MANUFACTURERS' LIABILITY UNDER UNITED STATES LAW FOR PRODUCTS USED IN COMMERCIAL SPACE ACTIVITIES

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I. *Introduction*

The Challenger disaster has emphatically reminded us that, even in a government-run manned space program with high standards and vaunted safeguards, accidents will occur. Commercial space programs will be no different, and there is now an intensified interest in the legal liabilities that may arise out of accidents in (or on the way to) outer space.

This article describes the likelihood that United States product liability law will be applied to determine the liability of manufacturers for personal injury, property damage, and economic loss allegedly caused by the use of those manufacturers' products in commercial space activities. Application of U.S. product liability law is made possible by the rather limited scope of the international space law agreements relating to liability, which agreements are briefly reviewed herein. This article concludes with an account of current aspects of U.S. product liability law that are of particular interest to manufacturers whose products are being used in commercial space activities.

Of course, use of the term "U.S. product liability law" is not intended to suggest the existence of any monolithic body of law; the term is used here only as a shorthand reference to the individualistic and often inconsistent product liability laws, statutory and decisional, of the various states of the United States, as well as potentially applicable federal laws, such as admiralty law.

It should be noted that, to the extent that international and domestic laws permit, parties involved in commercial space activities may, by contractual agreement, allocate among themselves the responsibility, risk of loss, insurance costs, etc., as they see fit, provided that the parties' bargaining positions are not too unequal and that the contract provisions otherwise comply with public policy. In this and other ways, proper planning with the assistance of United States product liability counsel can help minimize manufacturers' risks under U.S. product liability law. However, exculpatory agreements will probably have little or no effect on the rights of anyone who is not, directly or indirectly, a party to the contract.

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II. *Applying United States Product Liability Law to Accidents in Outer Space.*

Courts of other countries seldom apply United States product liability law to any of the issues in a product liability lawsuit. Therefore, claimants who are seeking to have U.S. product liability law apply to their cases will take advantage of every opportunity to prosecute their product liability claims in United States courts.

Foreign claimants want to have the substantive product liability law of the United States applied to their cases because the U.S. product liability law makes it easier for plaintiffs to recover from manufacturers for damage caused by the manufacturers' products, although this may change somewhat in Europe under the new EEC directive on product liability.[1] Even when U.S. courts apply foreign substantive law to the measure of damages, United States juries are more than generous in determining the appropriate level of damages. Claimants are also intrigued by the possibility of obtaining punitive damages in the U.S. Finally, claimants can finance their U.S. lawsuits through the contingent fee system.[2]

Of course, even when they have proper jurisdiction over the subject matter and parties in a lawsuit, U.S. courts are increasingly dismissing certain actions against American defendants by foreign plaintiffs on the ground of *forum non conveniens*. We began this trend in 1978 in *Bouvy-Loggers v. Pan American World Airways, Inc.*,[3] which arose out of the Tenerife aircraft collision, and the current high-water mark of the *forum non conveniens* doctrine is found in the United States Supreme Court decision in *Piper Aircraft Corp. v. Reyno.*[4] However, the doctrine gives the trial courts much discretion not to dismiss the actions,[5] which discretion will be exercised on the basis of the particular facts of

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1. *But see* Diederiks-Verschoor, *Special Aspects of Products Liability in Relation to Space Transportation*, PRODUCT LIABILITY IN AIR AND SPACE TRANSPORTATION 165, 175 (K-H. Bockstiegel ed. 1977) (Directive should not be used to regulate product liability in space transportation).

2. Use of a contingency fee is probably inappropriate when there is little or no contingency involved, which might be the case where a state is automatically liable or when the private defendant does not contest liability. *See, e.g.*, Craft, *The Direct Approach to Early Settlement of Mass Disaster Cases*, MANAGEMENT OF COMPLEX MASS TORT LITIGATION 431 (P. Glazer ed. 1986).

3. 15 Av. Cas. (CCH) 17,153 (S.D.N.Y. 1978). *See* Craft, *Factors Influencing Settlement of Personal Injury and Death Claims in Aircraft Accident Litigation*, 46 J. AIR L. & COM. 895, 908-10 (1981).

4. 454 U.S. 235 (1981).

5. Recent cases in which the courts denied American defendants' motions to dismiss lawsuits by foreign plaintiffs on the ground of *forum non conveniens* include Friends for All Children, Inc. v. Lockheed Aircraft Corp., 717 F.2d 602 (D.C. Cir. 1983), and *In re* Aircraft Disaster Near Bombay, India on January 1, 1978, 531 F. Supp. 1175

the case before the court.[6] Major considerations are whether the lawsuit can be reinstituted in a more convenient foreign forum and whether plaintiffs will be able to get proper relief in that forum.[7] (It should be noted that U.S. courts will generally impose certain conditions on *forum non conveniens* dismissals in order to help protect the plaintiffs.) Another consideration of major importance is whether litigating the lawsuits in a U.S. court would preclude a U.S. defendant from having access to the relevant foreign witnesses and records and from bringing other likely foreign defendants into the lawsuit by means of third-party claims (recourse actions).[8]

All in all, the likelihood is that the *forum non conveniens* doctrine will not generate a steady stream of dismissals of foreign plaintiffs' product liability claims arising out of commercial space activities. Accordingly, because most claims instituted in U.S. courts by foreign plaintiffs and U.S. plaintiffs will probably not be dismissed on the ground of *forum non conveniens*, the more interesting issue is whether those U.S. courts will choose to apply U.S. law to those claims. (The determination of this issue may influence, but is seldom dispositive of, the outcome of the *forum non conveniens* issue itself.)

Initially, it must be emphasized that United States courts generally use a *depecage* approach that allows the laws of different jurisdictions to be applied to different issues in a case. At the present time, most U.S. courts are more likely to choose the law applicable to a particular issue in a product liability case on the basis of an analysis of the relationships among the parties with respect to that issue, the connection between the parties and the jurisdiction in which the accident occurred, the various jurisdictions' governmental interests in the application of their laws, the various governmental interests in the outcome of the issues, and so forth. Even in those U.S. jurisdictions that still follow *lex loci delicti*, the *lex loci* approach is less likely to be followed when the location of the accident is found to be fortuitous. Furthermore, some courts make every effort to apply the law of the forum jurisdiction, that is, the law of the jurisdiction in which the plaintiff has instituted his lawsuit (assuming that the court has jurisdictional power over the defendants and that the forum jurisdiction has sufficient contacts and interests to satisfy Constitutional requirements of fairness in choice of law). Naturally, in any court the law of the forum

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(W.D. Wash. 1982).

6. *See* Craft, *Forum Non Conveniens Considerations in Product Liability Litigation*, MANAGEMENT OF COMPLEX MASS TORT LITIGATION 403 (P. Glazer ed., 1986).

7. Perhaps the most significant recent decision in this area is *In re* Union Carbide Corporation Gas Plant Disaster at Bhopal, India, 634 F. Supp. 842 (S.D.N.Y. 1986). A consolidated lawsuit consisting of 145 lawsuits on behalf of thousands of Indians was dismissed on the grounds that, under the circumstances, the Indian legal system would be better able to determine the cause of the accident and fix liability; the overwhelming majority of witnesses and evidence was in India, as were the claimants; and India had a substantial interest in the accident and the outcome of the litigation.

8. *See, e.g.*, Wahlin v. Edo Corp., 17 Av. Cas. (CCH) 17,562 (N.Y. Sup. Ct. 1982).

jurisdiction will be applied where the court finds that there is no real conflict between that law and the other jurisdictions' laws that might otherwise be applied.

