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# THE AIR & SPACE LAWYER

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## The Investigation of Domestic Commercial Space Accidents by the United States

By J. Steven Jarreau and Jeanne L. Amy

The commercial space industry in the United States, although still in its infancy, is rapidly establishing itself as a significant part of the domestic economy. Eighty-two orbital space vehicles were launched worldwide in 2013, with nineteen of those vehicles launched from the United States.<sup>1</sup> By 2022, those numbers increased significantly with 182 launches worldwide, seventy-eight of which were from US spaceports.<sup>2</sup> As private-sector spaceflight becomes commercially viable, there's every indication that the launch of orbital vehicles and other spacecraft, accompanied by the risks associated with a burgeoning, innovative industry, will only increase.

"Space is a risky business," according to Aaron Cohen, a former National Aeronautics and Space Administration (NASA) administrator, who "considered every launch a barely controlled explosion."<sup>3</sup> The "rapid unscheduled disassembly"<sup>4</sup> of SpaceX's Starship in April of 2023 is but the latest accident.<sup>5</sup> As expressed by NASA Administrator James E. Webb after the Apollo 1 tragedy in 1967, "we've always known that something like this would happen."<sup>6</sup> As space and rocket technology attempts to keep up with our imagination of reaching for the stars, there will inevitably be future accidents, incidents, and mishaps, as they are often interchangeably characterized. Which federal commission, department, or agency will undertake the accident investigations to determine the probable cause and seek to prevent reoccurrences is a question without a definite answer. Currently, several federal offices have some degree of congressionally mandated and possibly overlapping authority to undertake those investigations, make probable cause determinations,

and, in some cases, propose corrective actions.

Since the inception of space exploration by the United States, space accidents have been investigated by the federal government by several different methods. Understanding the evolution of space accident investigations provides a basis on which we can better appreciate the current landscape of federal agencies that will likely be engaged in future investigations and how the government might improve the fact-finding process.

### An Historical Perspective of Space Accident Investigations

#### *The Apollo 1 Fire*

On January 27, 1967, as Apollo 1 astronauts Virgil I. "Gus" Grissom, Edward H. White, and Roger B. Chaffee were engaged in a launchpad ground test, a flash fire erupted in the command module. All three astronauts perished in the service of their country's space ambitions.

Pursuant to the authority of NASA's Administrator, the Apollo 204 Review Board was established. As set forth in NASA Management Instruction 8621.1 (April 14, 1966), it was "NASA policy to investigate and document the causes of all major mission failures which occur in the conduct of its space and aeronautical activities."<sup>7</sup> The review board, in its report on the accident, noted that there are inherent hazards in America's space program and one of the board's goals was to reduce those to a minimum. The review board consisted of nine individuals, comprised of six senior

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## Chair's Message

### By Abby Bried

Welcome to the first all-digital format of *The Air & Space Lawyer*. We are excited to embrace sustainability and provide a more convenient and accessible reading experience. While we understand that this change may not be everyone's first choice in how they receive *The A&SL*, we believe that there are many advantages of going all-digital:

- **Sustainability:** An all-digital format is reflective of sustainability decisions our clients are facing on a rapidly increasing basis. The Forum will be “greener” because of this decision, and as the aviation and aerospace industries work tirelessly on sustainability, we must do our part, too!
- **Continued membership-rich benefits:** By going digital, we can provide a sustainable and cost-effective publication that still offers the same high-quality scholarly articles by aviation and aerospace law leaders. You will still have access to the latest issue of *The Air & Space Lawyer*, but in a more environmentally friendly and efficient manner. The costs saved on printing hard copies of each issue can be used by the Forum to provide additional membership-rich benefits to its members.
- **Access wherever you go:** With the digital format, you will be able to access the latest issue of *The Air & Space Lawyer* wherever you go. A fully linked PDF of the issue will always be accessible on the Forum's web pages, making it ideal for reading on a laptop, desktop computer, or even a tablet. This means you can stay up to date with the latest developments in air and space law no matter where you are.
- **Timelier experience:** Instead of waiting for the publication to arrive in the mail, the latest issue of *The Air & Space Lawyer* will be emailed to you as soon as it publishes. This ensures a more timely and efficient reading experience, allowing you to stay informed about the latest legal issues and trends in the aviation and aerospace industries.
- **Tailored reading experience:** With more readers accessing each issue online, we will be able to gain valuable insights into the most popular articles. This will enable us to further tailor your reading experience by providing more coverage of similar issues in future publications. By understanding your preferences and interests, we can ensure that each issue of *The Air & Space Lawyer* is relevant and engaging for you.
- **Online engagement and growth:** Going all-digital opens up new opportunities for online engagement and growth within the Forum. By increasing our online presence, we can foster a stronger community and provide additional benefits to our members. This means that your involvement in the Forum will be even more rewarding and impactful.

To ensure that you do not miss a future issue of *The Air & Space Lawyer*, please make sure that your email address on file with the American Bar Association is current. You can confirm this by logging into your profile on the



## Editor's Column

By Jonathon H. Foglia

As I write this column, we are a little more than one month away from the Washington Update Conference, where the Forum comes together each year for lively panel discussions and unparalleled networking opportunities. This year's program includes panels and workshops that cover the waterfront, ranging from legislative, international aviation, environmental/sustainability, cargo, space law, and consumer protection regulatory updates to antitrust developments and a DEI and belonging workshop. Special thanks to our program co-chairs, Stephen Baskin of King & Spalding and Sophie Hayashi of Delta Air Lines, for all their hard work assembling an impressive lineup.

This issue of *The Air & Space Lawyer* is our first in an all-digital environment. Although the format has changed, the Editorial Board remains committed to bringing you superb articles from air and space law practitioners covering topics that are relevant and engaging, to which we now turn.

Our first article is from two trial attorneys in the prestigious Aviation, Space & Admiralty Litigation Section, Torts Branch, Civil Division of the US Department of Justice, J. Steven Jarreau and Jeanne L. Amy, who provide an overview of space accident investigations in the United States. With commercial space transportation's exponential growth projected to continue, their article is timely, informative, and thoughtful.

Our second article is written by Faraz Naqvi and Sengova Kailondo of Hogan Lovells International LLP (UK). Faraz and Sengova analyze the frequently overlooked but critical role that general terms agreements (GTAs) have in aircraft maintenance, repair, and overhaul businesses, and offer our readers, in practical and accessible terms, their international perspective and suggestions for negotiating effective GTAs.

Next, we feature an article from Ryan Payne of Netzer, Krautter & Brown, P.C., which includes a history of civil supersonic air transport, beginning with the introduction of Concorde, and a synopsis of the current regulatory framework, including the Federal Aviation Administration prohibition on overland sonic booms. Ryan offers a fascinating critique of how the law will need to change to facilitate the development and commercially successful deployment of the next generation of civil supersonic aircraft.

Last, but by no means least, we are delighted to feature an interview with Maria Garton, general counsel and corporate secretary for Signature Aviation, which operates one of the world's largest networks of fixed-based operators, from airport locations in the United States, South America, Europe, Africa, and Asia. Before beginning her position at Signature Aviation, Maria held senior legal roles at a number of organizations with aviation interests, including Mubadala Development Company and Strata Manufacturing. Maria offers advice for young attorneys keen to enter the practice of aviation law, reflects on some of the matters she has been entrusted to handle over the course of her distinguished career, and provides a glimpse into her management style for successfully overseeing a team of fifteen legal professionals. We are grateful to Maria for agreeing to the interview and hope that you enjoy reading it.

Finally, please consider writing an article for an upcoming issue of *The Air & Space Lawyer*. This publication is only as good as the willingness of others to contribute content for it. If you are interested in contributing or wish to discuss your ideas for aerospace-related articles, please contact me at [jfoglia@cozen.com](mailto:jfoglia@cozen.com) or our Managing Editor Kathy Yodice at [kathy.yodice@yodice.com](mailto:kathy.yodice@yodice.com).



## An Interview with Maria Garton

General Counsel at Signature Aviation

*Maria Garton has been general counsel at Signature Aviation since August 2018, where she leads a team of attorneys and legal professionals. Garton advises Signature Aviation's executive team on strategic and transactional matters, and is corporate secretary to the board of directors. She leads all mergers and acquisitions from a legal perspective, and fields all contractual, transactional, litigation, and regulatory matters.*

**A&SL: Your legal career has spanned private practice to in-house counsel; tell us about that journey.**

I started out working in project finance at Dewey Ballantine in New York and then at Hogan Lovells in DC. I liked the transactional work and the international aspects of the deals I worked on. While at Hogan, I was asked to go on secondment for six months to a sovereign wealth fund, Mubadala Development Company, in Abu Dhabi, United Arab Emirates (UAE). They had just started an aerospace investment fund and needed a transactional lawyer for six months who could help them put contracts in place. I did not know what to expect and somewhat reluctantly accepted the assignment.

