

TRANSPORTATION

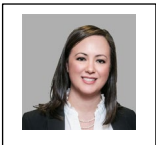
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This article addresses insurance related to space travel, including the types of policies available and the underwriting process.

Your Chance of Getting Hit by Space Junk Is Extremely Low, But Not Zero! (The Current “Universe” of Space Insurance)

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Space insurance has actually existed since 1965, but it has undergone incredible growth in recent decades¹ thanks in part to commercialization/privatization of efforts to launch satellites and other space objects. In 2021, the number of active satellites jumped over 200% from five years prior.² One of the most-pressing concerns a private company or a governmental agency may have in the process is navigating the “space junk” or “space debris” in orbit around the Earth, estimated at over 170 million pieces.³ So far, there has only been 11 instances of partial or total failure related to space debris, but insurers are becoming increasingly concerned about such collisions—this is known as the “**Kessler Effect**.”⁴

In the 1970s, NASA’s Don Kessler anticipated that the low earth orbit (“LEO”) would become so crowded that there would be a “cascade of collisions.”⁵ As a result of this concern, collision coverage may be increasingly hard to offer for insurers.⁶ Even with the Federal Communications Commission’s recent rules ordering companies to take down nonfunctioning

satellites within five years,⁷ it is unclear how to effectively reduce the amount of space debris overall.

Passenger space travel presents another unique concern with which insurers will have to grapple. There are surprisingly few national laws requiring space law insurance coverage for passenger space travel specifically. However, more nations may begin to legislate on space matters, and as a result, insurers will have to navigate their risk tolerance in relation to those laws.

This article discusses the current “universe” of space insurance for all those would-be explorers to space and beyond!

I. Space Insurance Policies

There are four primary types of insurance policies offered on the market, all of which operate separately and cover different risks. Some insurance companies offer combined policies, but most insurance policies operate independently.⁸ Insurance packages typically cover “risk to the rocket, the satellite, and related equipment.”⁹ Normally,

¹ *Id.*

² Noor Zainab Hussain & Carolyn Cohn, *Launching into space? Not so fast. Insurers balk at new coverage*, REUTERS (Sept. 1, 2021), <https://www.reuters.com/lifestyle/science/launchin-g-into-space-not-so-fast-insurers-balk-new-coverage-2021-09-01/>.

³ How do you clean up 170 million pieces of space junk? - Federation of American Scientists (fas.org)

⁴ *Id.*

⁵ *Id.*

⁶ *Id.*

⁷ The FCC Is Finally Taking Space Junk Seriously - Scientific American

⁸ See *Covers for Satellites in Commercial Space Flight*, MUNICH RE, <https://www.munichre.com/en/solutions/for-industry-clients/space-and-satellite-insurance-solutions.html> (“Launch plus Life is the unique combination of launch insurance and in-orbit insurance.”)

⁹ *The Commercial Space Insurance Industry*, Select Committee of the U.S. House of Representatives,

insured entities will obtain policies from a few different parties to better protect themselves in the event that an insurer is unable to pay, what may be an extremely large claim.¹⁰

a. Pre-launch insurance:

Pre-launch insurance covers **material damage** associated with **activities prior to launch** and can be obtained for both the satellite itself and the launch vehicles, including the rocket.¹¹ Typically, it covers transportation of the satellite from the manufacturing location to the launch location, the “launch configuration; integration into the launch vehicle; and all launch preparations.”¹² It generally includes fueling and encapsulation, as well.¹³ This coverage usually ends when satellite ownership by manufacturer terminates and passes to the purchaser.¹⁴ It can, however, be extended up until the point where a “launch can no longer be aborted—often a few seconds after ignition. In such cases, pre-launch insurance covers—if only for a very short time—the risk that the launch vehicle will fail to operate.”¹⁵ There is also an option for “post-abort coverage” where, if

the coverage ended earlier, it could reattach if the launch is aborted.¹⁶

b. Launch insurance:

Launch coverage typically runs from the start of the launch phase until one year after launch and “provides **all-risks coverage** for material damage and malfunctions occurring” during that time frame.¹⁷ All risk coverage is a type of insurance policy that includes any and all risks that the insurance policy does not specifically exclude, so it provides more broad coverage typically.