Many factors are considered by U.S. courts in deciding what laws to apply to conventional product liability cases. Additional factors will be considered if a case arises out of an accident or activity in outer space. One such factor would be the identity of the launching state in which the space object in question is registered. Since outer space is itself not a "jurisdiction," identifying the registry state (see Part III.C *infra*) might determine the jurisdiction in which the accident or the conduct (on the space object) may be said to have occurred. (This would still not be dispositive unless a strict *lex loci delicti* rule was followed.) Depending on where the accident occurs, the court may also have to decide whether the launching state of registry has jurisdiction and control over the spacecraft during the entire flight up into space, including any flight through airspace of other countries passed through on the way to outer space; the "functionalist" approach answers this question in the affirmative.[9]

Similar choice of law problems arise in cases involving maritime activities that take place beyond the territory of any nation. (Indeed, the United States government's recognition of this similarity is reflected in the way that the criminal jurisdiction exercised by the United States over crimes on space vehicles of U.S. registry resembles the U.S. exercise of jurisdiction over crimes on aircraft over the high seas.)[10] In a maritime case where there is a conflict among the potentially applicable laws of various nations, the governmental interest analysis used by U.S. courts will, among other factors, take into account the ship's registration in a particular nation much as they would take into account a nation's territorial jurisdiction over the location of an accident.[11]

Simple explanations of the choice of law rules that may be applied by U.S. courts will probably be inaccurate. Equally inaccurate will be any attempt to predict in a complex case the law that will be chosen as a result of the application of the ambiguous and often inconsistent choice-of-law rules. Nevertheless,

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9. *See* Gál, *Fundamental Links and Conflicts Between Legal Rules of Air and Space Flights*, PROC. 26th COLLOQ. L. OUTER SPACE 77 (1983).

10. 18 U.S.C.A. § 7(6), Pub. L. No. 97-96, 95 Stat. 1210 (1981). Although of very limited practical interest, another potential analogy may be found in laws applicable to Antarctica. *See, e.g.*, P. JESSUP & H. TAUBENFELD, CONTROLS FOR OUTER SPACE AND THE ANTARCTIC ANALOGY (1959).

11. *Cf.* Lauritzen v. Larsen, 345 U.S. 571 (1953). The issue of choice of law in international waters may be governed by the Convention on the High Seas, April 29, 1958, 13 U.S.T. 2313, T.I.A.S. No. 5200. Article 1 states that the term "high seas" means all parts of the sea that are not included in the territorial seas or in the internal waters of a state. As to which law applies in such a nationless void, Article 5 states that "[s]hips have the nationality of the state whose flag they are entitled to fly." Article 6 provides that ships shall sail under the flag of one state only and, save in exceptional cases expressly provided for in this or other international treaties, shall be subject to its exclusive jurisdiction on the high seas.

some weak generalizations may be risked in an effort to bring some semblance of order, however oversimplified, out of this chaos: In deciding which law will be applied to determine the elements of damages recoverable by foreign and domestic plaintiffs in a product liability action, U.S. courts will generally apply the damage laws of the domicile of the injured party. In order to determine whether the manufacturer will be held strictly liable or liable for negligent conduct in manufacturing and designing the product, U.S. courts will tend to apply the law of the jurisdiction that has the most liberal grounds for recovery against the manufacturer, provided that that jurisdiction had a reasonably foreseeable connection with the product and the parties to the lawsuit. An exception to this is when the court making this decision is sitting in the jurisdiction where the manufacturer is located; in that situation the courts tend to apply the law of the forum jurisdiction. (Again, in determining that U.S. product liability law is to be applied in a particular case, a court will use the foregoing principles to determine which U.S. jurisdictions are the ones whose laws should be applied.)

Commentators have suggested that there be a unification or harmonization of the choice-of-law rules used in resolving tort and contract claims that have their genesis in outer space.[12] This will apparently not happen in the foreseeable future. It must be concluded, then, that United States product liability law will probably be applied by U.S. courts to determine manufacturers' liability for damage caused by products used in commercial space activities in cases where the product was manufactured in the United States, where the product constituted part of a space object launched by the United States or registered in the United States,[13] or where the damages not unforeseeably occurred in the United States. (This conclusion would not apply in the unlikely case in which an American plaintiff is suing a foreign manufacturer whose home jurisdiction provides a more liberal basis for recovery by the plaintiff.)

III. *International Space Law.*

Of course, when U.S. law is applied, that law includes the international agreements to which the U.S. is a party. To the extent that their provisions are pertinent, these agreements are controlling, and they must be described here. (Recognizing that virtually every article on space law liabilities includes a tiresome recitation of the provisions of the relevant international agreements, the following descriptions are especially brief and are intended to offer some new perspectives.)

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12. *See, e.g.*, Haanappel, *Product Liability in Space Law*, 2 HOUS. J. INT'L L. 55, 62-64 (1979); DeSaussure & Haanappel, *A Unified Multinational Approach to the Application of Tort and Contract Principles to Outer Space*, 6 SYRACUSE J. INT'L L. & COM. 1 (1978).

13. *Cf.* Bourély, *The Spacelab Program and Related Legal Issues*, 11 J. SPACE L. 27, 31-32 (1983).

A. *The Outer Space Treaty of 1967.*

The Outer Space Treaty[14] is remarkable in that, in addition to leaving "space activity" undefined, it does not define "outer space". The absence of such a definition in this and other international agreements is due to the disagreement among the nations of the world concerning the lower limit of outer space, that is, the boundary between airspace ("inner space") and outer space.[15] The Soviet Union has proposed that 100-110 kilometers above the Earth's sea level be considered as the lower limit of outer space, but this is higher than the lowest practical perigee of some satellites with eccentric orbits, and it might seem incongruous to say that any satellite in its own orbit was not in outer space. For this and other reasons, the United States prefers to avoid setting any specific altitude limit at this time.

A number of equatorial nations have asserted sovereignty over satellites in geostationary orbits permanently above their territory. Of course, since the satellites have a definite orbital velocity that is simply synchronized with the Earth's rate of rotation, to suggest that the satellites are stationary may be a Ptolemaic misnomer.

The Chicago Convention[16] gives each nation complete and exclusive sovereignty above its territory, but this refers only to the airspace below the lower limit of outer space. Therefore, the uncertainty about the boundary between airspace and outer space leads to uncertainty as to which laws are applicable to activities or occurrences in the vicinity of that boundary.

Article II of the Outer Space Treaty precludes nations from claiming sovereignty over outer space. Nations are, however, permitted to exercise jurisdiction over space objects.[17] Indeed, the Treaty, in conjunction with an envisioned registration system, requires each state to exercise jurisdiction and control over its registered space objects, and over any personnel thereon, while in outer space or on a celestial body (Article VIII). The Treaty's goal with respect to

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14. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, January 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205. There are 93 signatories to this treaty, including the United States and most other technologically advanced countries.

15. *See, e.g.*, Cheng, *The Legal Status of Outer Space and Relevant Issues: Delineation of Outer Space and Definition of Peaceful Use*, 11 J. SPACE L. 89 (1983); Kopal, *The Question of Defining Outer Space*, 8 J. SPACE L. 154 (1980); Sloup, *Outer Space Delimitation Proposals: Enlightened Jurisprudence or Celestial Shakedown? Some Implications for Private Enterprise*, 2 HOUS. J. INT'L L. 87, 106-12 (1979); *The Problem of the Demarcation of Air Space and Outer Space*, PROC. 59th CONF. INT'L L. A. 168-207 (1980).

16. Convention on International Civil Aviation, Dec. 7, 1944, art. 1, 61 Stat. 1180, T.I.A.S. No. 1591.

17. *See generally* Rothblatt, *State Jurisdiction and Control in Outer Space*, PROC. 26th COLLOQ. L. OUTER SPACE 135 (1983).

commercial (private) space activities is to make each nation's government responsible for seeing that commercial space activities comply with international law (Article III) and, more particularly, with the nation's obligations under the treaty itself (Article VI). According to the United States State Department, the U.S. has this obligation despite the absence of internal U.S. legislation, which is to say that Article VI of the treaty is self-executing in the U.S.

Article VI makes the appropriate governments responsible for authorizing and supervising non-governmental space activities. In the United States, this may lead to a situation where the government's control over private commercial space activities will become similar to the regulatory control that it exercises today over licensed aviation activities.[18] However, although it may already have some such power to regulate space activities, NASA apparently does not desire this role.[19]

Under Article VII, each nation that launches or procures the launching of an object into outer space and each nation from whose territory or facility an object is launched is internationally liable for damage to other nations that are also parties to the treaty or to those nations' natural or juridical persons. In conjunction with Article VI, Article IX also makes a nation responsible for supervision of space activities of its nationals notwithstanding that nation's non-involvement with the relevant launch. In particular, a non-launching nation may be subject to responsibility under Article VI for damages caused by a space object launched by its nationals not from the territory of that or any other nation but, instead, for example, from the high seas.[20]

Accordingly, a nation involved in the launch of a space object will clearly be liable under the treaty for any damages to another nation or to another nation's nationals that were caused by defects or dangerous conditions in that space object. Further, it may be argued that a nation that is not involved in the launch of a space object but in which the space object was manufactured is subject to liability under Article VI for any damages to another nation or to another nation's nationals that were caused by defects in the space object; my view is that this argument goes beyond the intended obligations under the treaty.