As it turned out, I loved the experience. It was fast-paced and exciting because there is a lot of investment happening in the aerospace industry there. Companies spring up everywhere. And the UAE is a very international place. Close to 90 percent of the people living in the UAE are expats. So it makes for a very eclectic environment where people are accepting of different ways of doing things and constantly learning from each other. As I was working on aerospace contracts, I was learning about the industry from engineers, safety professionals, procurement specialists and others from countries like Austria, Australia, Malaysia, and the UK.

When Mubadala asked me to stay on as general counsel of a new composite aerostructures manufacturing company they were starting up, Strata Manufacturing, which would be making parts for Airbus and Boeing aircraft, I said, "Yes." It was such a great opportunity at the time for me as a young lawyer. I was learning so much and really felt I was making a difference, not only by doing meaningful legal work and learning about an industry that was

new to me at the time, but also by helping to expand the investments of the UAE and train young UAE nationals so they could launch their own careers in their home country. When I first started working with Strata, they had not yet built a facility and were working out of a villa with about 30 people. By the time I left five years later, it had 600 employees and was churning out hundreds of aircraft parts and shipping them to Europe and the US to be put on aircraft being used by airlines across the world, including, at the time, Etihad Airways' new A380 aircraft.

My time at Strata was also rewarding because I was able to establish the legal function and help put best practices in place to minimize risk for the company right from the get-go. Beyond the basic legal work, I was often the first one called to fix problems, including several out of left field, whether it was a fight that broke out in the parking lot or a question from the Crown Prince's office about our operations.

On a personal note, my husband and I welcomed our two children while in the UAE. After about five years in Abu Dhabi, we decided it was time to get back to the US. We moved to Fort Worth, Texas, where I began working at Lockheed Martin Aeronautics. That's where they make the F-16 and F-35 fighter jets. It was a big change to go to a large, US publicly traded government contractor from a small startup in the UAE, and again, I learned a lot. I was focused on global transactions and compliance at Lockheed Martin. That meant I was helping negotiate contracts to sell Lockheed's goods and services to foreign ally governments. I had to be heavily focused on the Foreign Corrupt Practices Act, the UK Bribery Act and other compliance issues. Another big part of the role was to ensure export control considerations were factored into our sales activities. It was very different work but helped me to see another side of the aerospace industry.

**AS&L: How did you come to head the legal office for a leading organization of fixed-based operations at airports around the world?**

I got the call for BBA Aviation (now Signature Aviation) in the summer of 2018 when I was at Lockheed. At the time the company was publicly traded on the London Stock Exchange and had several aerospace/



aviation subsidiaries. The move to Signature was a great step for me, as I was able to apply some of my international experience and join a really dynamic leadership team. Signature also gave me the opportunity to head up a global legal team, with lawyers and other legal professionals handling thousands of contracts and legal issues for hundreds of locations around the world.

**AS&L: You led Signature through a significant transition that must have involved a great deal of legal issues. What was that like?**

Signature has changed quite a lot since I first joined it. Signature has a long history, starting out as an automotive conglomerate in the UK in the early 1900s. It gradually moved into the aviation space by making not only a number of investments in FBOs (fixed based operators), but also aircraft parts manufacturing, landing gear manufacturing, ground handling and MRO work. Over time, Signature sold many of its various holdings. For example, when I joined Signature, in addition to the FBO business, it owned Ontic, a legacy aircraft parts manufacturer, and Dallas Airmotive and H+S Aviation, both engine repair and overhaul companies. We sold Ontic in 2019 and Dallas Airmotive and H+S Aviation in 2021. We kept the FBO and fueling (EPIC Fuels) businesses, as well as Signature TECHNICAir.

In June 2021, Signature was purchased jointly by three private equity investors, Blackstone, Global Infrastructure Partners and Cascade. The take-private transaction was impactful, as it inspired new priorities, ways of working, and investment opportunities. And the process of going from a public company to a private company was of course a heavy lift from a legal perspective. We led the response to the due diligence review conducted by our investors, carefully managing what was disclosed because, under the UK take-private rules, everything divulged to our potential buyers at the time could have been made public if the transaction did not go through. We also supported the regulatory approvals from a competition and foreign direct investment perspective. Thankfully we had a fantastic legal team working on it, both inside the company and outside, and we were able to complete it smoothly, even while in the throes of COVID restrictions. I certainly learned a ton, as did my team.

**A&SL: How are you and your office able to handle the legal issues across continents and time zones?**

The legal department includes not only legal, but also government affairs, insurance, and environmental, and as you can imagine, issues pop up at all hours and from all over the world. We have a lean team of lawyers and other professionals, and we do everything we can to step in for each other and help each other address issues in a timely manner. Most of our team

sits in Orlando, Florida, but we have a few others in DC, Texas, and Arizona, as well as a small legal team of two in London. While we handle almost all of our day-to-day contract drafting and negotiations in-house, we also rely on outside counsel to help provide the best support to our internal clients, especially for very specialized matters like litigation and M&A.

**A&SL: How do you and your team stay in touch?**

I believe communication is crucial to a strong working team. That is why, no matter where we are working from, we have regular check-ins and frequent opportunities to collaborate and help each other navigate issues. We have weekly all-hands calls with our team of 15, where we catch up on our team objectives and key results (OKRs) and generally update each other on major things going on. We also have calls or meetings with subsets of our group, so the corporate and commercial teams can trade ideas, while the litigation team can also catch up, and so forth. Finally, I also have regular one-on-ones with my direct reports and encourage them to do the same with their directs. The way I see it, in-house legal teams can provide the best support to their internal clients if they are plugged into what is happening and see things coming early. I try to do everything I can to relay information internally so we are on the same page, and I encourage my team to do the same.

**A&SL: When did you know that you wanted to be a lawyer and what kind of career did you envision? How did that work out?**

I was not one of those people who always knew they wanted to be a lawyer. I grew up speaking Spanish because my mom is from Spain, and I also moved around quite a bit growing up (to five different cities in Texas, followed by St. Louis, Costa Rica, and Northern Virginia). All of that inspired me to want to work internationally and, if possible, use my language skills in my career. I wasn't sure exactly what I wanted to do, and after finishing high school in Northern Virginia, I attended the McIntire School of Commerce at the University of Virginia, where I was focused on marketing and international business. While in that program, I was required to take a class in commercial law, where I fell in love with the law. I had a fantastic professor who was very practical in explaining how

The move to Signature was a great step for me, as I was able to apply some of my international experience and join a really dynamic leadership team.

basic legal concepts worked in business.

After my commercial law class, I decided that I wanted to go to law school. I think what really intrigued me was getting a glimpse into the framework underpinning how business is carried out. I like to understand how things work, and I pictured myself adding value to a company by helping it navigate the rules and regulations that apply to businesses. I figured there were also plenty of opportunities to help an international company understand and comply with various different laws and regulations in various jurisdictions. I set my aims at working in-house and attended Columbia Law School for my JD because of their strong corporate law program.

**A&SL: Was aviation on your radar, so to speak?**

Aviation was not on my radar. I fell into it because of Mubadala and its investment in the aerospace sector. But now that I'm in it, it feels like a natural fit. It's such an interesting industry for lawyers because it's highly regulated, so it gives us a lot of opportunity to help our clients succeed. It is also by definition international and allows us the opportunity to traverse borders and connect with others in other parts of the world.

**A&SL: What advice would you offer someone considering a career in law or aviation?**

I think the key is to apply yourself fully to what you're doing, but keep an open mind and always strive to treat others kindly and with respect. I could never have predicted my career path, but I was open to say "yes" to new opportunities and challenges when they came through. It was also important to establish and maintain a good reputation. The aviation industry, like many others, is a small one. You will run into people over and over. It's crucial to have high integrity and treat others well; you never know when someone on the other side of a dispute may end up being a potential customer or even a potential employer to you. That means you advocate zealously for your client, but never be a jerk. I like to tell my team to "kill 'em with kindness." I find that much more effective than being unpleasant. Finally, I would say working for an organization that you align with culturally is critical to feeling fulfilled and engaged. At Signature, we embrace the shared values of "Deliver Safety & Excellence," "Be One Team," "Lead

with Trust," and "Shape the Future." It makes for an environment in which each employee can contribute and feel appreciated, which is hugely important to me on a personal level.

**A&SL: What was the last book you read, the last movie you saw, and the last trip you went on?**

Since we've recently moved to Florida with Signature, I am reading *A Land Remembered* by Patrick Smith. A lot of people don't realize that Florida has such a rich history, including having the oldest continuously occupied colonial settlement in the United States in St. Augustine.

