5) report to Congress at the earliest practicable date, but no later than September 1, 1990, on the steps taken to carry out items (1) through (4) above, including a list of all current and planned NASA initiatives in each of the categories mentioned in item (4).

## II.

### President Bush's Policy Decision of March 8, 1990, on his Space Exploration Initiative of July 20, 1989.\*

The President approved the first of a series of policy decisions for long-term space exploration initiative he announced on July 20, 1989.

The policy consists of the following elements:

The initiative will include both lunar and Mars program elements.

The early program will focus on technology development with a search for a new and innovative approaches and technologies.

The program will include investment in high leverage innovative technologies with potential to make a major impact on cost, schedule, and/or performance.

The program will take at least several years defining two or more significantly different human space exploration reference architectures, while developing and demonstrating technology broad enough to support all.

Selection of a base line program architecture will occur after that time.

The program will perform mission, concept, and system analysis studies in parallel with technology development.

The program will include robotic science missions.

By spurring research and development in high technology fields, the space program will help promote American Economic leadership.

The program will require the efforts of several agencies.

NASA (National Aeronautics and Space Administration) will be the principal implementing agency. The Department of Defense and the Department of Energy will also have major roles in the conduct of technology development and concept definition. The National Space Council will coordinate the development of an implementation strategy for the exploration initiative by the three agencies. To facilitate coordination, the Department of Energy will be added as a formal member of the National Space Council.

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\* WEEKLY COMP. PRES. DOCS. 381-82 (Mar. 8, 1990).

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