LIABILITY OF AEROSPACE MANUFACTURERS: *MacPherson v. Buick* SPUTTERS INTO THE SPACE AGE

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Introduction

In 1915 Donald MacPherson took his Buick motor car out for a drive on New York roads. He had purchased the car new from a retail car dealer in New York, who had purchased it from the manufacturer, Buick Motor Company. While traveling at a speed of eight miles per hour MacPherson was thrown from the car and injured when it collapsed after one of the wooden spokes in one of the car's wheels crumbled into fragments. MacPherson brought suit against the manufacturer. Evidence introduced at the trial showed that the wooden spoke that failed was made of defective wood, and that its defects could have been discovered by reasonable inspection. Buick had purchased the wheel from a component manufacturer, the Imperial Wheel Company of Flint, Michigan, which had previously supplied Buick with eighty thousand defect-free wheels. There was evidence that neither Imperial nor Buick had inspected MacPherson's wheel for defects.

MacPherson's problem was that the applicable rule of law prevailing in New York and in the majority of other states in 1915 came from an English case decided in 1842. In *Winterbottom v. Wright*[1] the court held that there could be no action, even in tort, for the misperformance of a contract of sale of a chattel in the first instance.[2] An exception to this rule had been created in New York in 1852 in *Thomas v. Winchester*,[3] a case holding a seller liable to a third person for negligence in the preparation or sale of an article "imminently" or "inherently" dangerous to human safety.[4] But the firmly-established rule facing MacPherson in 1915 when he sued the Buick Motor Company was that the original seller of goods was not liable for damages caused by their defects to anyone except his immediate buyer, in this case the retail car dealer, or

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1 10 M & W 109, 152 Eng. Rep. 402 (1842).

2 *See generally,* 68 PROSSER & KEETON ON THE LAW OF TORTS, § 96 at 681 (5th ed. 1984) (hereafter "PROSSER & KEETON").

3 6 N.Y. 397 (1852).

4 PROSSER & KEETON, *supra,* note 2, at 682.

to one in privity with him. Reasons given in support of the rule included the notion that an intervening resale by a responsible party "insulated" the negligence of the manufacturer. They also included the view, typical in the nineteenth century, that it would place too heavy a burden on manufacturers to hold them liable to large numbers of unknown persons, and that it was better to let the consumer suffer.[5]

Luckily for MacPherson, his case ultimately found its way to the desk of Benjamin Cardozo, then a judge on New York's highest court, the New York Court of Appeals. In the words of Dean Prosser, Cardozo's opinion "struck through the fog of the 'general rule' and its various exceptions and held the maker liable for negligence."[6] The reasoning and the fundamental philosophy expressed by Judge Cardozo in *MacPherson v. Buick Motor Co.*,[7] were that the manufacturer, "by placing the car upon the market, assumed a responsibility to the consumer, resting not upon the contract but upon the relation arising from his purchase, together with the foreseeability of harm if proper care were not used."[8] Judge Cardozo wrote:

> We are dealing now with the liability of the manufacturer of the finished product, who puts it on the market to be used without inspection by his customers. If he is negligent, where danger is to be foreseen, a liability will follow. . . . There is here no break in the chain of cause and effect. In such circumstances, the presence of a known danger, attendant upon a known use, makes vigilance a duty.
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> Precedents drawn from the days of travel by stage coach do not fit the conditions of travel today. The principle that the danger must be imminent does not change, but the things subject to the principle do change. They are whatever the needs of life in a developing civilization require them to be.[9]

Three-quarters of a century after Judge Cardozo wrote his landmark opinion in *MacPherson v. Buick* it is difficult for us to imagine a time when life in the United States was governed by the rule of *Winterbottom v. Wright*. After *MacPherson* the law of products liability went on to develop the concept of strict liability, first in contract for breach of warranty,

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5 *Id.* at 681-82.
6 *Id.* at 682.
7 217 N.Y. 382, 111 N.E. 1050 (1916).
8 PROSSER & KEETON, *supra* note 2, at 683.
9 217 N.Y. at 386, 111 N.E. at 1054 (1916).

express or implied,[10] and later strict liability in tort for physical harm to persons and tangible things.[11]

The first case involving liability of an aerospace manufacturer for a defective product malfunctioning in space was filed in California state court in January 1986, *Appalachian Ins. Co., v. McDonnell Douglas Corp.*,[12] In the eight years since the *Appalachian* case was filed a number of other cases involving the liability of aerospace manufacturers for their malfunctioning or defective products have been litigated in courts in the United States. Some of the claimants in these cases probably felt the way MacPherson did when he filed suit against the Buick Motor Company in 1915. This article reviews some of these cases and some of the issues and legal rulings involved in them. It concludes from this review that liability of aerospace manufacturers for their malfunctioning and defective products, while in its infancy, is becoming established; and it forecasts that a slow but steady reallocation of the risk of loss resulting from these malfunctioning products will occur in the future between aerospace manufacturers and the purchasers and users of their products.

A. *Interparty Waivers of Liability*

1. *NASA's Interparty Waivers*

On February 3, 1984, the Space Shuttle Challenger lifted off from its launch pad at Cape Kennedy with two commercial telecommunications satellites in its cargo bay -- WESTAR VI owned by Western Union Corporation and PALAPA B-2 owned by the Government of Indonesia. Each satellite had attached to it a Payload Assist Module ("PAM-D") manufactured by McDonnell Douglas Corporation. The PAM-D constituted the third stage booster, or perigee kick motor ("PKM"), of the launch vehicle. The purpose of the PAM-D was to place the spacecraft in a transfer orbit following deployment of the spacecraft from the Shuttle while it was in a parking orbit around the earth. The major component of the PAM-D was its STAR 48 solid rocket motor ("SRM"), manufactured for McDonnell Douglas by Morton Thiokol, Inc. The nozzle, or exit cone, of the STAR 48 was manufactured for Morton Thiokol by HITCO. The exit cones on the PAM-Ds attached to WESTAR VI and PALAPA B-2 were new carbon-carbon nozzles utilizing an "involute" design. They were replacing McDonnell Douglas's older, heavier but very reliable carbon phenolic exit cones made by the "tape-wrapped" process.

The nominal burn time for the PAM-D's STAR 48 SRM was 85 seconds. Following deployment of WESTAR VI from the Shuttle on February 3, 1984, its PAM-D was ignited. Approximately five seconds after ignition the carbon-carbon exit cone disintegrated completely

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10 *See generally,* PROSSER & KEETON, *supra* note 2, § 95, at 677.

11 *See* RESTATEMENT (SECOND) OF TORTS § 402A.