My family loves to watch movies together. We are partial to eighties comedies and loved *Overboard*, *Short Circuit*, and of course, *Airplane!*

The last trip we went on was over Thanksgiving. My brother and his family, my sister and her family, and my family rented a house right outside of Charlottesville, Virginia, for a few days. It's beautiful in that part of the country, especially during the fall, and it was really nice because the kids had space to run around outside.

**I like to understand how things work, and I pictured myself adding value to a company by helping it navigate the rules and regulations that apply to businesses.**



# One Giant Leap Backward: The Restriction of Overland Supersonic Aviation

By Ryan A. Payne

*The national objectives of general welfare, economic growth and stability, and security of the United States require the development of transportation policies and programs that contribute to providing fast, safe, efficient, and convenient transportation at the lowest cost consistent with those and other national objectives, including the efficient use and conservation of the resources of the United States.<sup>1</sup>*

The above statement encapsulates the purpose and complexity of the federal government's transportation policy. While it renders the aim of the policy clear, the application of and means to achieve its purpose are significantly muddled—perhaps nowhere more so than in the regulatory structure governing civil supersonic transportation.

The advent of supersonic transportation, namely Concorde, in 1969 heralded the arrival of a new and glimmering aviation age, vast technological improvements (many of which are only now becoming commonplace on new aircraft), and unrivaled speed in civil aviation. Concorde even boasted a sterling safety record until its only fatal accident in 2000.<sup>2</sup> The development imperative of “fast” and “convenient” transportation technology, in the end, however, yielded to an overly broad regulatory structure with a focus on “efficient use and conservation of resources.”<sup>3</sup>

Advances in supersonic transportation came at an incredible financial cost to not only the manufacturing consortium of Concorde, but also the only two nations that would finance and ultimately purchase Concorde, France and Britain. Despite this, Concorde displayed financial viability for the majority of its life span. A tragic accident, rising fuel costs, and the aftermath of the 9/11 terrorist attacks forced the fleet into an early retirement. Since then, an overly broad regulatory structure, which essentially imposes a de facto ban on all civil supersonic air travel by prohibiting the cause of an unwanted effect, rather than the effect itself, has been in place. Meanwhile, technology has advanced to such a degree that the initial unwanted effect has been left in obsolescence. Impediments to

the successful deployment of a new generation of civil supersonic aircraft, therefore, include not only the regulations in 14 C.F.R. part 91 (applicable to all civil aircraft operations in US airspace), but also an outdated and mismatched intellectual property rights structure that rewards second, third, or fourth movers instead of protecting the trailblazer's investment in this technology.

## Concorde

Any discussion of civil, supersonic aviation cannot be had without a brief introduction to, and history of, Concorde. In 1969 Concorde took its first flight, ushering in an unrivaled 27-year era of glamorous, fast, and luxurious jet-setting. “The sense of status, enthusiasm and romance surrounding supersonic airline travel has never stopped.”<sup>4</sup> Concorde represented the culmination of a multibillion-dollar joint venture between Britain and France that gave us aviation technology that is only now, 60 years later, becoming commonplace on aircraft.

The attendant sonic boom (discussed below) prompted most airlines to cancel their purchase options, leaving the Franco-British group with their flag carriers as the only two customers: British Airways and Air France. As this was then-new technology, near hysteria ensued over the intrusive noise. Protests were convened at nearly every major city on Concorde's inaugural press tour. “Drive-ins” attempting to disrupt all passenger travel at New York's John F. Kennedy Airport (JFK) were staged. Some in the scientific-environmental community claimed that emissions at Concorde's flight level would be the proximate cause for the melting of the polar ice caps. A Scottish woman even blamed her unwanted pregnancy on Concorde's supersonic testing, which she claimed interrupted her rhythm method of contraception. However, when Concorde was flown into JFK, it proved to be nowhere near the sonic cataclysm that was feared, silencing the protestors.<sup>5</sup> Nevertheless, because of its sonic boom, Concorde was limited to trans-Atlantic routes between Washington, New York, Paris, and London for the remainder of its active life span.

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Concorde was retired in October 2003, in the wake of a deadly crash three years earlier,<sup>6</sup> and with it ended the period of commercial supersonic flight, the fastest means of traveling the world to date. Though Concorde's tenure was more limited than may other aircraft types, the absence of a replacement is largely due to a regulatory scheme that prevents overland supersonic flight.

### The Problem

The acoustic event that occurs when an object accelerates past the speed of sound is commonly known as the "sonic boom." "Supersonic-capable aircraft passing Mach 1 produce a loud sound called a sonic boom. Thunder-like sonic booms are caused by air

molecules being crowded into shockwaves by an aircraft travelling supersonically. The sonic boom is the 'wake' of the plane's shockwaves combined together, similar to a boat's wake. Double booms are sometimes produced first by shockwaves from the plane's nose and then from its tail."<sup>7</sup> Occasionally, a sonic boom has been severe enough to cause physical damage when

it reaches the ground. It is the single most prohibitive aspect of overland supersonic flight. While this claim is somewhat of an outlier, there have been other legitimate claims leveled at operators and the government. The mere testing of supersonic overland flight in the United States has led to litigation involving takings claims under the theories of trespass, nuisance, and inverse condemnation.<sup>8</sup>

Traditional sonic booms were tested for public reaction in Oklahoma City in 1964 for potential supersonic overflight:

The sonic boom test program at Oklahoma City was designed to determine the public acceptability and the effect on ground structures on booms anticipated from future supersonic transport flights, inasmuch as the projected supersonic transport would travel at faster-than-sound speeds, carrying paying passengers, and fly over people and population centers.<sup>9</sup>

The results did not bode well for the possibility of overland supersonic travel and resulted in several rounds of lawsuits against the federal government, though they were ultimately unsuccessful.<sup>10</sup>

### Concorde's Derivative Technology

Due to the unique operational environment and mission objectives, Concorde was forced to be lighter,

more powerful, more advanced, more luxurious, and faster than any civil aircraft of its time. In designing something so advanced, a virtual treasure trove of derivative technology was introduced, fomented, or completed. Fly-by-wire control surfaces transmitted pilot inputs electronically to hydraulically operated control surfaces that could operate at speeds in excess of Mach 2. Computer-controlled air intakes that could decelerate air from 1,000 mph to zero mph within the span of 14 feet were the first of their kind within the industry. Advanced braking technology, engine management, and in-flight entertainment are only a few of the advancements brought about by the supersonic efforts of the 1960s. For example, the first fly-by-wire aircraft system, created in the 1960s, is now incorporated into modern, clean-sheet designs.<sup>11</sup>

The disincentive to aggressively invest in research of these technologies due to the absence of standard-setting regulations and the moratorium on supersonic overland flight has impeded advances. Such regulatory decisions may have long-term, adverse technological, political, and social impacts for the United States.

### Federal Policy

Federal law controls the pace at which aviation technology is implemented. Well-established policy encourages innovation in air travel for private, commercial, and military aims. Yet environmental concerns, addressing counterbalancing policy, have at times slowed progress and, in reality, America's prominence in the development of cutting-edge jet technology. The law as it has developed is in tension with clearly stated federal policy goals, as well as commonsense and commercial goals.

The regulatory ban on civil supersonic flights over land is contradicted by a national policy to develop increasingly fast and efficient aircraft—a policy statutorily expressed by Congress:

"The national objectives of . . . the United States require the development of transportation policies and programs that contribute to providing fast, . . . efficient, and convenient transportation."<sup>12</sup> The statute continues by stating that the purpose of the "Department of Transportation is necessary in the public interest and to— . . . make easier the development and improvement of coordinated transportation service to be provided by private enterprise to the greatest extent feasible; . . . [and] stimulate technological advances in transportation, through research and development. . . ."<sup>13</sup>

Over the years, presidential administrations similarly have emphasized policies encouraging the development of supersonic flight to ensure speed and efficiency for both civilian and military purposes. For

The law as it has developed is in tension with clearly stated federal policy goals, as well as commonsense and commercial goals.



example, during an address to graduates of the US Air Force Academy delivered early on in the Jet Age, President John F. Kennedy remarked as follows:

I am announcing today that the United States will commit itself to an important new program in civilian aviation. Civilian aviation, long both the beneficiary and the benefactor of military aviation, is of necessity equally dynamic. Neither the economics nor the politics of international air competition permits us to stand still in this area. Today the challenging new frontier in commercial aviation and in military aviation is a frontier already crossed by the military-supersonic flight.