Curiously, a strict reading of the treaty would seem to make a launching nation liable for defects in a space object that was manufactured by a private company in the very nation making the damage claim against the launching nation. Such a strict construction of the treaty would probably yield to practical considerations, but exactly how this would be accomplished would depend

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18. Menter, *Legal Aspects of Commercial Space Activities*, paper presented at the First National Institute on Aviation Litigation and Space Law sponsored by the American Bar Association (1982).

19. Hosenball, *The Law Applicable to the Use of Space for Commercial Activities*, PROC. 26th COLLOQ. L. OUTER SPACE 145 (1983).

20. *See* Gorove, *Space Stations - Issues of Liability, Responsibility and Damage*, PROC. 27th COLLOQ. L. OUTER SPACE 251, 253 (1984).

upon the particular situation.

No specific procedures are established by the Outer Space Treaty for prosecution of damage claims, nor does the treaty describe or limit the damages recoverable, though it may be assumed that it provides for recovery only of provable compensatory damages.[21]

B. *The Liability Convention.*

The Liability Convention of 1972,[22] which took eight years to negotiate,[23] was the next international agreement to deal with liabilities. As its formal title demonstrates, the Convention deals only with international liability for damage caused by space objects. The Convention defines a launching nation (Article I(c)) in the same way as the Outer Space Treaty and makes such a launching nation absolutely liable to pay compensation for damage proximately caused by its space object to persons or property on the surface of the earth or to aircraft in flight (Article II). The term "space object" is defined to include component parts of a space object, as well as its launch vehicle and parts thereof (Article I(d)).[24] A launching nation is not absolutely liable for damage caused by its space object to another launching nation's space object or to persons or property on board another launching state's space object (unless the other space object is on the surface of the earth). Instead, the nation that launched the damage-causing space object will be liable only if the damage is due to its fault or the fault of persons for whom it is responsible (Article III). Whenever there are two or more launching nations responsible for damages caused by a jointly launched space object or for damages caused to a third nation by separately launched space objects, the launching nations will be jointly and severally liable for such damages, but, as between themselves, the "burden of compensation" (apportionment or allocation of responsibility) is to be determined in accordance with the extent to which each was at fault.[25] For

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21. Compensatory damages for extended effects of harmful contamination, which contracting nations are required to avoid under Article IX, could be in the hundreds of millions of dollars.

22. Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762. The Liability Convention has 80 signatories, including the United States and most of the other technologically advanced countries; among the non-signatories is The People's Republic of China.

23. N.M. MATTE, AEROSPACE LAW 153 (1977).

24. The definition of space object, when considered along with other provisions of the Liability Convention and the Outer Space Treaty, gives rise to some doubt as to whether a space station is a space object, particularly if it is a permanent station on the Moon or other celestial body. *Compare* N.M. MATTE, AEROSPACE LAW 156 (1977), *with* Gorove, *Space Stations - Issues of Liability, Responsibility and Damage*, PROC. 27th COLLOQ. L. OUTER SPACE 251 (1984).

25. Practical difficulties in applying Articles II and III to various scenarios are

example, the United States and any other state for whom shuttle launch services are provided on a particular flight would be jointly and severally liable for damages caused by the shuttle or other space objects launched on that flight.[26] Because of this, the launching nations will enter into pre-launch agreements allocating risks among themselves.

Inexplicably, the Liability Convention exonerates a launching nation from absolute liability to the extent the launching nation can establish that the damage resulted from gross negligence or intentional acts or omissions on the part of a claimant nation or its nationals. (Article VI.1) This defense is of limited utility, for, as indicated above, absolute liability is imposed only in situations where the damaged party is unlikely to have been even minimally negligent, much less grossly negligent. In any event, to the extent that this provision has any practical application at all, it will probably be the source of some vigorous disputes, just as similar provisions have caused much controversy in aviation cases.

The Liability Convention does not control liability of a launching nation to its own nationals. (Article VII) Furthermore, although the term "launching" includes an attempted launching (Article I(b)), Article VII states that the Convention does not control liability of a launching nation to foreign nationals present for launch operations.

In describing the damages recoverable under the Liability Convention, Article XII refers to compensation that is to be based upon international law and principles of justice and equity in order to restore the damaged party "to the condition which would have existed if the damage had not occurred." This might seem to allow unlimited recovery for provable compensatory damages proximately caused by the space object, including mental damages (*e.g.*, pain and suffering), "moral" damages, and various kinds of consequential economic damages.[27] Nevertheless, it has been suggested that the Convention is not sufficiently victim-oriented and that victims will be unlikely to recover full compensation under the Convention.[28] It may be asked whether the Convention allows recovery of more elements of compensatory damages than are provided for by the law of the domicile of the victim; my view is that in such a case recovery should be no greater than that provided for by the domicile's law.

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discussed in M. FORKOSCH, OUTER SPACE AND LEGAL LIABILITY 75-87 (1982).

26. Menter, *Legal Responsibility for Outer Space Activities*, PROC. 26th COLLOQ. L. OUTER SPACE 121, 122 (1983).

27. Nesgos, *International and Domestic Law Applicable to Commercial Launch Vehicle Transportation*, PROC. 27th COLLOQ. L. OUTER SPACE 98, 101 (1984); Christol, *International Liability for Damages Caused by Space Objects*, 74 AM. J. INT'L L. 346, 357-68 (1980); Gorove, *Liability of the State and Private Companies for Mishaps Involving Space Activities*, paper presented at the Second National Institute on Litigation in Aviation and Space Law sponsored by the American Bar Association (1983).

28. *See, e.g.*, Reijnen, *Outer Space Law and Private Enterprise in Outer Space: An International Perspective*, 2 HOUS. J. INT'L L. 65, 75 (1979).

The Convention's procedures for making claim against the launching nation have also been criticized. These claims must first be pursued through diplomatic channels (Article IX); if that does not result in resolution of the claim, then the Convention provides for the establishment of a claims commission upon the request of either party to the claim (Article XIV). Nevertheless, the claims commission decisions are not final or binding unless all parties have so agreed.[29]

The Convention does not deal with the way in which an injured national is to present his claim to his own government for prosecution against another nation. Domestic law will control this, as well as the procedure for a national to make claim against his own government for his damages that it caused. The Liability Convention also does not apply to claims made by or against non-contracting nations.[30]

More significant is the non-exclusivity of the Convention.[31] In other words, even where the Liability Convention does apply, it is not exclusive. The victims of damages caused by defective space objects may desire to sue the objects' manufacturers directly, especially when the manufacturers are United States companies that can be sued directly in United States courts under a more liberal standard of recovery.

In any event, even in situations where launching nations pay damages pursuant to the Convention, it is to be expected that, in the absence of contractual provisions to the contrary, the nations will seek indemnity from private manufacturers whose space objects caused the damage. Indeed, it has been suggested that a nation absolutely liable under international law for space activities of its own private industry will, in turn, ultimately promulgate laws making that industry absolutely liable to the nation.[32] Again, domestic law, not international law, will govern such claims over (recourse actions), as well as direct actions by victims against those manufacturers.[33]

C. *The Registration Convention.*

The Outer Space Treaty subjects a space object (while in outer space or on

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29. Comment, *Legal Ramifications of the Uncontrolled Return of Space Objects to Earth*, 45 J. AIR LAW & COM. 457 (1980).

30. These nations and their nationals will be at some procedural disadvantage. Magdelénat, *Spacecraft Insurance*, 7 ANNALS OF AIR AND SPACE L. 363, 368 (1982).

31. *See* Gorove, *Legal Aspects of International Space Flight*, 3 ANNALS OF AIR & SPACE L. 409, 417-19 (1978).

32. Böckstiegel, *Present and Future Regulation of Space Activities by Private Industry*, SYMP. SPACE ACTIVITIES & IMPLICATIONS (1980).