12 No. 481712 (Orange Co. Super. Ct.).

resulting in WESTAR VI going into a low "failed" elliptical orbit around the earth. In such an orbit it was useless as a telecommunications satellite. Three days later the crew of the Challenger deployed PALAPA B-2 and its PAM-D was ignited. The carbon-carbon exit cone of the Indonesian satellite's STAR 48 SRM also disintegrated completely approximately five seconds after ignition, leaving PALAPA B-2 in a failed orbit nearly identical to that of WESTAR VI.

Both satellites were insured and the insurers paid Western Union and the Government of Indonesia over $200 million for these two launch failures. Some of the insurers of WESTAR VI filed a subrogation action against McDonnell Douglas, Thiokol and HITCO alleging strict liability in tort, negligence and breach of warranty. *Appalachian Ins. Co. v. McDonnell Douglas Corp., supra.* Some of the insurers of PALAPA B-2 filed a similar action in the same court at the same time against the same defendants. *Lexington Ins. Co. v. McDonnell Douglas Corp.*[13]

Both Western Union and the Government of Indonesia (through its agency PERUMTEL) had entered into Launch Service Agreement contracts ("LSAs") with the National Aeronautics and Space Administration ("NASA") in connection with the launches of their satellites on the Shuttle. In these LSAs NASA had insisted that Western Union and PERUMTEL agree to "a no fault, no subrogation, interparty waiver of liability" clause. The clause in PERUMTEL's LSA was an earlier, "limited" interparty waiver clause;[14] the one in Western Union's LSA was a later, "extended"

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13 No. 481713 (Orange Co. Super. Ct.).

14 The "limited" interparty waiver clause in the NASA-PERUMTEL LSA reads as follows:

> In carrying out this Agreement, the User and NASA will bring to a United States Government installation used for STS Operations their property and employees. The property and employees of each party will be in proximity to the property and employees of each other and of other users of the Space Transportation System. To simplify the allocation of risks among NASA and all users of the Space Transportation System and to make the use of the Space Transportation System feasible for the use and exploration of outer space by all potential users, the parties agree to a no-fault, no-subrogation inter-party waiver of liability under which each party agrees to be responsible for any Damage which it sustains as a result of Damage to its own property and employees involved in STS Operations during such operations, which Damage is caused by NASA, the User or other users involved in STS Operations during such operations, whether such Damage arises through negligence or otherwise. Thus, if NASA's property, while involved in STS Operations, is damaged by the User or another user, NASA agrees to be responsible for that Damage and agrees not to bring a claim against or sue any user. Similarly, if any user's property, while involved in STS Operations, is damaged by NASA or another user, the user whose property is damaged agrees to be responsible for that Damage and agrees not to bring a claim against or sue NASA or another user. It is the intent of the parties that this inter-party

interparty waiver clause.[15] NASA had also insisted that Western Union agree to a "flow down" provision in its LSA which required Western Union to extend the waiver to its "contractors and subcontractors at every tier."[16]

> waiver of Liability be construed broadly to achieve the intended objectives.

15 The "extended" interparty waiver clause in the NASA-Western Union LSA reads as follows:

> NASA and the Customer (the parties) will respectively utilize their property and employees in STS Operations in close proximity to one another and to others. Furthermore, the parties recognize that all participants in STS Operations are engaged in the common goal of meaningful exploration, exploitation and uses of outer space. In furtherance of this goal, the parties hereto agree to a no-fault, no subrogation, inter-party waiver of liability pursuant to which each party agrees not to bring a claim against or sue the other party or other customers and agrees to absorb the financial and any other consequences for Damage it incurs to its own property and employees as a result of participation in STS Operations during Protected STS Operations, irrespective of whether such Damage is caused by NASA, the Customer, or other customers participating in STS Operations, and regardless of whether such Damage arises through negligence or otherwise. Thus, the parties, by absorbing the consequences of damage to their property and employees without recourse against each other or other customers participating in STS Operations during Protected STS Operations, jointly contribute to the common goal of meaningful exploration of outer space.

16 The "flow down" provision in the NASA-Western Union LSA reads as follows:

> The parties agree that this common goal [of meaningful exploration of outer space] will also be advanced through extension of the inter-party waiver of liability to other participants in STS Operations. Accordingly, the parties agree to extend the waiver as set forth in Subparagraph 3.b. above to contractors and subcontractors at every tier of the parties and other customers, as third party beneficiaries, whether or not such contractors or subcontractors causing damage bring property or employees to a United States Government Installation or retain title to or other interest in property provided by them to be used, or otherwise involved, in STS Operations. Specifically, the parties intend to protect these contractors and subcontractors from claims, including products liability claims, which might otherwise be pursued by the parties or the contractors or subcontractors of the Parties, or other customers or the contractors or subcontractors of other customers. Moreover, it is the intent of the parties that each will take all necessary and reasonable steps in accordance with Subparagraph 3.e. below to foreclose claims for Damage by any participant in STS Operations during Protected STS Operations, under the same conditions and to the same extent as set forth in Subparagraph 3.b. above, *except for claims between the Customer and its contractors or subcontractors and claims between the United States Government and its contractors and subcontractors*. (Emphasis added.)

The *Appalachian* and *Lexington* cases were consolidated for discovery purposes, but before discovery was commenced McDonnell Douglas moved for summary judgment in both cases on the ground that the interparty waiver clauses in the two LSAs barred these suits. Neither Morton Thiokol nor HITCO joined McDonnell Douglas in that motion.

The trial court granted the plaintiffs' request to take discovery concerning the origin and meaning of these interparty waiver clauses prior to a hearing on the motions. The plaintiffs took the deposition of Robert Wojtal, a senior lawyer in NASA's office of the General Counsel who had authored both versions of the interparty waiver provisions. He testified at his deposition that in the days preceding the Shuttle when satellites were launched using Delta expendable launch vehicles ("ELVs"), the LSAs used by NASA with satellite owners contained no liability waiver of any kind. NASA's only concern at that time was its requirements that a satellite owner obtain liability insurance to protect the United States from third-party claims that might result from the launch.

An ELV launched only one satellite per mission, but the Shuttle was designed to carry up to four satellites per mission, each of which could cost many millions of dollars. Furthermore, the Shuttle itself cost over one billion dollars. NASA was concerned about losing business to its competitor, Arianespace, which could happen if the cost of NASA's launch services escalated with the introduction of the Shuttle. One of the major items that could substantially increase a NASA customer's costs was the cost of satellite launch insurance. If, for example, an owner's satellite came adrift after lift-off of the Shuttle and destroyed the three other satellites on board and damaged the Shuttle, that satellite owner's insurer would face staggering liabilities, and would presumably quote equally staggering rates. This would drive customers to Arianespace, where no Shuttle was endangered and where a maximum of two satellites were on board its ELV for each mission. This idea resulted in the so-called "interparty waiver of liability" clause in NASA's LSAs.