[It] is my judgment that this Government should immediately commence a new program in partnership with private industry to develop at the earliest practical date the prototype of a commercially successful supersonic transport superior to that being built in any other country of the world.<sup>14</sup>

Sixty years later, however, the United States has yet to produce a viable supersonic transport, despite the advancements in engineering and technology witnessed by the past decades. Additionally, five years after Kennedy's address at the Air Force Academy, President Lyndon B. Johnson signed into law a congressional amendment to the Federal Aviation Act of 1958, giving unilateral authority to the Federal Aviation Administration (FAA) to ban overland supersonic flight. Additional regulatory complexity was added when the statute was further amended to require US Environmental Protection Agency (EPA) consultation before FAA issuance of regulations regarding sonic booms, and to provide the EPA with joint authority for proposing such regulations.<sup>15</sup>

In March 1973, the FAA issued regulations banning overland civilian supersonic operations in US airspace. This regulatory death knell was written into the Code of Federal Regulations:

(a) No person may operate a civil aircraft in the United States at a true flight Mach number greater than 1 except in compliance with conditions and limitations in an authorization to exceed Mach 1 issued to the operator in accordance with § 91.818.

(b) In addition, no person may operate a civil aircraft for which the maximum operating limit speed MMO exceeds a Mach number of 1, to or from an airport in the United States, unless—

(1) Information available to the flight crew

includes flight limitations that ensure that flights entering or leaving the United States will not cause a sonic boom to reach the surface within the United States; and

(2) The operator complies with the flight limitations prescribed in paragraph (b)(1) of this section or complies with conditions and limitations in an authorization to exceed Mach 1 issued in accordance with § 91.818.

14 C.F.R. § 91.817. Thus, no civil supersonic aircraft have flown in the United States since Concorde; and even when Concorde did operate in US airspace, it was prohibited from producing sonic booms over land.

The FAA's prioritization of noise abatement and environmental issues over supersonic flight was again reiterated in its October 16, 2008, Statement of Policy, which stated "that any future supersonic airplane [may] produce no greater noise impact on a community than a subsonic airplane."<sup>16</sup> The 2008 Policy Statement further stated, "Public involvement will be essential in defining an acceptable sonic boom requirement, and public participation would be part of any potential rulemaking process."<sup>17</sup>

The 2008 Policy Statement was nevertheless careful to note a change from the 1973 ban on supersonic flight over land. It noted the noise levels for certification of aircraft were modified in 1994 and in 2005, underscoring the federal government's ability to evolve on the issue of noise abatement.<sup>18</sup>

Nevertheless, existing regulations, especially part 91 in title 14 of the *Code of Federal Regulations*, continue to inhibit the reality of future supersonic flight.<sup>19</sup> The regulations further discourage private companies (with a few notable exceptions discussed below) from moving forward with research, due to a perception that such investment is unlikely to result in a successful process to gain authorization for supersonic overland flight. This process acts as a *de facto* prohibition in addition to the regulatory prohibition. Under the regulatory scheme, even an overland flight with an imperceptible and trivial sonic boom signature (a reality today due to technological advancements) is currently banned, even though such a flight has no adverse impact on persons below or to the environment.

In 2021, part 91 was amended by a final rule titled "Special Flight Authorizations for Supersonic Aircraft." The change was largely organizational in nature; it simply moved Appendix B to the body of the regulation in part 91. One notable change, however, was the addition of noise testing as a stated basis for obtaining permission for supersonic flight. Nevertheless, the *de minimis* impact of the 2021 changes is reiterated within the rule itself, which states, "This rule does not

introduce any new FAA policy or change the intent of the original application process” for supersonic flight. “Neither this final rule nor the part 36 noise limit . . . alters the general prohibition on supersonic flight over land. . . .”<sup>20</sup>

### State Regulation

Airport noise is controlled by a curious mix of local and federal interests. For example, a local regulation prohibiting the wholesale operation of jet aircraft at an airport for noise concerns was deemed unconstitutional under the equal protection clause in *Santa Monica Airport Ass’n v. Santa Monica*.<sup>21</sup> However, in that same case, regulations restricting jet aircraft at certain times and under specific circumstances were deemed valid on appeal—the aviation equivalent of a time, place, and manner regulation.

The issues with Concorde’s landing and takeoff profile and potential noncompliance with local regulations at JFK and Dulles were easily overcome by manipulating glide and approach paths and through pilot skill. While airport noise control must necessarily be part of any supersonic flight discussion, it is more easily overcome by planning. Additionally, technological advancements, such as the variable cycle engine, will greatly diminish local noise.<sup>22</sup>

In *British Airways Board v. Port Authority of New York & New Jersey*,<sup>23</sup> a suit brought about by Concorde’s operation into New York’s JFK and that predated Airport Noise and Capacity Act of 1990 (ANCA)(discussed below), the US Court of Appeals for the Second Circuit observed that “both the vital importance of the aviation industry to the national economy and basic considerations of fairness . . . require[] that even the appearance of whim and caprice be eliminated from critical decisions concerning airport access.”<sup>24</sup> The court went on to explain:

If ever there was a case in which a major technological advance was in imminent danger of being studied into obsolescence, this is it. There comes a time when relegating the solution of an issue to the indefinite future can so sap petitioners of hope and resources that a failure to resolve the issue within a reasonable period is tantamount to refusing to address it at all.<sup>25</sup>

The appeals court affirmed the district court’s order enjoining any prohibition of Concorde operations at JFK. It did, however, encourage promulgation of “reasonable, nonarbitrary, and nondiscriminatory noise regulation that all aircraft are afforded an equal opportunity to meet.”<sup>26</sup>

Following the passage of ANCA, airport noise and access restrictions are subject to a robust federal regulatory scheme set forth at 14 C.F.R. part 161, with the FAA charged with determining whether such

restrictions are permissible under ANCA. Nevertheless, equal protection and commerce clause considerations, which proved central to the decisions in *Santa Monica Airport Ass’n* and *British Airways Board*, are readily apparent in ANCA and its implementing regulations at part 161. Although ANCA brought greater predictability and uniformity to disputes based on airport noise and access restrictions, the law did not alter the regulatory scheme applicable to supersonic aircraft. Indeed, Concorde continued operations to and from the US for nearly 13 years after the passage of ANCA, during which time the aircraft produced sonic boom while over the ocean only, and not land. Regardless, any future local attempts to limit airport access for supersonic aircraft specifically would, in all likelihood, be prohibited under ANCA and part 161.

### More Sonic—Less Boom

The current scientific context in which the regulatory ban exists is quite changed from that of over a half century ago when Concorde was being developed and first flew. Advancements in avionics, computer-aided design, and aerodynamic engineering have greatly diminished the drawbacks of supersonic travel, including the sonic boom. We have the engineering technology to begin a new era of quiet, supersonic flight.

For example, a partnership between Gulfstream Aerospace Corporation and the National Aeronautics and Space Administration (NASA) has made significant gains in the suppression of sonic shock waves. This patented technology, called Quiet Spike, utilizes “a multi-segmented articulating boom that, when fully extended from the nose of a supersonic low-boom shaped aircraft, is expected to reduce the effects of sonic booms.”<sup>27</sup> The retractable boom on the front of the aircraft is used to disrupt the standard sonic shock wave and produce a much-diminished noise signature. In supersonic testing, the Quiet Spike resulted in a more rounded pressure waves that resulted in a softer sound which is 10,000 times quieter than Concorde.<sup>28</sup> The vast regulatory criteria in this undertaking are described as a main reason for the Quiet Spike venture:

These tests are just a few in a series of activities which must be undertaken to prove to numerous regulatory agencies and environmental groups, both at home and abroad, that supersonic flight over land is achievable in a way that will significantly reduce the impact of the sonic boom on people and on the environment. It is only one step, but a very important step, for all of us.<sup>29</sup>

Boom Supersonic’s Overture platform is likely the next bearer of the passenger supersonic mantle. It has proven to be the most viable, even garnering orders

from United Airlines, American Airlines, and Japan Airlines. However, under the current regulatory regime, even the Overture, like Concorde, will be relegated to overseas routes, at least at supersonic speeds.<sup>30</sup>

Additionally, advances in computer-aided design (CAD) have completely redefined the “clean-sheet” design process from that which was available during Concorde’s design years in the 1960s. This is evident in aircraft that easily cruise just below the speed of sound as well as sonic experiments such as NASA’s Shaped Sonic Boom Demonstration. In this experiment, the shape of the fuselage of the supersonic aircraft was subtly manipulated to shape the accompanying sonic boom. This resulted in an extreme reduction in sonic boom perception.

Without a change in the regulation that bans civil supersonic flight over land, though, the market value of any supersonic civil aircraft design is diminished by the operational constraints.

### **Economic Impediments to Further Advances**

Given achievements in the field of nonintrusive supersonic technology and the promise of future technological advances, why is overland supersonic flight not a reality? Why has no entity, public or private, undertaken to gain FAA authorization under part 91?