33. Matte, *Special Aspects of Product Liability in Relation to Space Transportation*, PRODUCT LIABILITY IN AIR AND SPACE TRANSPORTATION 181, 185-86 (K-H. Böckstiegel ed. 1977).

a celestial body) and any person on that space object to the jurisdiction and control of the nation in which the object is registered. But neither that treaty nor the Liability Convention made any further reference to registration, so registration was covered in the 1974 Registration Convention.[34]

This Convention requires the launching nation to maintain a registry in which each space object launched by that nation is to be registered. (Where there are two or more launching nations, they must determine among themselves which will register the object, for, as with aircraft under Article 18 of the Chicago Convention, there can be only a single registration for a space object.) Because each nation of registry determines the contents of its registry and the conditions under which the registry will be maintained (Article II.3), it has been argued that the Convention is not clear enough about requiring private companies to register their space objects with their governments and is also too lax in requiring timely notification of the United Nations Secretary General about the technical aspects of the launch, orbit, and function of the space object being launched.[35]

Another aspect of the Registration Convention that is of possible relevance to liability issues is the obligation the convention imposes on the contracting nations to help identify any unidentified space object that has caused damage (Article VI).

Of course, as noted in Section II *supra*, the registration may well have an effect on the determination of the law to be applied to various issues concerning the manufacture and operation of that object.

D. *Other International Agreements.*

There are other international agreements relating to space activities, but their primary relevance to product liability is in the indirect way that their provisions occasionally help clarify certain concepts in the above-described agreements.

Additional international agreements have been suggested and may someday come into force to deal with unresolved issues.[36] For example, since 1980 the Space Law Committee of the International Law Association has been work-

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34. Convention on the Registration of Objects Launched into Outer Space, January 14, 1975, 28 U.S.T. 695, T.I.A.S. No. 8480. There are 41 signatories to this convention, including the United States.

35. Reijnen, *supra* note 28, at 71, 75; de Crombrugghe, *International Interaction and Profits Regarding Launching of Satellites*, PROC. 27th COLLOQ. L. OUTER SPACE 298, 299 (1984). Legal problems of registration of space objects are the subject of a number of papers published in PROC. 28th COLLOQ. L. OUTER SPACE 173-207 (1985).

36. *See generally* Christol, *The Growth of Space Law*, ASTRONAUTICS & AERONAUTICS 111 (1981), and Jasentuliyana, *Treaty Law and Outer Space: Can the United Nations Play an Effective Role?* 11 ANNALS AIR & SPACE L. 219 (1986).

ing on a draft convention on the settlement of space law disputes.[37] (Interestingly, one study predicted many years ago that, when space travel becomes more highly developed, the nations will not want to be held responsible for private space activities.)[38]

Private companies involved in commercial space activities[39] may be surprised to find how much is left unresolved by current international space law agreements. This lack of resolution extends not only to matters not dealt with by the agreements but also to many matters that the agreements do attempt to cover. Customary international law may help fill in some of the gaps, but, except for certain admiralty principles, customary international law is imprecise and not very predictable.[40] Because current international agreements will seldom be pertinent to determining manufacturers' liability under U.S. law for products used in commercial space activities, it is the domestic law of the United States that will usually be determinative.

IV. *U.S. Domestic Law of Product Liability.*

The United States may some day have a preemptive federal law controlling product liability (see Section IV.G *infra*), at least product liability in space, but thus far it seems that, when U.S. product liability law is applied in a case, it will be the laws of one or more of the various states of the U.S. This may be seen in the recent cases in which satellite insurers and reinsurers have sued McDonnell Douglas and other companies involved in manufacturing the rocket motors whose malfunctions caused the failure of the Palapa B-2 and Westar VI satellites to achieve their proper orbits. *Appalachian Ins. Co. v. McDonnell Douglas Corp.*;[41] *Lexington Ins. Co. v. McDonnell Douglas Corp.*[42] In the Westar case, defendants moved for summary judgment on the basis of federal law, but this motion was denied on the ground that California law, not

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37. Böckstiegel, *Proposed Draft Convention on the Settlement of Space Law Disputes*, 12 J. SPACE L. 136 (1985); Böckstiegel, *Space Law Problems at the Turn of the Century*, PROC. 26th COLLOQ. L. OUTER SPACE 339, 342 (1983); Böckstiegel, *Convention on the Settlement of Space Law Disputes*, PROC. 26th COLLOQ. L. OUTER SPACE 179 (1983); Böckstiegel, *The Settlement of Space Law Disputes - Working Paper*, PROC. 59th CONF. INT'L L. A. 188 (1980).

38. M. SEARA VAZQUEZ, COSMIC INTERNATIONAL LAW 123-24 (1965).

39. The magazine *Aerospace America*, published by the American Institute of Aeronautics & Astronautics, assembled as of April 1, 1984, a list of over 350 companies directly involved in commercial space activities.

40. Dula, *United States Government Authorization and Supervision of Non-Governmental Space Activities: Present Law and Future Possibilities*, PROC. 27th COLLOQ. L. OUTER SPACE 35, 37-38 (1984).

41. No. 481712 (Cal. Super. Ct., Sept. 8, 1986).

42. No. 481713 (Cal. Super. Ct., Sept. 8, 1986).

federal law, should be applied because the manufacturers resided in California and because the U.S. Congress had not shown any intent to preempt tort actions involving defective products manufactured by private enterprise which arise in space.[43]

A. *Product Liability Law in Admiralty.*

Anyone remotely familiar with the crazy-quilt of product liability laws of the various states of the United States will recognize that they are too complex and inconsistent to be summarized accurately or meaningfully. Given the need here to oversimplify, one way to attempt to describe the product liability law of the United States is to describe the product liability law that is used by U.S. courts in maritime cases, especially those involving accidents on the high seas. Maritime law is subject to many specific statutes and international agreements[44] and contains many arcane doctrines. However, neither the idiosyncracies of maritime law nor its incorporation of customary international law[45] have precluded the "general" maritime law from attempting to absorb the best, or at least the most widely accepted, principles of product liability law from the laws of the various states of the United States.[46] In some measure, then, the general maritime law offers a generalized picture of the state of U.S. product liability law. Moreover, there is much to be said for the proposition that space law will develop so that it will become more like maritime law than like aviation law.[47] Fortunately, although my practice is primarily devoted to aviation and space matters, my law firm is heavily involved in maritime law, and I have been engaged in maritime law matters not only when airplanes have fallen into the ocean[48] but also in dealing with maritime product liability law as applied to vessels.

The general product liability principles recognized by maritime law include not only the maritime-related implied warranty of workmanlike service,[49] but also the implied warranties of fitness and merchantability.[50] Negligence by

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43. Appalachian Ins. Co., *supra*, Memorandum and Order of Sept. 8, 1986.

44. These treaties have been compiled in N. SINGH, INTERNATIONAL MARITIME LAW CONVENTIONS (1983).

45. *See generally* Lauritzen v. Larsen, 345 U.S. 571, 581-82 (1953).

46. *Cf.* Watz v. Zapata Off-Shore Co., 431 F.2d 100, 113 (5th Cir. 1970).

47. Twelve papers on the comparison between sea and space law are published in PROC. 28th COLLOQ. L. OUTER SPACE 118-172 (1985).

48. Many of the cases that developed the maritime product liability law were in fact aviation cases in which aircraft crashed at sea.

49. *See, e.g.*, Hurdich v. Eastmount Shipping Corp., 503 F.2d 397 (2d Cir. 1974).

50. *See, e.g.*, Schaeffer v. Michigan-Ohio Navigation Co., 416 F.2d 217, 221-22 (6th Cir. 1969); Ohio Barge Line, Inc. v. Dravo Corp., 326 F. Supp. 863, 865-66 (W.D.

the claimant does not preclude recovery for a breach of an implied warranty but may reduce the amount of recovery in accordance with the extent of the claimant's negligence.[51]

Of course, manufacturers may be held liable for negligence in design, planning, manufacturing, assembling, inspecting, testing, and servicing their products and their components.[52] In addition, they may be subjected to liability for negligence in furnishing insufficient manuals, instructions, and warnings regarding operations, maintenance, and repairs of products and their components.[53] Negligence in failing to make or recommend safety repairs or modifications to their products and their components will also subject manufacturers to liability.[54] Shipbuilders, as well as component-part manufacturers, owe a duty of reasonable care in the design and construction of their products to any person who may foreseeably be injured or whose property may foreseeably be damaged by the failure of the manufacturer to exercise such care.[55] If negligence or fault of the claimant is found to have contributed to the accident, this does not preclude recovery but may reduce the claimant's recovery.[56]

With respect to strict liability, maritime law has adopted Section 402A of the Second Restatement of Torts.[57] Thus, manufacturers (and other suppli-

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Pa. 1971); Montgomery v. Goodyear Tire & Rubber Co., 231 F. Supp. 447, 453-54 (S.D.N.Y. 1964).