The first such clause used by NASA was referred to by Wojtal as a "limited" waiver because it dealt only with (1) the two parties to the LSA (NASA and the "User"), (2) other "users" and (3) third parties who brought their property to the launch site at the request of NASA or the satellite owners. By December 1982, Wojtal realized that these limited waivers did not protect in any way the contractors and subcontractors of the satellite owners who were launching on the same mission. He therefore wrote an "extended" interparty waiver clause, which was used exclusively by NASA thereafter. Wojtal felt that these extended waivers, coupled with a "flow down" provision requiring the satellite owner to extend the waiver to its "contractors and subcontractors at every tier," did provide protection to contractors and subcontractors against suits brought by NASA or other satellite owners launching on the same mission. However, to insure that he did not foreclose a satellite owner's right to sue his *own* contractor or subcontractor for breach of contract, breach of warranty or negligence, Wojtal inserted the "except" clause into the flow down provision. Thus, the extended waiver foreclosed claims for damage by a

participant in Shuttle operations "*except for claims between the customer and its contractors or subcontractors* and claims between the United States government and its contractors and subcontractors." (Emphasis added.)

After reviewing the extrinsic evidence obtained during discovery the trial court in the *Appalachian* and *Lexington* cases found that both the limited and extended versions of NASA's interparty waiver clauses were "ambiguous;" that is, susceptible to two reasonably alternative interpretations. Under California law the intention of the parties to an ambiguous contractual term is a disputed question of fact for the court[17] making disposition by summary judgment inappropriate. Accordingly, McDonnell Douglas's motions for summary judgment based on the NASA interparty waivers were denied by the Superior Court in both *Appalachian* and *Lexington.* The *Appalachian* case was decided on other grounds and although it was appealed to the California Court of Appeals, McDonnell Douglas did not raise as an issue on that appeal that the Superior Court had erred in ruling as it did on the interparty waiver in the NASA-Western Union LSA.

The *Lexington* case proceeded to a jury trial. At the end of that trial the court heard extrinsic evidence out of the hearing of the jury concerning the parties' intention as to the limited interparty waiver in the NASA-PERUMTEL LSA. The plaintiffs introduced the deposition testimony of Mr. Wojtal. McDonnell Douglas offered the testimony of George Baker, a non-lawyer who had worked at NASA. Mr. Baker testified that in his view the limited interparty waiver barred tort claims against contractors like McDonnell Douglas, but permitted breach of warranty claims against subcontractors like Morton Thiokol. At the conclusion of the trial the court ruled that the interparty waiver provision in the NASA-PERUMTEL LSA did not bar plaintiffs' negligence claims against any of the defendants, nor their breach of express warranty claim against Morton Thiokol. The trial court said:

> The court finds that the LSA, the Launch Services Agreement, between PERUMTEL and NASA is silent as to the right of PERUMTEL to sue its subcontractors or contractors. So, therefore, the interparty waiver provision is not applicable to this lawsuit and, therefore, this affirmative defense would be denied.[18]

This ruling was never appealed by any party.

After the Challenger disaster in January 1986 President Reagan announced that, "NASA will no longer be in the business of launching

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17 In federal court in California and elsewhere such a contested issued of fact is for the jury to decide if a jury trial has been demanded by one of the parties. In state court in California, however, the factual issue of the intention of the parties to an ambiguous contract is decided by the court after hearing testimony relevant to that issue out of the hearing of the jury.

18 Transcript of Record, at 5719.

private satellites."[19] With the privatization of the commercial space launch industry NASA's involvement in satellite launches became limited to NASA's ELV program launches, sometimes referred to as "unlicensed" launches. NASA's present requirement for the inclusion of a "cross-waiver of liability" in NASA's LSAs concerning such launches is found in the regulations at 14 C.F.R. § 1266.104 (1993). This NASA cross-waiver of liability is used for unlicensed launches only. It is inapplicable when the cross-waiver required by the Commercial Space Launch Act[20] is applicable.

2. Commercial Space Launch Act Waivers

The Commercial Space Launch Act ("CSLA"), enacted in 1984 and amended in 1988, is a Congressional attempt to encourage privatization of the commercial space launch industry. It requires the licensing of all private space launch operators, and further requires each license holder[21] to:

> [E]nter into reciprocal waivers of claims with its contractors, subcontractors, and customers, and the contractors and subcontractors of such customers, involved in launch services, under which each party to each such waiver agrees to be responsible for any property damage or loss it sustains or for any personal injury to, death of, or property damage or loss sustained by its own employees resulting from activities carried out under the license.[22]

This cross-waiver provision in the CSLA was raised by Martin Marietta as a defense to a counterclaim filed by the International Telecommunications Satellite Organization ("INTELSAT") in a declaratory judgment action brought by Martin Marietta following the launch failure of an INTELSAT VI satellite on March 14, 1990.[23] On that date the separation system on Martin Marietta's Titan III ELV failed to separate the second stage from the payload. INTELSAT issued commands which separated the satellite from its PKM and the satellite then went into a failed low earth orbit where it was useless as a telecommunications satellite.[24] When

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19 Statement by the President, 22 WEEKLY COMP. PRES. DOC. 1103-04 (Aug. 15, 1986).

20 Pub. L. No. 98-575, 98 Stat. 3055 (1984) (codified as amended at 49 U.S.C. App. §§ 2601 to 2623 (1990)).

21 At present only McDonnell Douglas Corporation, General Dynamics and Martin Marietta are license holders.

22 49 U.S.C. § 2615(a)(1)(C).

23 Martin Marietta Corp. v. INTELSAT, C.A. No. MJG-90-1840 (D. Md.).

24 This INTELSAT VI satellite was "rescued" by NASA astronauts on May 13, 1992, after which it was boosted into geosynchronous orbit, where it is in commercial operation today.

INTELSAT demanded unlimited damages from the manufacturer for the Titan III's failure to perform, Martin Marietta filed an action for declaratory relief in federal court in Baltimore, Maryland, seeking a declaration that INTELSAT's demand for unlimited damages was barred by the cross-waiver provision in the CSLA. INTELSAT counterclaimed for compensatory damages in the amount of "at least $400 million," alleging claims for breach of contract, negligent misrepresentation, negligence and gross negligence.