The answer lies in the regulatory process for gaining supersonic overland flight permissions, which is time intensive and costly, with no guarantee of approval. These regulations stand as a constructive prohibition by limiting the first-mover advantages of a firm undertaking the authorization process. “Even if a particular company thinks that it can persuade Congress to change the rules, subsequent entrants may be able to free ride on that benefit.”<sup>31</sup>

The lack of protection via patents or other intellectual or legal mechanisms for the first mover further inhibits market entry. The technology of supersonic travel is not only prolific but it is obvious, rendering it difficult to protect under traditional intellectual property rules. There is an element of “social usefulness” that is being ignored by the regulatory and de facto bans on overland supersonic travel. This “orphan business model” is further explained:

Orphan business models may also merit property rights protection where the principal obstacle to development is that government regulation may impede progress. To succeed both technologically and legally, the prospective developer of a jet design that would reduce sonic booms must persuade Congress or the Federal Aviation Administration to permit certain types of supersonic jet aircraft. The problem is that given such success, other jet designers may invent other forms of sonic boom reduction technology and free ride on the lobbying effort of the first manufacturer.<sup>32</sup>

Gulfstream owns a patent on its Quiet Spike. However, its executives say that “[i]n order to make the market viable for supersonics you have to make it feasible to fly overland faster than sound—which is currently against the law. We don’t think there is a viable market until you change [the law].”<sup>33</sup> Gulfstream, and likely other similarly situated companies, are reluctant to expend the vast amounts of money and time, in addition to research and development, on lobbying and testing to receive authorization for overland supersonic travel.<sup>34</sup>

### **First-Mover Advantage Protections**

This “social inefficiency” must be mitigated by some kind of intellectual property scheme that preserves and protects the first-mover advantages earned by any such authorization. One such approach could be granting an exclusive right to sell supersonic aircraft for a specific amount of time to the first mover.<sup>35</sup> Another would be a wholesale government initiative, specifically targeted to encourage and reward supersonic advances. Third, a consortium (similar to that behind Concorde) may prove effective to overcome the regulatory barriers. These comport with Congress’s statutory directive to the US Department of Transportation (including the FAA) to “stimulate technological advances in transportation, through research and development or otherwise,” and ease “the development and improvement of coordinated transportation service to be provided by private enterprise to the greatest extent feasible.”<sup>36</sup>

### **Conclusion**

In the words of Gulfstream’s senior vice president,

The regulation was rightfully initiated as a reaction to the potential dramatically increased noise levels due to sonic booms. However, since then, advances in technology have enabled us to produce aircraft that are much quieter. We believe it is time to consider reviewing and amending the regulations to ensure they reflect current technologies, which have brought us to the threshold of revolutionizing aviation as we know it today.<sup>37</sup>

Though the prohibition on supersonic travel once justifiably was used for noise abatement, the advancements in technology and research surrounding shaped sonic booms have rendered the prohibition unnecessary. The complex web of FAA and EPA restrictions and other requirements exponentially increases the barrier to entry for any manufacturer wishing to invest in the research and development of a supersonic aircraft. This already high barrier is exacerbated by the lack of an intellectual property structure that would protect the first mover instead of incentivizing subsequent movers into the market.

Famed petrolhead and provocateur Jeremy Clarkson famously lamented:

Now Concorde is grounded, it becomes a museum piece like no other. Because, unlike steam trains or Ford Mustangs, there is nothing that has superseded it. We're not looking at Concorde as an example of outdated technology. It is still at the cutting edge. Losing it has been one giant leap backwards for mankind.<sup>38</sup>

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17. *Id.*
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19. 14 C.F.R. § 91.817 (Lexis Advance through the Jan. 17, 2024, issue of the *Federal Register*, with the exception of the amendments appearing at 89 Fed. Reg. 3026).
20. 86 Fed. Reg. 3782, 3783 (Jan. 15, 2021).
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## Focus on General Terms Agreements

By Faraz Naqvi and Sengova Kailondo



An airframe or engine general terms agreement (GTA) is an umbrella term for any agreement between (a) an entity that has an interest in an airframe or engine (for example, an airline or a lessor) and (b) a maintenance and repair organization (MRO), in relation to the MRO's provision of

certain services in respect to such airframe or engine. The types of services that GTAs cover are diverse and can range from airframe maintenance, to engine overhaul, to flight-testing and even fuel-related services. This article focuses on MRO-type services.

### Why are GTAs of vital importance these days?

Imagine a scenario where the technical team of an aircraft leasing company receives an email late Friday in relation to the entry by the company into an engine GTA. The context is that an aircraft is coming off lease with an unserviceable engine—and that engine needs to be inducted with the MRO by the following Monday to ensure it is repaired in time for onward lease to a new airline customer. The MRO sent the technical team a “standard” agreement for signing only, informing them no changes are allowed “for us to get this done by Monday.” The technical team assumes the GTA is nonnegotiable, and with a view toward not losing the induction slot with the MRO, the agreement is signed as is. Fast-forward six months and it is clear that the MRO negligently repaired the engine and the airline customer is required to ground the aircraft. As a matter of urgency, the technical team now sends a copy of the engine GTA to you as in-house legal counsel for review so you can advise on the company's legal options. Following your review of the GTA, it is unfortunately clear that the warranty clauses in the GTA are very limited, the warranty claim process is subject to the full discretion of the MRO, and you can only litigate the GTA in the local courts of the MRO's jurisdiction.

The reality is that many airlines and lessors primarily focus their attention on their aircraft financing, leasing, and sale documentation and tend to devote less attention to GTAs. GTAs come in various forms (from one-pagers to long-form documents), and it can be tempting to simply execute these GTAs in the

form provided by an MRO to save time and money, as in the example above, but doing so does not often achieve the desired results.

Moreover, the post-COVID, high-inflation landscape has impacted MROs disproportionately. The aviation industry is not immune to the supply chain issues and labor and materials shortages that plague the wider economy and, as a result, MROs are claiming excusable delays like never before. In addition, recent manufacturing defects have significantly disrupted entire aircraft or engine types, creating significant pressure on the relevant manufacturers and their approved MRO network. Such events have prompted customers to review exclusivity arrangements through a new lens, recognizing that delays need to be managed actively to return aircraft to revenue-generating service as soon as possible. All the while, prices have been consistently escalating and without well-negotiated caps and collars, longer-term GTAs could result in expensive, unplanned costs and prove to be even more disruptive to business.

Well-negotiated GTAs can address lessons learned in the past, but, crucially, they can also have an eye on the landscape that customers will find themselves in for years to come. GTAs can have high-value implications and are the most likely source for disputes and litigation. Well-drafted GTAs are therefore vital for avoiding issues in the future and preventing any negative impact on an airline's or lessor's business.

### The Five Ws for Negotiating GTAs

So, how can you protect your business or client when entering into a GTA? You should ask and be able to answer the following questions that begin with five crucial “Ws”:

1. *Who*: Who are you contracting with? Check whether the party entering into the contract is one who has the expertise and credit standing to perform its obligations, rather than, for example, a local subsidiary that may not provide the same warranty coverage as its more established parent.

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2. *What*: What is being contracted for? Ensure that the scope of the services is clearly defined and there is clarity on the performance required from the MRO.
3. *Where*: Where are the services to be performed? Determining the location of the services is key, especially if you need to exercise inspection rights or arrange a ferry flight to resolve warranty claims, for example.
4. *When*: When are the services to be performed? Consider the slot or induction obligations and the relevant timing considerations for when the services need to be completed by; and
5. *Why*: Why do you need a GTA? Check whether having the work performed by the MRO under a GTA is necessary or whether the relevant work can be managed through a lessee or buyer as a predelivery or postdelivery obligation.

### Key GTA Clauses

Though forms of GTAs can vary wildly, there are certain clauses you should look out for or request to insert when negotiating GTAs. The below is not an exhaustive list but is intended as a useful prompt:

- *Standard of work*: The GTA should expressly state an objective standard of service that the MRO must comply with, especially as this will support the standard of care in relation to a potential negligence claim should the work not progress as hoped.
- *Quality of materials*: If products are being supplied, a specific description of the type and quality of such products should be detailed in the GTA; do not forget to include restrictions on PMA (Parts Manufacturer Approval) parts and DER (Designated Engineering Representative) repairs, if needed.
- *Staged payments*: Usually, GTAs that cover extended maintenance require payment following the completion of certain milestones, so ensure that you have a degree of control in determining when the relevant milestone has been achieved and the ability to dispute payments without the MRO being entitled to suspend its work.
- *Repairer's lien*: Many legal systems, including English and New York law, will impose a repairer's lien on an aircraft for unpaid amounts; ensure that the MRO cannot extend these rights beyond the affected aircraft to the rest of your fleet.
- *Warranty*: The warranty clauses should be connected to the standard of work expected (i.e., you can claim under the warranties if the relevant standard is not complied with) and the

process for bringing a warranty claim should be clearly set out.