51. *See, e.g.*, Lewis v. Timco, Inc., 716 F.2d 1425 (5th Cir. 1983).

52. *See, e.g.*, *In re* Oil Spill by Amoco Cadiz, 699 F.2d 909 (7th Cir. 1983); Jig the Third Corp. v. Puritan Marine Ins. Underwriters Corp., 519 F.2d 171 (5th Cir. 1975), *cert. denied*, 424 U.S. 954 (1976); Pan Am. World Airways, Inc. v. United Aircraft Corp., 56 Del. 187, 192 A.2d 913 (1963), *aff'd*, 57 Del. 322, 199 A.2d 758 (1964) (manufacturer liable for, *inter alia*, failure to test product component in vibrating environment in which it was to be used). *Cf.* Mickle v. Blackmon, 252 S.C. 202, 166 S.E.2d 173, 184-88 (1969) (manufacturer must design and manufacture product to withstand reasonably foreseeable environmental situations, even those not caused by manufacturer).

53. *See, e.g.*, Schaeffer v. Michigan-Ohio Navigation Co., 416 F.2d 217, 222-23 (6th Cir. 1969) (manufacturer failed to warn operator of hazards involved in repairs to product).

54. *See, e.g.*, Noel v. United Aircraft Corp., 342 F.2d 232, 236-37 (3rd Cir. 1964) (manufacturer has continuing post-delivery duty to develop and adapt improvements to make products safer).

55. *See, e.g.*, Jones v. Binder Welding and Machine Works, Inc., 581 F.2d 1331 (9th Cir. 1978).

56. *See, e.g.*, Hurdich v. Eastmount Shipping Corp., 503 F.2d 397 (2d Cir. 1974); Ohio Barge Line, Inc. v. Dravo Corp., 326 F. Supp. 863, 865-66 (W.D. Pa. 1971).

57. RESTATEMENT (SECOND) OF TORTS § 402A (1965). The great majority of States in the United States, including Illinois and Texas, have adopted the strict liability provisions of Section 402A of the Restatement, but there are many different interpretations of the Restatement's language. New York and California have adopted strict lia-

ers[58]) may be held strictly liable for furnishing products (including components) that were defective or dangerous and that caused the alleged damages.[59] Manufacturers may also be held strictly liable for insufficient manuals, comments, instructions, and warnings regarding operations, maintenance, and repairs of their products.[60] Negligence or fault on the part of the claimant will not preclude a claimant's recovery but may reduce it in an action based on defendant's strict liability.[61]

The foregoing principles of product liability law are rather unsurprising. Of more interest are the following, more controversial, issues of product liability law, not all of which have been faced in the admiralty context. These are only a few of the issues of concern, but they seem particularly relevant to commercial space activities.

B. *Standard of Care.*

Section 402A of the Restatement (Second) of Torts has been adopted by most U.S. states and, as noted above, by the general maritime law; it requires a plaintiff in a manufacturer's strict liability case to prove that the product was in a "defective condition unreasonably dangerous to the user or the consumer or to his property". This "unreasonably dangerous" requirement makes it necessary in some cases to decide whether the reasonableness of the danger is to be determined from the point of view of a consumer or a prudent manufacturer or from some other perspective. This makes no difference in most cases involving manufacturing defects and inadvertent design errors, but in cases involving alleged defects that result from conscious design choices, the outcome may depend upon how the reasonableness of the danger is assessed.

The Restatement considers a product unreasonably dangerous if the product is "dangerous to an extent beyond that which would be contemplated by

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bility, but not Section 402A. The Second Restatement of Torts was published in 1965 as a comprehensive formulation of general American tort law as it then stood and, at least with respect to strict liability, as it was expected to develop.

58. Lessors are also subject to strict liability, although an exception is usually made for "finance lessors" who act only in a financial capacity and who have virtually nothing to do with the product itself.

59. *See, e.g.*, Pan-Alaska Fisheries, Inc. v. Marine Constr. & Design Co., 565 F.2d 1129, 1134-36 (9th Cir. 1977); Jig the Third Corp. v. Puritan Marine Ins. Underwriters Corp., 519 F.2d 171, 176-77 (5th Cir. 1975), *cert. denied*, 424 U.S. 954 (1976); Lindsay v. McDonnell Douglas Aircraft Corp., 460 F.2d 631, 635-37 (8th Cir. 1972).

60. *See, e.g.*, Pan-Alaska Fisheries, Inc. v. Marine Constr. & Design Co., 565 F.2d 1129, 1136-37 (9th Cir. 1977) (post-delivery warning held insufficient).

61. *See, e.g.*, Lewis v. Timco, Inc., 716 F.2d 1425 (5th Cir. 1983); Pan-Alaska Fisheries, Inc. v. Marine Constr. & Design Co., 565 F.2d 1129 (9th Cir. 1977). *Cf.* Anthony v. Petroleum Helicopters, Inc., 693 F.2d 495 (5th Cir. 1982).

the ordinary consumer who purchases it, with the ordinary knowledge common to the community as to its characteristics."[62] In cases involving conscious design choices, this "consumer expectation" test is too subjective and can even work to the disadvantage of plaintiffs when consumer expectation has not caught up with available technology, which might well be the situation in cases involving commercial space products.

Manufacturers usually prefer that questions of reasonableness be answered from the point of view of a prudent, knowledgeable manufacturer making the design choices at issue. In other words, would a reasonable manufacturer sell a product that has certain known risks resulting from conscious design choices and trade-offs? This test would avoid the uninformed subjectiveness of the consumer expectation test and would also avoid the potential for liability that would arise just because it is almost always possible to design a product more safely.

Even in strict liability cases, determining whether or not a design was defective will, in most U.S. states, entail an examination of whether the design was a reasonable one. The involvement of intangible and difficult-to-prove factors relating to product design makes it imperative for manufacturers and their attorneys to be extremely well prepared to deal with intricate technical and economic aspects that must be balanced in each case. From the beginning of their preliminary design efforts on a particular product, manufacturers should keep these considerations in mind and should keep appropriate records of how they handle these various considerations. Staff counsel, in consultation with outside counsel, will have to be heavily involved in this preparation for future lawsuits. When those lawsuits do arise, in addition to having a full understanding of the many subtleties of product liability law, the outside trial counsel will have to be able to understand the engineering and economic factors involved, including those related to the other major battle area, causation. Of course, the same may be said of plaintiff's counsel. Whatever party he represents, a trial attorney in product liability litigation will have to make enormous investments of time and effort in order to get a complete understanding of precisely how the challenged design was decided upon and developed, and in court he will have to be prepared to deal with each alternative design that could have been utilized. This is not ever easy and may be even more difficult in cases involving advanced products being used in space.

It is not enough for a manufacturer's counsel to show that the design meets industry standards. Adherence to design and construction practices of an industry may be some evidence of reasonable prudence, but this adherence is not conclusive.[63] Neither is compliance with governmental regulations, even if the government has "certified" the design.

In aviation cases, courts have held that compliance with Federal Aviation Administration safety standards is not a complete defense to a claim that the

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62. RESTATEMENT (SECOND) OF TORTS § 402A comment i (1965).

63. The T.J. Hooper, 60 F.2d 737 (2d Cir.), *cert. denied*, 287 U.S. 662 (1932).

aircraft design was defective.[64] According to the courts, government safety regulations are intended to be minimum standards only, and compliance with government safety regulations may be considered simply as one factor bearing on whether the design was dangerously defective.

For that matter, government certification of an aircraft design is not even conclusive on the narrower question of whether the aircraft design meets all government-mandated design standards. In *Elsworth v. Beech Aircraft Corp.*,[65] the lawsuit arose from the crash of a multi-engine Beech Travel Air model 95. An investigation indicated that, prior to the crash, one of the airplane's engines had been shut down. Plaintiff heirs of the pilot and passengers alleged that the accident was caused by the airplane' undue propensity to stall and spin while operating on one engine. Despite a finding by the FAA, after conducting its own stall/spin tests, that the airplane met all safety regulations, the appellate court approved an instruction by the lower court that the jury could conclude that the FAA safety regulations were violated and that, if it did so conclude, it must further conclude that Beech was negligent *per se*.