Martin Marietta filed a motion to dismiss for failure to state a claim,[25] arguing that section 2615(a)(1)(C) of the CSLA, the cross-waiver provision, preempted all state law tort claims brought in connection with a launch service contract and automatically created mandatory reciprocal waivers in all contracts between launch participants, even if those contracts contained no such waivers. The district court rejected that argument, noting that the statute required only that the licensee include cross-waivers in its launch services contracts.[26] Neither party took an appeal from that ruling.

It seems fair to conclude that the manufacturers' arguments that NASA's interparty waivers and the CSLA's cross-waiver provision insulate them from all liability for damages resulting from their malfunctioning products, have not been well received by the courts and are not likely to find favor with them in the future. That conclusion has also been reached by some commentators.[27]

B. *Strict Liability in Tort*

In the *Appalachian* case the insurers sought to recover damages for the launch failure of WESTAR VI from all three of the aerospace manufacturers concerned with the defective PAM-D -- McDonnell Douglas, Morton Thiokol and HITCO -- on a strict liability in tort theory. McDonnell Douglas filed a motion for summary judgment in that case arguing that an exculpatory clause in Article 7 of the contract between Western Union and McDonnell Douglas for the purchase of the PAM-D barred such a claim. That Article said, ". . . under no circumstances will [McDonnell Douglas] be liable to Purchaser under or in connection with this agreement, under any tort, negligence, strict liability, contract or other legal or equitable theory." The two component manufacturers, Morton Thiokol and HITCO, also filed motions for summary judgment in the *Appalachian* case, arguing that Article 14 of the Western Union-McDonnell Douglas Purchase Agreement for the WESTAR VI PAM-D barred all claims against them. Article 14 had been inserted in the PAM-D purchase agreement by Western Union prior to the launch of WESTAR VI in an effort

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25 *See* Fed. R. Civ. P. 12(b)(6).

26 Martin Marietta Corp. v Intelsat, 763 F. Supp. 1327, 1330 (D. Md. 1991).

27 *See, e.g., Wave Goodbye to Cross- Waivers*, SPACE NEWS, Oct. 11-17, 1993, at 15.

to comply with NASA's flow down requirement in the NASA-Western Union LSA. The plaintiffs in *Appalachian* argued to the trial court that under California law, which the court had held to be applicable in the case,[28] strict liability in tort could not be contractually disclaimed.[29] The Supreme Court of California had said in 1965, ". . . strict liability [in tort cannot] be disclaimed, for one purpose of strict liability in tort is to prevent a manufacturer from defining the scope of his responsibility for harm caused by the product."[30] Nonetheless, the trial court in *Appalachian* granted the manufacturers' motions for summary judgment and the plaintiffs appealed.

On appeal the California Court of Appeal for the Fourth District upheld the trial court, finding that the doctrine of strict liability in tort did not apply in this commercial setting.[31] The court said that the underlying purpose of the strict liability in tort doctrine was to provide a remedy for injury to consumers injured by defective products, and that when a lawsuit over a product "arises in a commercial setting and involves only a business loss, the courts hold strict liability theory is not available; the parties are limited to normal commercial remedies (e.g., the Cal. U. Com. Code or their contracts)."[32] The court concluded:

> Since liability for defective products when commercial entities and a business loss are involved is governed by the California Uniform Commercial Code which allows disclaimers of warranties (see Cal. U. Com. Code, § 2316) and by the parties' agreement, liability for defects

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28 All three manufacturers argued to the trial court that federal, not state law, was controlling on the tort issues in the *Appalachian* and *Lexington* cases because it preempted California's law of negligence and strict liability in tort. Morton Thiokol argued that even federal common law was preempted by the Outer Space Treaty, January 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6437, 610 U.N.T.S. 205, which it claimed barred any type of tort claim arising out of accidents occurring in outer space. The trial court rejected all of these arguments, finding that California had a "strong interest in applying California tort laws" because "the manufacturer of the alleged defective product [McDonnell Douglas] resides in California," citing Kasel v. Remington Arms, 24 Cal. App. 3d 71. The court said there had been "an insufficient showing of pervasive reasons to invoke federal common law," citing In re Agent Orange, 635 F.2d 987 (2d Cir. 1980), *cert. denied,* 454 U.S. 1128 (1981), and found that the defendants had "failed to make a sufficient showing of Congressional intent to preempt tort actions involving defective products manufactured by private enterprise which arise in space." Order dated September 8, 1986, case No. 481712, O.C.S.C. None of the defendants challenged any of these rulings on appeal.

29 *See, e.g.,* Seely v. White Motor Co., 63 Cal. 2d 9, 45 Cal. Rptr. 17 (1965); Vandermark v. Ford Motor Co., 61 Cal. 2d 256, 37 Cal. Rptr. 896 (1964).

30 Seely v. White Motor Co., *supra* note 29, at 17.

31 Appalachian Ins. Co. v. McDonnell Douglas Corp., 214 Cal. App. 3d 1, 32, 262 Cal. Rptr. 716, 735 (4th Dist. 1989).

32 *Id.* at 33.

> may be disclaimed; the tort theory of strict liability does not apply and thus does not bar the disclaimer.[33]

It seems likely that the Fourth District's ruling that strict liability in tort will not be available as a legal basis for recovery in commercial disputes between aerospace product users and manufacturers of malfunctioning aerospace products will be followed by other courts in the future.

C. Negligence

In both the *Appalachian* and *Lexington* cases the insurers also sought damages based on the negligence of all three manufacturers in designing, manufacturing and testing the PAM-D, including its STAR 48 SRM and new carbon-carbon involute exit cone, and in negligently failing to warn SRM users of defects in the STAR 48's exit cone. All three defendants moved for summary judgment on the ground that a negligence cause of action did not lie under California law for a loss that was purely "economic" where the product had caused injury only to itself. The plaintiffs argued to the trial court that California law permitted negligence claims in these circumstances.[34]

The courts are divided on the issue of whether damages can be recovered on a negligence theory where the only injury suffered is to the product itself. The leading case holding that recovery is not available in such circumstances is the United States Supreme Court's admiralty decision in *East River S.S. Corp. v. Transamerica Delaval, Inc.*[35] In that case the charterers of supertankers sued the manufacturer of the ships' turbines in negligence to recover damages to repair the ships and for lost income while the ships were out of service after the turbines malfunctioned. The Supreme Court held that there was no recovery in negligence for the damages sought. It said:

> Even when the harm to the product itself occurs through an abrupt, accident-like event, the resulting loss due to repair costs, decreased value, and lost profits is essentially the failure of the purchaser to receive the benefit of its bargain -- traditionally the core concern of contract law.
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> [W]e. . .hold that a manufacturer [of maritime products] in a commercial relationship has no duty under either a negligence or strict products-liability theory to prevent a

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33 *Id.*

34 *See, e.g.*, Ales-Peratis Foods, Int'l, Inc. v. American Can Co., 164 Cal. App. 3d 277, 209 Cal. Rptr. 917 (1985).