- *Exclusion of liability*: English and New York courts will generally enforce a limitation of liability clause in favor of an MRO, so you should not agree to any provision that limits claims against an MRO for its negligence or willful misconduct.
- *Indemnity*: Ensure that the indemnity granted by the MRO in your favor is not unduly limited and that you are not being asked to indemnify the MRO in circumstances that are not appropriate.
- *Insurances*: Ask the MRO for copies of the MRO's insurance policies in relation to hangar keepers and product liability coverage at levels acceptable to you so you have the relevant information should you ever need to rely on their insurances.
- *Intellectual property (IP)*: If IP rights will arise in the provision of services by the MRO, ensure that these IP rights relating to the aircraft are assigned or transferred to you or, if not capable of being transferred, that you and the relevant operator are licensed to use such IP rights for operation and ownership purposes.
- *Delays*: Distinguish between excusable and inexcusable delays and include an express resolution process to identify and notify the occurrence of a delay and to mitigate the effect of delay events. As an MRO's timely completion of services can often be the gating item to a lessor delivering an aircraft to a lessee or the return of an aircraft to revenue service, it is important to ensure that there are clear contractual terms in place with the MRO to limit the impact of any delay.
- *Subcontracting*: MROs often require the ability to subcontract their services to third parties. While this may be reasonable for specialist repairs, ask yourself where your equipment will be and what coverage you have if the repair by the subcontractor does not go according to plan.
- *Sanctions, anti-bribery, and corruption*: Ensure that there are protections in place that require compliance by the MRO and allow you to terminate the GTA if a breach occurs.
- *Governing law and jurisdiction*: Ensure that the chosen governing law and the forum for resolving disputes enable the parties' rights to be determined with clarity and disputes to be settled efficiently and without undue expense.

Though there are other points to consider, the above should provide a helpful checklist when reviewing any GTA and be a reminder of the provisions you should expect to see.

Clients and internal teams (including commercial

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## Investigation of Domestic Commercial Space Accidents

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NASA officials, one academic from Cornell University, one high-ranking Air Force officer, and one representative of the prime contractor of the Apollo command module.

*Space Shuttle Challenger: The Rogers Commission* Seventy-three seconds after the liftoff of the Space Shuttle Challenger on January 28, 1986, an O-ring on one of the orbiter's solid fuel rockets failed, causing the external fuel tank to explode and the Challenger to break apart, resulting in the death of all seven crew members aboard. In accordance with the authority granted the President by the Federal Advisory Committee Act,<sup>8</sup> the Presidential Commission on the Space Shuttle Challenger Accident (Rogers Commission) was established by Executive Order 12546 (Feb. 3, 1986).

The commission, chaired by William P. Rogers, a former Secretary of State and Attorney General, was similar to the Apollo 204 Review Board in that it was ad hoc. The Rogers Commission also included Neil Armstrong, the Commander of Apollo 11 and the first person to walk on the moon; Brigadier General Chuck Yeager, the first person to break the sound barrier; Dr. Sally Ride, the first American woman in space, who had previously flown on the Challenger; a private-sector physicist and member of the President's Foreign Intelligence Advisory Board; an aerospace engineer and recipient of NASA's Distinguished Public Service Medal; professors in the fields of physics and aeronautics from Stanford University, the Massachusetts Institute of Technology, and the California Institute of Technology, one of whom was a Nobel Prize recipient; an aviation and space journalist; an attorney and son of former Secretary of State Dean Acheson; and an Air Force Major General who was the Director of the Air Force Space Systems and Command, Control and Communications and had previously managed the Department of Defense space shuttle program. Although NASA had a Contingency Action Plan in place to undertake the investigation, that plan was ultimately never initiated as NASA correctly anticipated and awaited the establishment of the commission.

The Rogers Commission concluded that the loss of the Space Shuttle Challenger was "an accident rooted in history," as both NASA and its contractor, Morton Thiokol, had been aware of the O-ring design flaw for many years.<sup>9</sup> The commission offered nine recommendations, which included addressing the shuttle's launch decision-making process.

*Space Shuttle Columbia Accident Investigation Board* On February 1, 2003, eighty-two seconds after liftoff of the Space Shuttle Columbia, foam insulation from

an area where the external fuel tank attaches to the shuttle broke free and struck the leading edge of the left wing of the shuttle. Upon striking the wing, the foam breached the orbiter's thermal protection system. Sixteen minutes before touchdown, as the shuttle reentered Earth's atmosphere traveling at Mach 2.46, superheated air penetrated the wing, causing it to fail and the shuttle to break up, resulting in the death of all seven astronauts onboard.

In response to the tragedy, NASA established the Columbia Accident Investigation Board (CAIB).<sup>10</sup> The CAIB undertook its investigation from the perspective that "complex systems almost always fail in complex ways" and that it would be incorrect "to reduce the complexities and weaknesses associated with these systems to some simple explanation."<sup>11</sup> The CAIB looked beyond investigating the cause of the Columbia accident and examined NASA's space shuttle operations, the agency's organizational history and shuttle safety practices, and the impact of public expectations and national policymaking.

Similar to the Apollo 204 Review Board and the Rogers Commission, the CAIB was an ad hoc investigative body. The board's thirteen members were appointed by the NASA Administrator. The CAIB included active and retired members of the military, employees of NASA and the Federal Aviation Administration (FAA), academics, and representatives of private industry. It was supported by approximately 120 staff investigators and 400 NASA engineers.

**Sixteen minutes before touchdown, as the shuttle reentered Earth's atmosphere traveling at Mach 2.46, superheated air penetrated the wing, causing it to fail and the shuttle to break up, resulting in the death of all seven astronauts.**

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*Scaled Composites' SpaceShip Two Break Up*  
SpaceShip Two, permitted by the FAA Office of Commercial Space Transportation as an experimental vehicle, was designed to be a reusable, suborbital space tourism craft. It was carried to its release altitude of about 46,400 feet by Scaled Composites' White Knight Two, a four-engine aircraft. SpaceShip Two broke up on October 31, 2014, during a rocket-powered test flight after release from its launch aircraft.

The National Transportation Safety Board (NTSB) investigated the SpaceShip Two accident. According to the NTSB, its authority to investigate the SpaceShip Two accident derived from 49 U.S.C. § 1131(a)(1)(F), granting it the general authority to investigate, establish facts and circumstances, and make probable causes determinations regarding transportation accidents. The NTSB, in Appendix A to its report on the accident, devoted considerable discussion to addressing the basis of and support for its authority to conduct the SpaceShip Two investigation.<sup>12</sup>

#### **Federal Investigation of Future Space Accidents**

Although President John F. Kennedy's objective of landing an American on the Moon and safely returning the astronaut was achieved more than fifty years ago, the means of human space travel is still very much in its early developmen-

tal phase. As a result, it is realistic to anticipate that as more powerful space transportation vehicles are developed, even by some of the brightest engineers and scientists, accidents will happen.

When future accidents occur, which federal commission, department, or agency, or which combination, will lead or participate in the investigation? The answer is far from straightforward. No single federal entity appears to have exclusive jurisdiction to investigate commercial space accidents. Congress should consider a better way to investigate the root causes of future commercial space incidents. A more effective investigative process would better serve the country and the domestic space industry.

#### *Human Space Flight Independent Investigation Commission: Presidential Commissions Round II*

The presidential commission that investigated the Space Shuttle Challenger accident, as addressed above, was established by executive order pursuant to the Federal Advisory Committee Act. Today, pursuant to statutory authority,

[t]he president shall establish an independent, nonpartisan Commission within the executive branch to investigate any incident that results in the loss of— . . . (3) any orbital or suborbital space vehicle carrying humans that is—(A) owned by the Federal Government; or (B) being used pursuant to a contract or Space Agreement Act with the Federal Government for carrying a government astronaut or a researcher funded by the Federal Government; or (4) a crew member or passenger or any space vehicle described in this section.<sup>13</sup>

The Human Space Flight Independent Investigation Commission (Commission) is directed to investigate space-related incidents, determine the cause, identify contributing factors, make recommendations for corrective action, and report to Congress, the President, and the public. The Commission, which is mandated to be established within seven days of any incident, shall consist of fifteen members appointed by the President. The legislation that resulted in the enactment of the Commission was in response to concerns that the CAIB, which, as previously noted, investigated the Space Shuttle Columbia accident, was not sufficiently independent of NASA given that the CAIB was appointed by the NASA Administrator, reported to the Administrator, and was staffed by NASA employees. The Commission is empowered to hold hearings, subpoena witnesses and documents, enter into contracts to discharge its duties, and obtain support from other offices of the federal government; but beyond that, the Commission is left to decide how to best undertake its responsibilities.

#### *The NTSB and the FAA*

The NTSB and the FAA each assert that it has statutory authority to investigate commercial space accidents.