Based on *Silkwood v. Kerr McGee*,[66] the *Elsworth* court held that "there is nothing inherently inconsistent in the proposition that, even if the Federal Government has entirely occupied the field of regulation of aircraft, a state may simultaneously grant damages for violation of such regulations." In *Silkwood*, nuclear energy regulations adopted by the Federal Government preempted the field of safety. Despite this preemption, "common law tort principles of Oklahoma were applicable to hold the defendant employer liable to an employee for compensatory and punitive damages as a result of radiation at the employer's plant."[67]

The *Elsworth* court ruled that it could find no irreconcilable conflict between Federal and state standards, and that the 1958 Federal Aviation Act expressly stated that its provisions were not intended to abridge remedies that might be available under state law. Beech, the manufacturer, petitioned the United States Supreme Court for a review of this decision, but the Court denied certiorari.[68]

Maritime law is not far behind aviation law on this question. Compliance with United States Coast Guard regulations and American Bureau of Shipping rules is given weight by the courts, but such compliance is not conclusive if it is shown that: (1) approval was obtained due to the failure of the regulatory agency or classification society to adequately inspect the vessel; (2) the regulatory agency or classification society did not abide by its own standards; or (3) a

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64. *See, e.g.*, Wilson v. Piper Aircraft Corp., 282 Or. 61, 577 P.2d 1322 (1978).

65. 37 Cal.3d 540, 208 Cal. Rptr. 874, 691 P.2d 630 (1984), *cert. denied*, 105 S.Ct. 2345 (1985).

66. 464 U.S. 238, *rehearing denied*, 465 U.S. 1074 (1984).

67. *Elsworth*, 691 P.2d at 635-36.

68. 105 S.Ct. 2345 (1985).

higher standard of care is required.[69]

Therefore, manufacturers of products designed for use in commercial space activities will probably not be insulated from liability just because they comply with governmental regulations or because a governmental authority has concluded that the product has met all safety regulations. On the other hand, as indicated above, failure to comply with the Government's regulatory standards, which are considered as minimum standards, may in fact constitute "negligence per se".[70]

C. *Government Contractor Defense.*

Where a manufacturer has designed a product to comply with requirements established by the United States government in a contract with the manufacturer, the manufacturer may be in a better position than if, in a non-governmental context, it merely complied with government regulations. It should be noted, though, that, up until recently, manufacturers who were government contractors were facing the worst of situations.

Under the Federal Tort Claims Act, the United States Government is not liable for injuries to a member of the military arising out of or in the course of activity incident to military service, and the Federal Government is also immune from a manufacturer's claims for indemnity arising out of payments made by the manufacturer for injuries to members of the military.[71] This has left government contractors with the entire burden of liability to military servicemen for defectively or dangerously designed products. Manufacturers may be held liable despite proof that their products have been substantially modified and improperly maintained by the military,[72] and even if the manufacturer suspects that its product was improperly operated, this is difficult to prove because of the confidentiality of certain information obtained through the military accident investigation process.

Manufacturers are now beginning to find some relief in a defense that argues that the allegedly defective or dangerous aspects of a product's design are the result of the product's having been designed to meet certain government specifications or requirements.[73] The doctrine is still unsettled, and there is

69. *See In re* Marine Sulphur Transp. Corp., 312 F. Supp. 1081 (S.D.N.Y. 1970), *aff'd in part, rev'd in part*, 460 F.2d 89 (2d Cir.), *cert. denied*, 409 U.S. 982 (1972).

70. *See, e.g.*, Reyes v. Vantage S.S. Co., Inc. 609 F.2d 140 (5th Cir. 1980).

71. *See, e.g.*, Stencel Aero Engineering Corp. v. United States, 431 U.S. 666 (1977); Feres v. United States, 340 U.S. 135 (1950).

72. *See, e.g.*, Vasina v. Grumman Corp., 644 F.2d 112 (2d Cir. 1981).

73. *See, e.g.*, McKay v. Rockwell Int'l Corp., 704 F.2d 444 (9th Cir. 1983), *cert. denied*, 464 U.S. 1043 (1984); Tozer v. LTV Corp., 792 F.2d 403 (4th Cir. 1986); Hendrix v. Bell Helicopter Textron, 634 F. Supp. 1551 (N.D. Tex. 1986); *In re* Agent Orange Product Liability Litigation, 534 F. Supp. 1046 (E.D.N.Y. 1982). *But see* Shaw v. Grumman Aerospace Corp., 778 F.2d 736 (11th Cir. 1986).

insufficient space available to discuss it in detail here.[74] Basically, a manufacturer may utilize the government contractor defense, at least in a strict liability lawsuit, if it can prove that the government established or approved reasonably precise specifications for the allegedly defective product, and that the product met the government's specifications in all material respects, and that the government knew as much or more than the defendants about the hazard-causing deficiencies of the product.

Manufacturers of space products that were designed for the government may be interested in using the government contractor defense not only in cases involving injuries to military personnel, but also in cases involving injuries to civilians. To be sure, some courts have indicated that, if the government is not immune from liability to those injured, the government contractor defense may not be utilized,[75] but this requirement may be met in certain civilian situations. In any event, some decisions have suggested that courts may allow government contractor defenses to insulate defendant manufacturers against liability to civilian plaintiffs in product liability actions.[76]

D. *The Applicability of Strict Liability.*

The doctrine of strict liability may not be considered applicable in all product liability cases. For example, in *Wangeman v. General Dynamics Corp.*,[77] we successfully defended General Dynamics against claims for the wrongful death of a test pilot who lost his life in an airplane crash. Plaintiff argued that General Dynamics should be held liable for negligence, breach of implied warranty of fitness, and strict liability. Our position was that the doctrine of strict liability and implied warranty of fitness were each inappropriate because the aircraft in question was an unfinished pre-production prototype in the process of being tested and evaluated by a subcontractor even though it was after the date of formal sale to the military. Furthermore, the test pilot had been engaged in (and hired to perform) testing of the aircraft. The court found in our favor on the basis of other arguments, so it never reached our arguments on this point, but I believe that we would have prevailed on this

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74. *See* Craft, *The Government Contractor Defense: Evolution and Evaluation*, THE GOVERNMENT CONTRACTOR DEFENSE: A FAIR DEFENSE OR THE CONTRACTOR'S SHIELD 3 (J. Madole ed., A.B.A. 1986); Craft, *Manufacturers' Strict Liability for Products that Meet Military Specifications*, paper presented at the Third National Institute on Aviation Litigation sponsored by the American Bar Association (1984).

75. *See, e.g.*, Johnston v. United States, 568 F. Supp. 351 (D. Kan. 1983).

76. *See, e.g.*, Casabianca v. Casabianca, 104 Misc.2d 348, 428 N.Y.S.2d 400 (Sup. Ct. 1980). *See generally In re* All Maine Asbestos Litigation, 575 F. Supp. 1375, 1377 (D.Me. 1983).

77. 53 A.D.2d 520, 384 N.Y.S.2d 174 (1st Dept. 1976), *appeal denied*, 40 N.Y.2d 808, 392 N.Y.S.2d 1025 (1977).

issue as well.[78] Again, this case is mentioned here as a demonstration of why it simply cannot be assumed that strict liability is applicable to every product case. In space activities there may be a number of experimental (if not one-of-a-kind) products that are not being commercially distributed and should not subject their manufacturers to strict liability.[79]

E. *Damages Recoverable.*

The law relating to the recovery of property damage and economic loss in product liability actions in the United States is quite confused, and, either as a cause or as a result, so are the labels for the many categories of damage to be considered. Among the categories are physical damage to the particular product itself, physical damage to the assembly of which the product is a component part, physical damage to other property, economic loss resulting from an inability to operate the product or the assembly in which it is installed, and economic loss resulting from physical loss to other property. The courts have been inconsistent in categorizing these damages and in applying the law to the various categories. Many of the inconsistencies are primarily the result of insufficient analysis rather than the result of mere differences of opinion among the courts of the various U.S. states.

A commonplace statement is that, except under a warranty, in a product liability action economic loss is not recoverable but property damage is recoverable. However, the reason for making this distinction is not as clear as it might be, and there has been much doubt about the validity of the distinction. For example, the same courts that suggest that more direct economic loss is not recoverable also say that somewhat indirect property damage, such as where a defective part causes harm to other property, is recoverable.

In either negligence or strict liability cases, property damages are generally considered to be compensable. Physical property damage is very similar to personal injury, and it has been suggested that there is no reason to distinguish them. But there is no agreement as to the full scope of the term "property damage", physical or otherwise.