35 476 U.S. 858 (1986).

> product from injuring itself. . . . When a product injures only itself the reasons for imposing a tort duty are weak and those for leaving the party to its contractual remedies are strong.[36]

The trial court in the *Appalachian* and *Lexington* cases concluded that California did recognize a cause of action for negligence where the only loss was economic, and denied the defendants' motions to dismiss plaintiffs' negligence claims. On appeal in the *Appalachian* case the Fourth District Court of Appeals never reached this issue.[37] The *Lexington* case proceeded to a jury trial on the issue of negligence. At the close of the evidence the jury deliberated for six days, finally voting ten to two that the defendants were not guilty of negligence. Two jurors found the manufacturers of the PAM-D guilty of negligence.[38]

In the *INTELSAT* case Martin Marietta moved to dismiss INTELSAT's negligence claim on the ground that it failed to state a claim upon which relief could be granted. The district court granted Martin Marietta's motion, holding as a matter of law that Martin Marietta owed no duty of care to INTELSAT under the circumstances.[39] The trial court said:

> Equally sophisticated parties who have the opportunity to allocate risks to third party insurance or among one another should be held to only those duties specified by the agreed upon contractual terms and not to general tort duties imposed by state law.
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> The case before the Court does not present circumstances in which the law creates a tort duty of care independent from the parties' contractual relationship. Such tort duties of care with respect to representations are imposed by courts to protect a peculiarly vulnerable party. . . . No such relationship of special trust exists here.[40]

On appeal to the United States Court of Appeals for the Fourth Circuit this ruling was affirmed and the above-quoted language cited with approval by the court of appeals.[41]

The subject of recovery in negligence for economic loss where the product injures only itself is still an open one, but it would seem prudent for purchasers of malfunctioning aerospace products to expect some courts

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36 *Id.* at 870, 871 (1986).

37 Appalachian Ins. Co. v. McDonnell Douglas Corp., *supra*, note 31, at 36.

38 Under California law a unanimous verdict is not required in a civil case.

39 Martin Marietta Corp. v. INTELSAT, 763 F. Supp. 1327, 1332-33 (D. Md. 1991).

40 *Id.*

41 Martin Marietta v. INTELSAT, 991 F.2d 94, 98 (4th Cir. 1993).

faced with this issue in the future to follow the reasoning of the United States Supreme Court in *East River Steamship*.

D. *Gross Negligence*

In addition to a claim of negligence, INTELSAT alleged in its counterclaim that Martin Marietta was guilty of gross negligence and sought to recover damages based on that theory. Shortly after the failure of its Titan III launch vehicle Martin Marietta had admitted in press releases that the failure of the launch vehicle to separate from its payload was the result of miswiring by its technicians, errors by its software and computer engineers and the lack of coordination between these groups.

Martin Marietta moved to dismiss INTELSAT's gross negligence claim on the ground that it was barred by the cross-waiver provision in the contract between INTELSAT and Martin Marietta for the launch of INTELSAT VI, a provision inserted because of the CSLA. INTELSAT argued to the trial court that under Maryland law, which the parties had agreed would govern, public policy invalidated such waivers as they applied to claims of gross negligence. The trial court found that the legislative history of the 1988 Amendments to the CSLA indicated, "that Congress intended the mandatory waivers to bar recovery in all instances, including cases where parties were grossly negligent."[42] The court said, "[t]he public policy of this country, as stated by Congress, requires that those using the service of a licensed space launch provider do so at their own risk."[43] The trial court continued:

> As mankind ventures forth from the home planet, great hazards, known and as yet unknown, will confront us. Now, and perhaps for as long as the human race seeks to go where it has not gone before, there shall be missions which cannot be "safe" as that term is used in the context of terrestrial activities. Those who seek to explore, and to exploit, outer space must do so charged with acceptance of the unknown, and perhaps unknowable, perils to be faced in that vast and potentially hostile environment.[44]

The Court of Appeals disagreed. It found that Maryland law invalidated contractual waivers of liability in cases of gross negligence, even where the parties were of equal bargaining power. It also found that INTELSAT had "sufficiently alleged gross negligence so as to survive a 12(b)(6) motion."[45] Furthermore, the Fourth Circuit found "absolutely no support" in the legislative history of the 1988 Amendments to the CSLA for

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42 Martin Marietta corp. v. INTELSAT, 763 F. Supp. at 1333.

43 *Id.* at 1334.

44 *Id.*

45 Martin Marietta Corp. v. INTELSAT, 991 F.2d at 100.

the trial court's conclusion that that statute overrode Maryland law.[46] The Court said, ". . . neither the language of the Amendments nor their legislative history reflects a Congressional intent to protect parties from liability for their own gross negligence."[47]

In reinstating INTELSAT's gross negligence claim the Fourth Circuit did little to promote clarity of thought in this area. Most courts consider that gross negligence falls short of a reckless disregard of the consequences and differs from ordinary negligence only in degree, and not in kind.[48] As Dean Prosser has put it:

> The prevailing rule in most situations is that there are no "degrees" of care or negligence, as a matter of law; there are only different amounts of care, as a matter of fact. From this perspective, "gross" negligence is merely the same thing as ordinary negligence, "with the addition," as Baron Rolfe once put it, "of a vituperative epithet."[49]

If gross negligence differs from ordinary negligence only in degree and not in kind; and if a *prima facie* case of ordinary negligence requires "[a] duty, . . . recognized by the law, requiring the person to conform to a certain standard of conduct, for the protection of others against unreasonable risks;"[50] it is difficult to see how the Fourth Circuit could conclude that INTELSAT had alleged a sufficient claim of gross negligence after affirming the trial court's dismissal of INTELSAT's ordinary negligence claim on the ground that Martin Marietta owed INTELSAT no tort duty of care. In any event, the Fourth Circuit's reversal of the trial court's construction of the CSLA seems sound, and aerospace manufacturers should not expect to prevail in the future when arguing that the CSLA reflects a Congressional intent to protect them from liability for their own gross negligence.

E. Negligent Misrepresentation

In 1981 Hughes Aircraft Co. manufactured and sold to Western Union two HS 376 model telecommunications satellites which, in their "long life option" forms, were supposed to have mission lives of ten years between beginning of life ("BOL")[51] and end of life ("EOL").[52] Western

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46 *Id.*

47 *Id.*

48 *See generally,* PROSSER & KEETON, *supra,* note 2, § 34, at 208-14.