The NTSB has a general statutory mandate to investigate accidents, including civilian aircraft accidents, involving the transportation of individuals or property. This authority is particularly germane when the accident is catastrophic or could be recurring in nature. In those instances, the investigation by the NTSB takes priority over investigations by other federal agencies. Although the NTSB's statutory directive specifically authorizes investigations, it does not expressly mention space mishaps or spacecraft accidents.

The FAA has general statutory authority to regulate commercial space launches, operations, and reentries, including uncrewed space launches and reentries. The FAA's mission in this regard is one of safety—protecting crews, government astronauts, spaceflight participants, and the public in general. The FAA is tasked with issuing licenses for space launches and has the authority to modify, suspend, or revoke those licenses. While the FAA has clear statutory authority

**No single federal entity appears to have exclusive jurisdiction to investigate commercial space accidents. Congress should consider a better way to investigate the root causes of future commercial space incidents.**



to undertake investigations to carry out its licensing mandate, its statutory authority does not specifically address the investigation of space accidents.

The NTSB published a notice of proposed rulemaking (NPRM) on November 16, 2021, that announced its intent to codify what it referred to as its “commercial space safety investigative authority.”<sup>14</sup> The NTSB stated that the amendment to its regulations would “enhance transportation safety by enabling the agency to carry out its statutory mission of conducting safety investigations, identifying necessary corrective actions, and preventing future *space* transportation accidents and incidents.”<sup>15</sup> (Emphasis added).

The statutory authority on which the NTSB based its NPRM is 49 U.S.C. § 1131(a)(1)(F). Section 1131(a)(1)(F) provides that

[t]he National Transportation Safety Board shall investigate or have investigated (in detail the Board prescribes) and establish the facts, circumstances, and cause or probable cause of— . . . (F) any other accident related to the transportation of individuals or property when the Board decides (i) the accident is catastrophic; (ii) the accident involves problems of a recurring character; or (iii) the investigation of the accident would carry out this chapter.<sup>16</sup>

This is the same general statutory authority cited by the NTSB as the basis for investigating the Scaled Composites’ SpaceShip Two accident. The NTSB further specifically stated in the NPRM “that per 49 U.S.C. 1131(b), the NTSB has statutory priority of any investigation by a US department or agency.”<sup>17</sup>

The FAA Administrator responded to the NTSB’s NPRM with correspondence directed to the Chair of the NTSB, maintaining that title 51 of the US Code provides the FAA with statutory authority over all aspects of commercial launch activities, including the investigation of launch mishaps. The Administrator’s correspondence noted historic collaboration between the FAA and the NTSB, and suggested that the agencies update their relationship agreements, clarify their respective investigative roles, and “send a unified message to the emerging commercial spaceflight industry about accident or mishap investigations by the US Government.”<sup>18</sup>

The NTSB has a supplemental NPRM scheduled for October 2024;<sup>19</sup> but subsequent to publishing the NPRM, it entered into a memorandum of understanding (MOU) with the FAA in September of 2022 concerning commercial space mishap investigations. The MOU is intended to “facilitate cooperative efforts of the NTSB and FAA in the area of commercial space mishap investigations.”<sup>20</sup> The NTSB, in accordance with the MOU, “will be the lead investigative agency for FAA permitted, licensed, or otherwise FAA

approved, commercial space launch and reentry mishaps” that result in “a fatality or serious injury (as defined in 49 C.F.R. § 830.2)” or “[d]amage to property from debris . . . that could reasonably be expected to cause death or serious injury, and the property is not associated with commercial space launch or reentry activities or the launch site.”<sup>21</sup> The FAA will be the lead investigative agency for all other commercial space mishaps as defined in 14 C.F.R. § 401.7. Section 401.7 of the FAA’s regulations sets forth a detailed definition of *mishap*, which includes the malfunction of a safety-critical system; failure of an FAA licensee or permittee’s safety organization, operations, or procedures; a high risk of serious injury or fatality to a spaceflight participant, crew member, government astronaut, or the public; substantial damage to property not associated with the FAA-licensed or -permitted activity; unplanned substantial damage to property associated with the FAA-licensed or -permitted activity; unplanned permanent loss of a launch or reentry vehicle; the impact of hazardous debris outside the planned landing site or designated hazard area; or, lastly, the failure to complete a launch or reentry as planned. While the NTSB is the lead investigative agency for the most serious mishaps, only the FAA has authority to suspend or revoke an operator’s FAA-issued license or permit.<sup>22</sup>

#### *FAA-Required Mishap Plans and Operator Responsibilities*

While the FAA may be the lead federal investigative agency for certain commercial space mishap investigations, when it comes to actually undertaking the boots-on-the-ground investigations of what happened and why, that responsibility rests, at the discretion of the FAA, on either the FAA or the FAA-licensed or -permitted operator.<sup>23</sup> FAA regulations mandate that operators have an FAA-approved mishap plan and that operators who lead mishap investigations are responsible for reporting, responding to, and investigating the mishap in accordance with their plan. The operator is then accountable to the FAA for determining the root cause of a mishap and reporting that to the FAA, with the FAA providing oversight to ensure compliance with the mishap plan.

In light of the telemetry generally available to FAA operators, the operators likely will have an immediate

**FAA regulations mandate that operators have an FAA-approved mishap plan and that operators who lead mishap investigations are responsible for reporting, responding to, and investigating the mishap in accordance with their plan.**

understanding of the cause of a mishap and know what equipment or pieces of equipment to look for at the debris site. Significant for FAA-licensed or -permitted operators during a mishap investigation will be the need to protect proprietary property and information.

The Government Accountability Office (GAO), at the request of Congress, recently completed a review of FAA commercial space transportation safety and accident investigation oversight.<sup>24</sup> The GAO concluded that the FAA's practice of determining on a case-by-case basis whether it or the space company involved should lead an investigation lacked specific criteria, and as a result, the FAA could not ensure consistency

in its decision-making process. It also concluded that the FAA had not evaluated the effectiveness or findings of its mishap investigation process. The GAO recommended, and the Department of Transportation concurred, that the FAA Administrator should direct the Office of Commercial Space Transportation to address the GAO recommendations.

#### **National Aeronautics and Space Administration**

*NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping: NASA Procedural Requirements*

*8621.1D* (NPR 8621.1D) sets forth the general particulars to report, investigate, and document NASA mishaps and close calls, and the corrective actions that may prevent similar injuries, property damage, or mission failures in the future.<sup>25</sup> Chapter 7 of NPR 8621.1D addresses the requirements for commercial launch mishap and close call investigations that involve the use of rockets and spacecraft built by the private sector to resupply and transport crews to the International Space Station (ISS).

A "mishap," as defined by NASA in chapter 1 of NPR 8621.1D, is an unplanned event that results in an occupational injury or illness to non-NASA or NASA personnel that is caused by NASA operations or NASA-funded research and development, property destruction or damage caused by the same, or a NASA mission failure before completion of the planned primary mission.<sup>26</sup> NASA considers a matter to be a "close call" when resulting injuries require no medical attention or only first aid, the property damage is less than \$20,000, or the mission is a failure and the direct costs are under \$20,000.<sup>27</sup> The seriousness of the injuries

and the amount of direct costs determine how NASA classifies the mishap or close call. Classifications range from Type A mishaps to Type D, and then close calls. A Type A injury mishap involves a fatality or an injury that causes permanent total disability, while a Type A property mishap is one in which the direct cost of mission failure and property damage is in excess of \$2 million and results in a crewed spacecraft hull loss or the unexpected departure from controlled flight of a spacecraft.<sup>28</sup> How NASA responds to a mishap or close call depends on the classification level assigned.

Chapter 7 of NPR 8621.1D, pertaining to the commercial resupply of the ISS and crew transport to the ISS, addresses how commercial space launch accident investigations will be conducted. If the launch is licensed by the FAA, NPR 8621.1D provides that either the FAA or the NTSB will lead the investigation depending on the terms of agreement between the FAA and the NTSB. If the US Space Force or NASA certified the launch, then the certifying entity will lead the investigation. NPR 8621.1D also provides that the Air Force and NASA may participate as "Official Observers" or be offered "Party Status" in NTSB-led investigations.<sup>29</sup>

#### **US Coast Guard Involvement in Commercial Space Accident Investigations**

In addition to securing safety zones for some land-based or water launch and recovery operations, the US Coast Guard is responsible for investigating marine casualties and accidents.<sup>30</sup> A "marine casualty or accident," pursuant to Coast Guard regulations,<sup>31</sup> is a casualty or accident involving any "vessel" on navigable waters that involves, among other possibilities, a collision, explosion, fire, or significant harm to the environment. *Vessel* is broadly defined as "any vessel and includes both ships and barges."<sup>32</sup> If a launch operator uses a floating platform or a barge to launch a vehicle or to recover rocket boosters, for example on a SpaceX drone ship, and an accident occurs, the Coast Guard will be involved.