There may also be available a combination policy of launch insurance and in-orbit insurance that may apply for all phases of a satellite life.¹⁸

c. In-Orbit Insurance:

In-orbit coverage provides an insured with protection in case of **failure while the satellite is in operation**.¹⁹ This coverage is “typically renewed on an annual basis, subject to satellite ‘health’ evaluation by the insurers.”²⁰ It can cover complete or partial failure during the operating phase. The value is agreed upon at the beginning of the

<https://www.govinfo.gov/content/pkg/GPO-CRPT-105hrpt851/pdf/GPO-CRPT-105hrpt851-2-11.pdf>.

¹⁰ Jeanne Suchodolski, *An Overview and Comparison of Aviation and Space Insurance*, 14 J. BUS. & TECH. L. 469, 474 (2019),

<https://digitalcommons.law.umaryland.edu/cgi/viewcontent.cgi?article=1303&context=jbt>.

¹¹ *Id.*

¹² *Id.*

¹³ Suchodolski, *supra* note 10 at 480.

¹⁴ *Covers for Satellites in Commercial Space Flight*, *supra* note 1.

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ *Id.*

¹⁸ Space & Satellite Insurance: Risk Covering from Pre-Launch to Operation in Orbit (beinsure.com)

¹⁹ *Id.*

²⁰ PAMELA L. MEREDITH ET AL., COMMERCIAL SPACE TRANSPORTATION: LIABILITY AND INSURANCE 3 (2009), https://www.mcgill.ca/iasl/files/iasl/Session_7_Meredith.pdf.

satellite's service life, usually based on the replacement value.²¹

Collision with space debris may be the cause of physical destruction or complete inoperability, which would result in a "total loss;" whereas, a partial loss may result if the performance of the satellite becomes impaired for any reason.²² These failures could be due to technical faults, human error, or the space environment itself.

d. Third-Party Liability Insurance:

This type of policy covers **damage to other satellites, terrestrial property, bodily injury** that may occur prior to or during launch, and any **damage to aircraft**.²³ This can also cover any damage to the government-owned launch facilities, revenue loss, service changes, and interruption of services.²⁴ Thus, there is insurance coverage available to purchase for space debris that falls back down to Earth (and isn't burnt up by the atmosphere) and causes damage.

In the United States, in order to obtain a **launch or reentry license**, the law requires the licensee to either obtain liability insurance or demonstrate an independent financial ability to compensate for the "maximum probable loss claims by – (a) a third party for death, bodily injury, or

property damage or loss resulting from an activity carrier out under the license; and the United States Government against a person for damage or loss to Government property resulting from an activity carried out under the license."²⁵ However, the **maximum amount a licensee could be responsible for is \$500 million for third party injury and \$100 million for any damage to Government property**.²⁶ Under this section, the term "**third-party**" does not include any **crew, government astronauts, or space flight participants**.²⁷ In fact, the U.S. requirements include provisions that require "cross waivers" from space flight participants in personal travel aboard commercial spacecraft.²⁸

Few nations actually require space insurance, partially due to the fact that so much of space activity is unregulated.²⁹ In 2019, only 40 countries had laws that either established space agencies or otherwise regulated activity in some manner.

II. Underwriting Process

The process for obtaining and underwriting space insurance policies differs significantly from other areas of insurance. It is a highly technical and individualized process that usually takes more than a year to complete, with most "insurance contracts [being]

²¹ [Space and satellite insurance solutions | Munich Re](#)

²² Space & Satellite Insurance: Risk Covering from Pre-Launch to Operation in Orbit (beinsure.com)

²³ Suchodolski, *supra* note 10 at 480.

²⁴ *The Commercial Space Insurance Industry*, Select Committee of the U.S. House of Representatives,

<https://www.govinfo.gov/content/pkg/GPO-CRPT-105hrpt851/pdf/GPO-CRPT-105hrpt851-2-11.pdf>.

²⁵ 51 U.S.C. § 50914(a).

²⁶ 51 U.S.C. § 50914(a)(3).

²⁷ 51 U.S.C. § 50902(26).

²⁸ Suchodolski, *supra* at 493; 51 U.S.C. § 50914(b)(1)(B)(iii) (2015).