49 *Id.* at 211.

50 *Id.* at 164.

51 The beginning of life of a satellite occurs when it is ready to begin commercial service, having arrived "on station" at its assigned location on the

Union launched both satellites in 1982 and they were successfully placed in geosynchronous orbit. Later, Western Union sold some of the twenty-four transponders on board each of the satellites to third parties, while retaining title to the satellites. Public Broadcasting Service ("PBS") purchased four of these "condominium" transponders on board WESTAR IV from Western Union in 1984. In its transponder sales agreement with PBS Western Union warranted that the four transponders each had ten year mission lives, making WESTAR IV's predicted EOL April 5, 1992, ten years after its BOL on April 5, 1982.

In April 1987 Western Union sent letters to its transponder purchasers, including PBS, advising them that its fuel usage calculations showed that both WESTAR IV and V were beginning to use more hydrazine fuel for stationkeeping purposes than was originally budgeted by HUGHES, and that Western Union was now predicting that the EOLs of these satellites would occur approximately nine months earlier than had been previously predicted. Hughes reviewed its fuel usage calculations for those satellites, its telemetry software and fuel thruster efficiency data, and subsequently agreed with Western Union that both WESTAR IV and WESTAR V would run out of hydrazine fuel before the end of their ten year mission lives. Thus advised, PBS purchased additional transponders to cover the shortfall period for its programming. It then sent a letter to Western Union and HUGHES demanding that they jointly pay PBS the sum of $9 million as damages caused by the early EOL of WESTAR IV.

Western Union settled PBS's claim short of litigation, but HUGHES refused to pay PBS. In February 1990 PBS filed suit against Hughes in federal court in Los Angeles seeking damages in the amount of the costs PBS incurred to replace the fifteen months of lost transponder service.[53] In its complaint PBS alleged a claim of negligent misrepresentation, charging that HUGHES had represented in its promotional and advertising materials, which Western Union had used when selling its transponders to PBS, that WESTAR IV had a minimum design, mission and operational life of ten years. PBS alleged that HUGHES knew or should have known that Western Union would use HUGHES's promotional literature when selling transponders to third parties like PBS; that HUGHES lacked reasonable grounds for believing that its representations as to the operational life of WESTAR IV were true; that it was foreseeable that PBS would rely upon Hughes's representations in making its decision to purchase transponders; and that PBS had, in fact, relied on HUGHES's representations in deciding to purchase the transponders. After months of discovery HUGHES filed a

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geosynchronous orbit and having successfully completed its tests and system checks.

52 In 1981 the end of life of a satellite occurred when it ran out of hydrazine fuel, the liquid fuel carried on board the satellite and used during its mission life to fire the thrusters in the satellite's reaction control system ("RCS") to correct the drift of the satellite and keep it "on station."

53 Public Broadcasting Serv. v. Hughes Aircraft Co., C.A. No. 90-0736 WDK (Bx) (C.D. Cal.).

motion for summary judgment. The trial court denied the motion and set the case for jury trial. The case was settled prior to trial and the terms of the settlement were not made public.[54]

INTELSAT also had a claim based on negligent misrepresentation in its counterclaim against Martin Marietta. Martin Marietta filed a motion to dismiss that count for failure to state a claim, arguing that a disclaimer clause in Article 17 of its contract with INTELSAT for launch services barred such a claim. INTELSAT argued to the trial court that this disclaimer clause did not apply to negligent misrepresentations made by Martin Marietta to INTELSAT after execution of the launch services agreement but before the launch of Martin Marietta's Titan III. The trial court agreed with INTELSAT that Martin Marietta was not entitled to a dismissal of the negligent misrepresentation claim based upon the disclaimer clause in Article 17.[55] However, the trial court granted the motion for the same reason it dismissed INTELSAT's claim of ordinary negligence -- that Martin Marietta owed no tort duty of care to INTELSAT in these circumstances.[56]

On appeal the Fourth Circuit affirmed the trial court's dismissal of INTELSAT's negligent misrepresentation claim on the ground that Martin Marietta owed no duty of care to INTELSAT.[57] However, it found that Maryland law did not support INTELSAT's theory that post-contract misrepresentations invalidate contractual limitations on remedies.[58]

F. Breach of Warranty

In contracting with McDonnell Douglas for the development and production of STAR 48 SRMs to be used with McDonnell Douglas's PAMs, seller Morton Thiokol expressly warranted to buyer McDonnell Douglas the performance of its SRMs, including their burn time and the ability of their carbon-carbon exit cones to withstand all thermal and mechanical stresses from ignition to ignition plus 200 seconds. The McDonnell Douglas-Morton

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54 In 1989 Western Union made claims against its in-orbit satellite insurers alleging that both WESTAR IV and WESTAR V had suffered "Insufficient Fuel" as defined in a policy of satellite life insurance having a policy period of three years from October 1, 1981 to October 1, 1984. A group of insurers headed by the Lexington Insurance Company ("the LEXINGTON Group") denied coverage and were sued by Western Union in federal court in New Jersey in 1991. Western Union Corp. v. Lexington Ins. Co., et al., C.A. No. 91-193 (JWB) (D.N.J.). Later, other insurers denied coverage and were joined as defendants in that action. The LEXINGTON Group recently settled its disputes with Western Union (now renamed New Valley Corp.) but the action remains pending as to Western Union's other insurers.

55 Martin Marietta Corp. v. INTELSAT, 763 F. Supp. at 1332.

56 *Id.* at 1333.

57 Martin Marietta Corp. v. INTELSAT, 991 F.2d at 98.

58 *Id.* at 99.

Thiokol contract for STAR 48s stated, "All warranties shall run to MDC, its successors and assigns, *and to its customers and the users of its products"* (emphasis added).

Plaintiffs in the *Appalachian* case, after discovering this warranty, sought to amend their complaint to add a cause of action against Morton Thiokol for breach of an express warranty, alleging that Western Union was a third-party beneficiary of this warranty and that plaintiffs were Western Union's subrogees. The trial court refused to permit plaintiffs to amend their complaint and, after summary judgment was entered in favor of the defendants in *Appalachian* on the basis of the exculpatory clauses and disclaimers in the Western Union-McDonnell Douglas Purchase Agreement for the PAM-D, the insurers appealed this ruling.