#### **Conclusion**

Certainty is a valued private-enterprise commodity. Providing the domestic commercial space industry with the certainty of knowing how a space accident will be investigated, should one occur, enables the company involved to more effectively support the investigation, identify the root cause, and more resourcefully implement improvements to prevent similar incidents.

With multiple federal commissions, departments, and agencies having differing authorities to investigate commercial space accidents, incidents, and mishaps, whatever the nomenclature used, Congress should consider a more efficient way to meet the objective of a safe domestic space industry. A more streamlined

**The seriousness of the injuries and the amount of direct costs determine how NASA classifies the mishap or close call.**

accident investigation process would better serve the US domestic space industry and might encourage foreign commercial space enterprises to relocate their operations to the United States. Now is the time to explore a more efficient governmental accident investigative process.

## Endnotes

1. *Orbital Launches of 2013*, GUNTER'S SPACE PAGE, [https://space.skyrocket.de/doc\\_chr/lau2013.htm](https://space.skyrocket.de/doc_chr/lau2013.htm) (last visited June 25, 2023).

2. *Orbital Launches of 2022*, GUNTER'S SPACE PAGE, [https://space.skyrocket.de/doc\\_chr/lau2022.htm](https://space.skyrocket.de/doc_chr/lau2022.htm) (last visited June 25, 2023).

3. *Best Space Shuttle Quotes You Need to Know*, Space Quotations, <https://spacequotations.com/quotes-about-space-shuttles> (last visited Oct. 28, 2023).

4. *SpaceX*, TWITTER (Apr. 20, 2023).

5. See DANIEL MORGAN, CONG. RSCH. SERV., IN FOCUS: COMMERCIAL SPACE LAUNCH AND THE APRIL 2023 STARSHIP MISHAP (May 19, 2023), <https://crsreports.congress.gov/product/pdf/IF/IF12403>.

6. *55 Years Ago: The Apollo 1 Fire and Its Aftermath*, NAT'L AERONAUTICS & SPACE ADMIN., <https://www.nasa.gov/feature/55-years-ago-the-apollo-1-fire-and-its-aftermath> (last visited Oct. 23, 2023). NASA Administrator James E. Webb said, "We've always known that something like this would happen sooner or later, but it's not going to be permitted to stop the program. . . . Although everyone realized that someday space pilots would die, who would have thought the first tragedy would be on the ground?"

7. NASA Management Instruction 8621.1 (Apr. 14, 1966).

8. See 5 U.S.C. § 1001 *et seq.* (formerly 5 U.S.C. app. I).

9. PRESIDENTIAL COMMISSION ON THE SPACE SHUTTLE CHALLENGER ACCIDENT, REPORT TO THE PRESIDENT, at ch. VI (June 6, 1986), [https://sma.nasa.gov/SignificantIncidents/assets/rog-ers\\_commission\\_report.pdf](https://sma.nasa.gov/SignificantIncidents/assets/rog-ers_commission_report.pdf).

10. See generally MARCIA S. SMITH, CONG. RSCH. SERV., RS21408, NASA'S SPACE SHUTTLE COLUMBIA: QUICK FACTS AND ISSUES FOR CONGRESS (Sept. 2, 2003).

11. SPACEFLIGHT NOW, COLUMBIA ACCIDENT INVESTIGATION BOARD STATEMENT, <https://spaceflightnow.com/columbia/report/006boardstatement.html>.

12. NAT'L TRANSP. SAFETY BD., IN-FLIGHT BREAKUP DURING TEST FLIGHT SCALED COMPOSITES SPACE SHIP TWO, N339SS, NEAR KOEHN DRY LAKE CALIFORNIA, OCTOBER 31, 2014, at app. A (2015), <https://www.nts.gov/investigations/AccidentReports/Reports/AAR1502.pdf>.

13. 51 U.S.C. § 70702; see also 51 U.S.C. § 70701 *et seq.* (formerly 42 U.S.C. § 16841 *et seq.*); Pub. L. No. 111-134, § 3 (Dec. 18, 2010).

14. 86 Fed. Reg. 63,324 (Nov. 16, 2021).

15. *Id.* (emphasis added).

16. 49 U.S.C. § 1131(a)(1)(F).

17. 86 Fed. Reg. 63,326.

18. Correspondence from Steve Dickson, Federal Aviation Administration Administrator, to Jennifer Homendy, National

Transportation Safety Board Chair (January 14, 2022).

19. The NTSB's NPRM addressed "the commercial space launch or reentry accidents and incidents that must be reported to the agency" and "the wreckage, evidence, and records that must be preserved after a commercial space accident or incident." The NTSB is currently reviewing comments from the NPRM and will issue a supplemental NPRM in October 2024. NAT'L TRANSP. SAFETY BD., SUPPLEMENTAL NPRM: COMMERCIAL SPACE INVESTIGATIONS, RIN 3147-AA19 (Fall 2023), <https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202310&RIN=3147-AA19>.

20. MEMORANDUM OF AGREEMENT BETWEEN NATIONAL TRANSPORTATION SAFETY BOARD AND FEDERAL AVIATION ADMINISTRATION CONCERNING COMMERCIAL SPACE MISHAP INVESTIGATIONS 2 (Sept. 9, 2022), <https://www.faa.gov/sites/faa.gov/files/2022-09/NTSB-FAA-Commercial-Space-MOA.pdf>.

21. *Id.* at 3.

22. 14 C.F.R. § 405.3.

23. *Id.* § 450.173.

24. US GOV'T ACCOUNTABILITY OFFICE, GAO-24-105561, COMMERCIAL SPACE TRANSPORTATION, FAA SHOULD IMPROVE ITS MISHAP INVESTIGATION PROCESS (2023).

25. NASA PROCEDURAL REQUIREMENTS FOR MISHAP AND CLOSE CALL REPORTING, INVESTIGATING, AND RECORDKEEPING: NASA PROCEDURAL REQUIREMENTS 8621.1D (July 6, 2020), [https://nodis3.gsfc.nasa.gov/npg\\_img/N\\_PR\\_8621\\_001D/N\\_PR\\_8621\\_001D\\_.pdf](https://nodis3.gsfc.nasa.gov/npg_img/N_PR_8621_001D/N_PR_8621_001D_.pdf).

26. *Id.* at 8.

27. *Id.*

28. *Id.* at 8–9.

29. *Id.* at 53 ch. 7.

30. 46 U.S.C. § 6301.

31. *Id.* § 4.03-1.

32. *Id.* § 170.055(u).





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## Chair's Message

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ABA's website: [www.americanbar.org](http://www.americanbar.org). Additionally, this may be a good time to update your profile on the website, as enhanced traffic will allow colleagues to learn more about your professional experience.

Thank you for your understanding and support as we make this transition to an all-digital format. We believe that this decision aligns with the sustainability efforts of the aviation and aerospace industries, and we are excited to embark on this new chapter with you.

Quickly I want to add a few words on the Forum's activities. In December, Mehtap Cevher Conti and Laura Lewis led another fantastic Aviation and Space Finance Conference program in New York City that was well attended and sponsored by Norton Rose Fulbright and co-hosted with the ABA's Business Law Section. Next up is the always dynamic Washington Update Conference on March 8 in Washington, DC. The committee is working on a jam-packed program, so do not miss our annual gathering in DC, this time in the spring when we could even see the cherry blossoms in bloom!

At the Update Conference we will announce the final logistics for the Forum's September Annual Conference, which will be in Southern California. You will not want to miss putting your toes in the sand in sunny California, a location that has been full of aerospace disruption over the years. Indeed, while visiting conference venue options, one hotel took us up on its roof with an aerospace buff on their staff to point out the valley in LA where Howard Hughes operated Hughes Aircraft Company. It was founded 90 years ago—Hughes was the great aerospace disruptor of his day, from taking over TWA to founding Hughes Aircraft and constructing aircraft for world speed records. A modern-day aerospace disruptor now operating in SoCal is often compared with Hughes—someone who takes wealth and big ideas to push new technology to its limits, and by doing so, transforming the world. And of course, the comparisons don't end there . . . Get ready for this SoCal event in September!

Thank you to our contributors and editorial board for this great new issue of *The A&SL*. Looking forward to seeing many of you soon in Washington, DC.

## Focus on General Terms Agreements

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and technical teams) should, as a matter of custom, ensure that each GTA is reviewed by in-house or external counsel for the reasons set out in this article. Despite an MRO insisting their form of GTA is

non-negotiable, there is usually scope to negotiate any problematic provisions, even if that requires entering into a separate amendment agreement.

## Write for *The Air & Space Lawyer!*

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