With respect to economic losses, there is disagreement among the states as to whether such losses are compensable in negligence or strict liability actions. Of course, in tort actions a tortfeasor is generally liable for all foreseeable damages proximately caused by his tort. The purpose of these compensatory damages is to restore the plaintiff to the position he would have occupied had there been no tort. While a defendant in a negligence action is not an insurer, he must nevertheless pay for the damages that he has caused. The scope of those

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78. *See* Winkler v. Hyster Co., 54 Ill.3d 282, 369 N.E. 2d 606 (1977).

79. Based on the law as it then was, earlier commentators suggested that strict liability would be appropriate for rocket-caused damage only so long as rocket flights were considered ultrahazardous and that, thereafter, strict liability would give way to use of the doctrine of *res ipsa loquitur*. *See, e.g.*, A. HALEY, SPACE LAW AND GOVERNMENT 244-45 (1963).

damages is supposedly restricted in practice by the requirements that the damages be proximately caused by the defendant's negligence and that the type of damages be reasonably foreseeable. Another requirement is that damages be proved with a reasonable degree of certainty; they may not be contingent, conjectural, or speculative. If courts actually enforced these requirements (which they seldom do), then permitting a plaintiff to be compensated for economic loss in a tort action would not have to open the door to unlimited or unreasonable damages.

Nevertheless, it is frequently suggested in manufacturers' strict liability and negligence actions that there is a general rule, based on the decision of the California Supreme Court in *Seely v. White Motor Co.*,[80] that there cannot be recovery for economic loss alone and that a manufacturer's liability is limited to damages for physical injuries. As pointed out on other occasions,[81] the *Seely* decision should not be given too much weight, unless it is taken to mean only that the kind of economic loss not recoverable in tort actions is "pure" economic loss (including costs of repair and loss of profits) that is not accompanied by an injury to a person or property as a result of an "accident".[82]

In 1985, the Third Circuit Court of Appeals concluded that damage to the defective product itself is not recoverable in a tort action unless the defect creates an unreasonable risk of harm to persons or property other than the product itself.[83] Other decisions also did not preclude recovery of "economic loss" in product liability actions, and it is important to note that some of these decisions were in admiralty cases.[84] The latter decisions may have turned on whether the economic loss was especially foreseeable, despite the absence of physical injury or property damage.[85]

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80. 63 Cal.2d 9, 18, 403 P.2d 145, 45 Cal. Rptr. 17 (1965).

81. Craft, *La Responsabilitê des Fabricants en Droit Amêricain*, 37 REVUE FRANCAISE DE DROIT AÉRIEN 21 (1981).

82. *See* S.M. Wilson & Co. v. Smith Int'l, Inc., 587 F.2d 1363, 1376 (9th Cir. 1978); State of Arizona v. Cooke Paint & Varnish Co., 541 F.2d 226, 228 (9th Cir. 1976) (concurring opinion); Union Oil Co. v. Oppen, 501 F.2d 558, 564-67 (9th Cir. 1974).

83. East River S.S. v. Deleval Turbine, 752 F.2d 903, 908 (3d Cir. 1985).

84. *See, e.g.*, Ingram River Equip. Inc. v. Pott Indus., Inc., 756 F.2d 648 (8th Cir. 1985) (maritime law); Miller Indus. v. Caterpillar Tractor Co., 733 F.2d 813 (11th Cir. 1984); Emerson G.M. Diesel v. Alaska Enterprise, 732 F.2d 1468 (9th Cir. 1984) (maritime law); Ales-Peratis Foods Int'l, Inc. v. American Can Co., 164 Cal. App. 3d 277, 209 Cal. Rptr. 917 (Cal. Ct. App. 1985).

85. In this way, they further liberalized the approach found in Jig the Third Corp. v. Puritan Marine Ins. Underwriters Corp., 519 F.2d 171 (5th Cir. 1975), *cert. denied*, 424 U.S. 954 (1976), where the Fifth Circuit held that the sinking of a vessel due to negligent construction or defective design was tortious in nature and thus fell within maritime tort jurisdiction. This was despite the recognized legal principle that contracts to construct ships are generally outside the maritime jurisdiction. The court reasoned "that a manufacturer's negligent design or manufacture of a product gives rise to a

But in *East River Steamship Corp. v. Transamerica Deleval, Inc.*,[86] the United States Supreme Court recently rejected the Third Circuit's and other courts' approaches and held that in admiralty a manufacturer of a defective product purchased in a commercial transaction will not be held liable for damage to the product itself resulting only in purely economic losses, except under warranty law, which is generally subject to the terms of the purchase contract. Thus, tort law theories of negligence and strict liability would not normally be available to recover for damage to the product. With respect to other "economic damages", the Court stated that it did not decide the question of whether a tort cause of action can ever be stated in admiralty for such damages.

The Supreme Court decision has thus gone a long way toward clarifying the admiralty law, and this decision may well influence court decisions regarding various states' laws as well. Nevertheless, many questions in this area remain unresolved, and their resolution is likely to have a great effect on actions for property damage and economic loss arising out of commercial space activities.

F. *Contractual Disclaimers.*

Implied warranties may be disclaimed only if the disclaimers are specific and conspicuous. Moreover, disclaimers and limitations of remedies must not be inconsistent with the express warranties. If they are inconsistent, the warranty language prevails.[87] Furthermore, a warranty limited to a particular period is enforceable only if the particular defect is not latent and undiscoverable within that period.[88]

In a contract between parties of roughly equal bargaining power, manufacturers may also disclaim negligence and strict liability, provided that the disclaimer is clear and unequivocal.[89] The manufacturer's disclaimer may also

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cause of action in tort, even where the aggrieved buyer is the economic equal of the seller and where the only damage is to the purchased chattel itself. . . ." *Id.* at 175.

86. 106 S.Ct. 2295 (1986).

87. *See, e.g.*, Consolidated Data Terminals v. Applied Digital Data Sys., Inc., 708 F.2d 385, 391 (9th Cir. 1983).

88. *Compare* Neville Chem. Co. v. Union Carbide Corp., 422 F.2d 1205 (3d Cir. 1969), *cert. denied*, 400 U.S. 826 (1970), and Wilson Trading Corp. v. David Ferguson, Ltd., 23 N.Y.2d 398, 404, 297 N.Y.S.2d 108, 112 (1968), *with* American Elec. Power Co. v. Westinghouse Elec. Corp., 418 F. Supp. 435 (S.D.N.Y. 1976).

89. *See, e.g.*, Delta Airlines v. McDonnell Douglas Corp., 503 F.2d 239 (5th Cir. 1974), *cert. denied*, 421 U.S. 965 (1975); Aeronaves de Mexico, S.A. v. McDonnell Douglas Corp., 677 F.2d 771 (9th Cir. 1982); Tokio Marine & Fire Ins. Co., Ltd. v. McDonnell Douglas Corp., 617 F.2d 936 (2d Cir. 1980); Keystone Aeronautics Corp. v. R. J. Enstrom Corp., 499 F.2d 146 (3d Cir. 1974).

protect subcontractors who did not directly negotiate with the purchaser and who were not specifically named in the purchase agreement.[90] Again, the disclaimer may not be enforced where the contractual disclaimer is not sufficiently clear and unequivocal, as when it makes no specific mention of negligence or tort liability.[91]

Disclaimers of tort liability may also be overcome by a demonstration that the limited remedies available under the contract failed of their essential purpose, usually because the manufacturer failed to live up to its obligations under the repair and replacement clause.[92]

Contractual disclaimers, limitations of remedies, indemnity clauses, and insurance clauses will obviously be important to manufacturers of products for use in commercial space activities. Equally obviously, manufacturers need to work with product liability counsel in order to maximize the effect of their disclaimers, etc. The manufacturer's customers' also need to consult product liability counsel in order to make sure that they fully understand the effect of the disclaimers, etc. Unless the contract is extraordinarily clear, an accident will no doubt generate litigation to test the nature and scope of the disclaimers, etc.

In speaking of contracts involving commercial space activities, reference must be made to the standard NASA agreements for joint endeavors and for shuttle launch and associated services. These agreements have been frequently described,[93] and there is no point in further embroidery here. The goal of these agreements is to avoid fights about fault and causation by means of a no-fault, no-subrogation, inter-party waiver of liability that will make each party responsible for the damage to its own personnel and property. The standard agreement may be attacked in various ways, and it has yet to be determined whether the agreement can effectively protect manufacturers from liability to others who are involved in the space activity and whose personnel or property were damaged by the manufacturer's product. For example, does the agree-

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90. *See, e.g.*, Airlift Int'l, Inc. v. McDonnell Douglas Corp., 685 F.2d 267 (9th Cir. 1982); Aeronaves de Mexico, S.A. v. McDonnell Douglas Corp., 677 F.2d 771 (9th Cir. 1982).