The California Court of Appeal for the Fourth District affirmed the trial court's denial of plaintiffs' motion to add a claim for breach of express warranty.[59] The court noted that there was no evidence that Western Union was aware of the warranty in the STAR 48 contract given by Morton Thiokol to McDonnell Douglas and to "the users of its products" at the time Western Union negotiated its contract for the purchase of a PAM-D from McDonnell Douglas. It reasoned that since Appalachian had failed "to show the warranty from Morton Thiokol ever formed a 'part of the basis of the bargain'",[60] there was "no basis for limiting or negating the exculpatory clauses and disclaimers in Western Union's written agreement with McDonnell Douglas."[61]

The Fourth District's analysis in *Appalachian* of plaintiffs' breach of warranty claim is extremely suspect in light of California law concerning third-party beneficiaries. Under California law the warranty given by Morton Thiokol to McDonnell Douglas in the STAR 48 contract expressly made Western Union and other STAR 48 users third-party beneficiaries of that contract.[62] The McDonnell Douglas-Morton Thiokol Star 48 contract created rights in the third-party beneficiary (Western Union) just as it created rights in the two parties to the contract -- the promisor (Morton Thiokol) and the promisee (McDonnell Douglas). Under California law it is not necessary that the beneficiary be identified, for a third party may enforce a contract where he shows that he is a member of a class of persons for whose benefit it was made,[63] and he may enforce it at any time before the parties to the contract rescind it.[64] California cases have long held that a third-party beneficiary of a promise need not be

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59 Appalachian Ins. Co. v. McDonnell Douglas Corp., *supra* note 31, at 737.

60 *Id.* at 737.

61 *Id.*

62 *See* Cal. Civ. Code § 1559.

63 *See* Garratt v. Baker, 5 Cal. 2d 745, 748 (1936).

64 Cal. Civ. Code § 1559.

aware of it, or act in reliance upon it, in order to enforce it later.[65] The promisor is held to his promise because he knew when making the promise that the promisee intended that a benefit be extended to the third party. If an express warranty was given to Western Union as a third-party beneficiary of the McDonnell Douglas-Morton Thiokol STAR 48 contract, the disclaimers in the McDonnell Douglas-Western Union PAM-D contract would be ineffective to bar express warranty claims because of the rule that express warranties take precedence over attempted disclaimers.[66]

In view of this undisputed body of California law it is difficult to understand the reasoning of the Fourth District that Western Union had no claim for breach of express warranty because Appalachian failed to show that the warranty from Morton Thiokol ever formed a part of the basis of the bargain between Western Union and McDonnell Douglas for the purchase of a PAM-D. The requirement of the Uniform Commercial Code that to create an express warranty there must be an "affirmation of fact or promise made by the seller to the buyer which relates to the goods and becomes part of the basis of the bargain"[67] was met because Morton Thiokol's express warranty was a part of the basis of the bargain between McDonnell Douglas and Morton Thiokol for the sale of STAR 48 SRMs.

Because of the flawed analysis of the Fourth District in *Appalachian* concerning breach of warranty, it seems fair to conclude that aerospace manufacturers would not be justified in relying heavily that this ruling will be followed by other courts when dealing with similar breach of express warranty claims. It is interesting to note that, following the *Appalachian* and *Lexington* cases, McDonnell Douglas sued Morton Thiokol in federal court in Los Angeles[68] seeking incidental and consequential damages in the amount of $17,243,000[69] for breach of this same express warranty given by Morton Thiokol to McDonnell Douglas in the STAR 48 contract.

G. Contract

Article 2 of the contract between INTELSAT and Martin Marietta contained a clause stating that Martin Marietta promised "to make its Best Efforts to furnish Launch Services for the purpose of delivering

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65 *See, e.g.*, Johnson v. Holmes Tuttle Lincoln-Mercury, 160 Cal. App. 2d 290, 297 (2d Dist. 1958); Pitzer v. Wedel, 73 Cal. App. 2d 86 (4th Dist. 1948); RESTATEMENT (SECOND) OF CONTRACTS § 306, Comment (a).

66 This rule is codified in California in Cal. U. Com. Code § 2316.

67 Cal. U. Com. Code § 2313(l).

68 McDonnell Douglas Corp. v. Thiokol Corp. and Morton Int'l Inc., C.A. No. 92-4008 WJR (GHK) (C.D. Cal.).

69 These damages include the costs incurred by McDonnell Douglas to investigate the cause of the failures of the WESTAR VI and PALAPA B-2 exit cones, and the "redesign" and retrofit costs incurred. In actual fact, following this double failure McDonnell Douglas returned to using its old, heavier but reliable tape-wrapped carbon phenolic exit cones on the Star 48 SRM.

INTELSAT's payload into orbit." The contract defined "Best Efforts" as "diligently working in a good and workman-like manner as a reasonable, prudent manufacturer of launch vehicles and provider of Launch Services."[70] In its counterclaim INTELSAT alleged that Martin Marietta had breached this provision in the contract. Martin Marietta moved to dismiss the breach of contract claim on the ground that it was barred by Article 6.7 of the contract. That article provided that a replacement launch "shall be the sole and exclusive remedy of the Buyer from Martin Marietta in the event the Titan III mission fails for any reason." Martin Marietta also argued that the Limitation of Liability section contained in Article 17 of the contract, entitled "Allocation of Certain Risks," barred INTELSAT's breach of contract claim. In that article the parties agreed that, "notwithstanding any other provision of this contract," the risks arising out of the launch would be allocated between INTELSAT and Martin Marietta as set forth in Article 17. In Article 17.6, entitled "Limitation of Liability," the parties agreed that Martin Marietta's liability to INTELSAT "whether or not arising under contract, ... shall not include any loss of use or loss of profit or revenue or any other indirect, special, incidental or consequential damages."

The trial court granted Martin Marietta's motion, holding that INTELSAT's breach of contract claim was clearly and unambiguously barred by Article 6.7 (replacement launch as sole remedy for a mission failure), and by Article 17.6 (Limitation of Liability).[71]

On appeal the Fourth Circuit disagreed. It found that the interplay of these two provisions was ambiguous, thus creating a contested issue of fact for the jury as to the intention of the parties concerning remedies for breach of contract.[72] The court said:

> INTELSAT claims that the contract is ambiguous because Article 6.7 states that a replacement launch is INTELSAT's "sole and exclusive" remedy, while the Article 17 "Limitation of Liability" provision puts a damages cap on claims "arising under contract, or in negligence, strict liability, or under any other theory of tort or liability." INTELSAT argues that an Article 6 replacement launch could not be an exclusive remedy when Article 17 recognizes the possibility of other claims, especially when Article 17 stated that it would govern the allocation of risks between the parties "notwithstanding any other provisions of this Contract." At the very least, INTELSAT contends the two articles together create an ambiguity precluding dismissal.
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70 Article 1.2 INTELSAT-Martin Marietta contract.