²⁹ Suchdolski, *supra* note 10 at 487.

finalized from six months to three years prior to launch.”³⁰ To start the process, the manufacturer provides detailed information regarding the technical aspects of the satellite and launch equipment, which the client presents to brokers.³¹ The technical information contains “specifics of the launch and satellite operations, coverage for partial or full loss, associated costs, . . . launch service availability . . . the program risks, history of the rocket, modifications, and reasons for using new technology, if any.”³²

Brokers then present this information to underwriters who ask a series of questions involving “communication systems, payload, electrical power systems, attitude control systems, and mechanical systems, including appendage and solar arrays.”³³ If, at any point throughout the process, the manufacturers make a “material change” to plans, they must notify the underwriters. The underwriters then take all of this information into account and submit bids for the insurance package.³⁴ The policies are then negotiated and written, with most of the process happening under NDAs.³⁵

In terms of market share, space insurance makes up “only 0.02% of the entire

insurance market. Due to the small number of insureds, and high severity of losses, the available capacity to underwrite policies fluctuates, usually in response to a recent loss event.”³⁶ Premiums, which take a considerable amount of time to calculate due to the individualized and technical underwriting process, depend on the entire industry.³⁷ “If, as in 2018 and 2019, a series of insured launches fails and those operators submit claims, then the insurance industry will have to raise premiums across the board to offset losses.”³⁸

Space insurance is also often syndicated, meaning that each individual underwriter assumes a percentage of the risk. Approximately 10-15 large companies and 20-30 smaller companies may participate in a given insurance package. Typically, multiple insurance underwriters cover each risk for a fractional share, thereby spreading the risk throughout the global markets.³⁹

Ultimately, part of the difficulty with space insurance is that a policy is being written for a device that cannot be examined if something goes wrong.⁴⁰ Brokers and underwriters conduct extensive examinations and research on the project,

³⁰ *Id.* at 305.

³¹ *Id.* at 304.

³² *Id.*

³³ *Id.*

³⁴ *Id.* at 305.

³⁵ *Id.*

³⁶ Suchdolski, *supra* note 10 at 475.

³⁷ Rachel Zisk, *The Space Insurance Landscape*, PAYLOAD (Oct. 31, 2022), <https://payloadspace.com/the-space-insurance-landscape/>.

³⁸ *Id.*

³⁹ *The Commercial Space Insurance Industry*, Select Committee of the U.S. House of Representatives, <https://www.govinfo.gov/content/pkg/GPO-CRPT-105hrpt851/pdf/GPO-CRPT-105hrpt851-2-11.pdf>.

⁴⁰ *Space Insurance and the New Era of Space Exploration*, GLOBAL AEROSPACE (June 29, 2020), <https://www.global-aero.com/space-insurance-and-the-new-era-of-space-exploration/>.

but when a partial loss occurs parties often have to use a “pre-agreed loss formula in the policy usually relating to the reduced useful life or commercial capability of a satellite.”⁴¹ In reality, though, that pre-agreed formula might not fit the actual loss since they cannot usually inspect it.

III. Self-Insurers

Space insurance accounts for roughly 10% of the total cost associated with projects, third only to satellite acquisition and launch service expenses.⁴² Because of the high costs, many entities opt out of insurance—**48% of satellites in-orbit in 2015 were uninsured.**⁴³

Additionally, entities may opt for launch-only insurance, which is increasingly common with LEO satellite operators. If companies are launching small satellites or they have a lot of satellites in orbit, they may find it redundant to insure everyone and instead just plan for a few to fail.⁴⁴ Ultimately, smaller launches require less financial assistance, which means banks, who tend to favor insurance, are not there to push the entities towards insurance.⁴⁵

IV. Space Liability Convention

It is unsettled law as to who might actually be liable for damages related to space debris. The Convention on International Liability for Damage Caused by Space Objects (i.e. the Space Liability Convention) holds that a company or institution will only be liable for issues caused by its space debris if it was negligent in some way (that caused the loss).⁴⁶ What qualifies as negligence is not defined specifically in the Space Liability Convention.

If space debris belonging to another country were to fall and cause damage or injury to a U.S. citizen, there are diplomatic and international treaties in place that would likely apply to address claims that could be made.⁴⁷ However, leaving “space junk” up there has a greater impact on the operations of government space agencies and commercial operators, which may impact the effectiveness of space operations generally. The insurance market is a key component to mitigating the risks of space operations in a way that enables innovation and the parties’ investments in the effectiveness of such new technology.

⁴¹ *Id.*

⁴² Suchdolski, *supra* note 10 at 476.
<https://www.global-aero.com/space-insurance-and-the-new-era-of-space-exploration/>.

⁴³ *Id.*

⁴⁴ Zisk, *supra* note 37.

⁴⁵ *Id.*

⁴⁶ Liability Convention (<https://www.unoosa.org/>);
Space Law: Liability for Space Debris
(<https://www.aviationdisasterlaw.com/>)

⁴⁷ Space law protects you from falling debris, but there are no legal penalties for leaving junk in orbit (phys.org)

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