91. *See, e.g.*, Jig the Third Corp. v. Puritan Marine Ins. Underwriters Corp., 519 F.2d 171 (5th Cir. 1975), *cert. denied*, 424 U.S. 954 (1976) (maritime law).

92. *See, e.g.*, Milgard Tempering, Inc. v. Selas Corp., [Current Decisions] PROD. LIAB. REP. (CCH) ¶10,515 (9th Cir. 1985) (need for case-by-case approach to examine provisions of each contract to determine whether parties intended exclusive remedy and damage exclusion provisions to operate as separable elements of risk allocation or as inseparable parts of comprehensive risk allocation package). In other words, the court is to determine whether the default of the manufacturer is so total and so fundamental as to require its damage limitations to be expunged from the contract. *Id.*

93. *See, e.g.*, J.E. O'Brien, *NASA Joint Endeavor Agreements*, paper presented at the Second Annual Forum of the A.B.A. Forum Committee on Air and Space Law (1984).

ment's waiver apply if the plaintiff proves gross negligence or recklessness rising to the level of willful misconduct by the manufacturer? The increase in successful punitive damage claims against manufacturers in conventional cases demonstrates that this is not a farfetched question.[94] In any event, the waivers will generally not protect the parties to the NASA agreement from liability to non-parties, including members of the public.

F. *Product Liability Insurance.*

Because the amounts awarded in product liability cases can be very high, manufacturers have to insure themselves against such potential liabilities. The extent of a company's exposure to liability and the size of American jury awards, as well as a generally tight insurance market, have prompted insurers to adopt a radically different comprehensive general liability form. This is not the place to discuss the details of the changes to be effected by this form, which has not yet been approved by all of the 50 states of the U.S. For those insureds who do not already have "claims-made" coverage, (which many believe will become the only effectively available form of comprehensive general liability insurance) the principal departure of the new claims-made form from the "occurrence" form is that the claims-made policy would provide coverage for only those claims actually made during the policy period, beginning at the policy inception or some other stated retroactive date. (This may result in an interruption of coverage, although an extended reporting period endorsement will be available — at a higher cost based on the expiring premium — to provide coverage for any period of interrupted coverage preceding the effective date.)

The new policy format continues to commit insurers to defend any suit against insureds covered under the policy, but the insurers have further considered the establishment of an absolute dollar limit on the extent of their duty to defend; this may be accomplished by including defense costs within the policy limits. Insurers point to the absence of any judicial consensus on their duty to defend. Some courts have held that the duty terminates upon payment of the policy limits of liability, while other courts have required insurers to defend to conclusion all cases pending at the time the policy limit was exhausted. Insurers also complain that their costs in defending lawsuits, especially product liability lawsuits, are simply too high.

The most important thing to be mentioned about insurance coverage is its decreasing availability. There is a major shortage in capacity, both in primary coverage and reinsurance, especially in commercial lines. Thus, despite rapid rises in premiums, increases in operating income will be slow to overcome the shortage. Moreover, because reinsurers have tightened underwriting, the terms and conditions of coverage have become more restrictive. Under these conditions, outside capital is unlikely to aggressively enter the insurance market.

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94. For a discussion of punitive damages in product design cases, *see* Craft, *Design and Punishment*, ASTRONAUTICS & AERONAUTICS 15 (January 1983).

All manufacturers are encountering the increasing expense and decreasing availability of full product liability coverage. Especially hard hit will be manufacturers of products intended for commercial space activities; the enormous losses sustained over the past few years by aviation and space underwriters have caused them to reduce capacity and raise premium rates.[95] Of course, NASA customers are required by NASA agreements for joint endeavors and for launch and associated services to obtain NASA-approved liability insurance covering the customer and the United States for their third-party liability. The amount of such insurance is to be agreed upon, and no individual customer will be required to have insurance in an amount in excess of $500 million. Multiple customers who are on the same shuttle flight and are named insureds on a single policy shall not be required to have insurance in an amount in excess of one billion dollars. If NASA determines that a customer is unable to obtain adequate insurance, NASA *may* provide insurance or indemnification for a reasonable fee to be agreed upon. In any event, at no additional cost, NASA agrees to indemnify each customer for third-party liability to the extent that such liability exceeds the limits of the insurance coverage purchased by or provided to the customer.

These indemnity obligations may not be interpreted as expected. For example, unless the NASA Administrator certifies that the amount is "just and reasonable," the NASA agreements state that the United States will make no indemnity payment. In addition, the indemnity obligation appears to be subject to the statement in the agreement that the United States government's liability to the customer shall be limited to direct damages only and shall not include any loss of revenue, profits, or other indirect or consequential damages. It is not certain, then, whether the United States would indemnify customers who were found liable for third parties' indirect or consequential damages. Indemnity payments may also be limited by the AntiDeficiency Act[96] and the Adequacy of Appropriations Act.[97] thus, the indemnity/insurance provisions of the NASA standard agreements are of unclear practical effect.

G. *Legislative Reforms.*

Much recent state legislation has been aimed at reforming certain problematic aspects of product liability law; most of these reforms have benefited the manufacturers but have not eliminated the doctrine of strict liability. As of this writing, thirty-four states have recently enacted reform legislation; however, in only a third of these states are the legislative reforms very significant, and the effect of these reforms will depend much on the ways that the courts

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95. For a general discussion of space insurance, *see* STAFF OF SENATE COMM. ON COMMERCE, SCIENCE, AND TRANSPORTATION, 99th Cong., 1st Sess., INSURANCE AND THE COMMERCIALIZATION OF SPACE (Comm. Print 99-16, 1985).

96. 31 U.S.C. §1341 (1983).

97. 41 U.S.C. §11 (1965).

interpret the statutory language over the next few years.

There have also been extensive efforts aimed at a federal product liability law that would essentially pre-empt the inconsistent state laws. This effort began with a proposed draft Uniform Product Liability Act, which developed into the Model Uniform Products Liability Act, which in turn evolved into a bill sponsored by Senator Robert Kasten of Michigan. After a long and tortuous process, during which some aspects of the bill were diluted, the bill came to a vote in the Commerce Committee of the United States Senate in the spring of 1985, and it failed to pass that Committee. In its place, Senator John Danforth of Missouri announced on July 15, 1985, a new draft bill that combined uniform federal product liability standards with an alternative claims system for the recovery of damages by those injured by defective products. This draft bill was subjected to a number of amendments, and on June 12, 1986, the Senate Commerce Committee adopted an amendment in the nature of a substitute for the previously amended draft bill. The substitute bill was considered further and subjected to still more amendments, and the Committee approved and reported to the full Senate a new bill, Senate Bill 2760, which was an original bill based on the previous bills and amendments.

Public hearings were held by the Senate to investigate the advisability of adopting S. 2760, and the outcome was very much in doubt. The Committee report on this bill was not unanimous, and various members of the Committee submitted dissenting opinions. Furthermore, various senators were planning to offer additional amendments to this legislation. The Reagan Administration was also not happy about a number of provisions. While this was the leading federal bill on product liability reform, it was not the only one, for other senators had introduced or were planning to introduce other bills. Of course, even if there had been enough votes to pass a bill in the Senate, this would not have meant that the bill would become law, for the House of Representatives would also have had to pass it.

As a result of all these factors, and the lack of time to resolve them, S. 2760 was removed from the calendar of this past session. It will come up again in 1987, but it will no doubt face many of the same obstacles. All considered, the proposed legislation continues to be in a state of flux, and it seems premature to say much more about it at this point.

Barring some federal legislative breakthrough, then, United States product liability law will for the most part continue in the common law tradition. It must be recalled, though, that it was the common law, as promulgated by the courts, that introduced the concept of strict liability in this country. In most of the states, the legislatures had little or nothing to do with it.

V. *Conclusion*

The development of United States product liability law will greatly affect the development of commercial space activities, and those involved in these activities will have to work with counsel conversant with both space law and U.S. product liability law in order to monitor developments and to minimize the risks involved. Legislative action will probably also be needed, if not to

reduce risks then at least to clarify them so that they can be dealt with and covered by insurance.