71 Martin Marietta Corp. v. INTELSAT, 991 F.2d 94, 97 (4th Cir. 1993).

72 *Id.* at 98.

> ... [T]he contract is far from crystal clear and never refers to "pre-launch" or "post-launch" damages or otherwise mandates Martin Marietta's interpretation.
>
> In light of these ambiguities, it does not appear beyond doubt that INTELSAT can prove no set of facts constituting breach of Martin Marietta's contractual duty to use its "Best Efforts," and we must therefore reverse the district court's dismissal of INTELSAT's breach of contract claim. [Citations omitted].[73]

Language such as "the contract is far from crystal clear," and "it does not appear beyond doubt," is unusual in a contract case. However, it seems beyond doubt that the Fourth Circuit was not impressed with Martin Marietta's promise to use its "Best Efforts" in performing the contract, coupled with its argument that it had no liability for breach of contract when it failed to perform in accordance with the contract definition of that phrase, a fact the court had to assume on a motion to dismiss for failure to state a claim. In any event, the *INTELSAT* case has now been settled and it has been reported that the terms of the proposed settlement include the purchase by INTELSAT of additional INTELSAT 8 satellites from Martin Marietta "under an existing contract but with revised conditions."[74]

CONCLUSION

Like MacPherson's decision to file suit against the Buick Motor Company in 1915 in the face of a rule of law hostile to purchasers and users of defective products, some purchasers and users of non-performing aerospace products (and their subrogees) decided to bring claims against the manufacturers of those products in the last eight years. A review of these cases shows that, while the courts have adopted a generally protective attitude towards the aerospace manufacturers, they have not accepted all of the manufacturers' arguments by any means, particularly those that have been overreaching in their attempt to insulate the manufacturers from liability.

In those eight years there have been many momentous changes in the global economy, the world political situation, the views of the public towards expensive and sometimes ineffective space projects and in the attitudes of the purchasers, operators and users of malfunctioning aerospace products towards the manufacturers of those products.

After watching the Shuttle Challenger explode on national television on January 28, 1986 with seven astronauts on board, the nation has never viewed aerospace products and space endeavors in the same way that it did before that date. The report of the Presidential Commission

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73 *Id.* at 97, 98.

74 *See Martin, Intelsat Agree to Settle Launch Suit,* SPACE NEWS, June 14-20, 1993, at 2.

established by President Reagan to investigate the cause of the Challenger accident, commonly known as "the Rogers Commission," did nothing to enhance the reputation of either NASA or aerospace manufacturers.[75]

For unmanned launches of commercial and government satellites during the last eight years the failure rate has remained constant at about fifteen percent.[76] Purchasers and users of satellites and launch services are beginning to show a growing lack of tolerance over this statistic.[77] Failures of aerospace products and launch vehicles during the last two years have received extensive news coverage. For example, General

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75 The Rogers Commission reported in its findings:

> The genesis of the Challenger accident -- the failure of the joint of the right Solid Rocket Motor -- began with decisions made in the design of the joint and in the failure by both Thiokol and NASA's Solid Rocket Booster project office to understand and respond to facts obtained during testing.
> The Commission has concluded that neither Thiokol nor NASA responded adequately to internal warnings about the faulty seal design. Furthermore, Thiokol and NASA did not make a timely attempt to develop and verify a new seal after the initial design was shown to be deficient. Neither organization developed a solution to the unexpected occurrences of O-ring erosion and blow-by even though this problem was experienced frequently during the Shuttle flight history. Instead, Thiokol and NASA management came to accept erosion and blow-by as unavoidable and an acceptable flight risk.

Report to the President by the Presidential Commission on the Space Shuttle Challenger Accident, June 6, 1986, at 148.

76 At an International Space Conference given by the Italian insurance company GENERALI in Rome, Italy on March 11-12, 1993 (hereafter "1993 GENERALI Conference"), David T. Tudge, Vice President and Chief Financial Officer of INTELSAT, reported to conference attendees:

> The risk of failure in bringing new satellites into operation is statistically reasonably constant over the large number of occurrences: one failure in seven being a reasonable approximation. Intelsat's own experience bears this out: with two failures out of 15 Intelsat V/VAS launched and one almost lost Intelsat VI out of the five ordered.

Commercial and Industrial Activities in Space, Insurance Implications, GENERALI Conference, March 11-12, 1993, at 115 (hereafter "1993 GENERALI Report").

77 In his remarks to the conferees at the 1993 GENERALI Conference Frederick M. Bartlett, Vice President, Finance and Administration and Treasurer, TELESAT Canada, said:

> At the last GENERALI conference in September 1991, . . . I concluded that we, the operators, . . . should be more demanding of satellite manufacturers and launching agencies.
> Let's face it, the quality control procedures we have in place within our industry are not producing acceptable results. In my view, a 80-85% success rate is just not good enough. We need better, much better. . . . I am somewhat embarrassed to be associated with an industry that produces a 17-20% failure rate.

1993 GENERALI Report, at 70.

Dynamics has experienced three failures of its Atlas 2 launch vehicles out of nine flights between April 18, 1991 and March 25, 1993, two of them back-to-back.[78] Martin Marietta experienced the failure of one of its Titan 4 launch vehicles and the loss of three of the satellites manufactured by its newly-acquired Astro Space division within two months in late 1993.[79] Furthermore, defense contractors like McDonnell Douglas, which once held a NASA-granted monopoly on the only upper-stage booster that could be used with commercial satellites launched from the Shuttle,[80] no longer enjoy the bargaining power they once wielded.[81] With the end of the Cold War, the breakup of the Soviet Union, Russia's efforts to become a market economy and the entry of the Russians, Chinese and Japanese into the field of launch vehicle services, keen competition is forcing aerospace manufacturers to pay more attention to the reliability of their products.[82]

Based on these and other factors the forecast here is that there will be in the future a slow but steady reallocation of the risk of loss from malfunctioning aerospace products away from the purchaser and user of those products and towards the manufacturers of them. It is predicted that MacPherson's Buick will slowly but steadily sputter forward into the next century.

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78 *See Atlas Rocket Resumes Launches, Deploys DoD Satellite,* SPACE NEWS, July 26-Aug. 1, 1993, at 9.

79 *See* Fixing Rockets and Reputations, WASHINGTON POST, Oct. 26, 1993, at C1.

80 *See* Appalachian Ins. Co., v. McDonnell Douglas Corp., *supra* note 31, at 728, 729.

81 *See McDonnell Douglas Assaulted on All Sides,* WASHINGTON POST, April 25, 1993, at H1.

82 *See GD Works to Repair Atlas' Image,* SPACE NEWS, May 31-June 6, 1993, at 4.