



**Comments of**

**TechFreedom**

James E. Dunstan<sup>i</sup>

**In the Matter of**

**Mitigation Methods for Launch Vehicle  
Upper Stages on the Creation of Orbital Debris**

**Notice of Proposed Rulemaking**

**Issued by the**

**Federal Aviation Administration (FAA), Department of Transportation (DOT)**

Docket No.: FAA-2023-1858

Notice No. 23-13

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<sup>i</sup> James E. Dunstan is the General Counsel of TechFreedom, a nonprofit, nonpartisan technology policy think tank. He can be reached at [jdunstan@techfreedom.org](mailto:jdunstan@techfreedom.org).

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## INTRODUCTION

TechFreedom hereby files these comments in response to the Notice of Proposed Rulemaking (“NPRM”) in Docket FAA-2023-1858 in the matter of *Mitigation Methods for Launch Vehicle Upper Stages on the Creation of Orbital Debris* issued by the Federal Aviation Administration (FAA), of the Department of Transportation (DOT).<sup>1</sup>

Orbital debris is a true tragedy of the commons that needs worldwide attention and consensus as to solutions. But it is highly questionable whether the FAA has statutory authority to promulgate the proposed rules. Especially after the Supreme Court’s decision in *West Virginia v. EPA*, courts will not allow agencies to regulate activities without clear congressional authority. In addition, the FAA needs to undertake a full cost-benefit analysis of the proposed regulations, lest they hamstring the American commercial space sector, slowing it down, while our enemies catch up and surpass us because they don’t constrain their own launch companies with similar regulations.

### I. About TechFreedom

Founded in 2010, TechFreedom is a nonprofit think tank dedicated to promoting the progress of technology that improves the human condition. To this end, we seek to advance public policy that makes experimentation, entrepreneurship, and investment possible, and thus unleashes the ultimate resource: human ingenuity. Wherever possible, we seek to empower users to make their own choices online and elsewhere.

TechFreedom, and the undersigned author, have almost 40 years’ experience in outer space law and policy. A short list of our work includes:

- Testimony before Congress on outer space regulation and the proper role of government in meeting its obligations under Article VI of the Outer Space Treaty (OST);<sup>2</sup>

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<sup>1</sup> The NPRM was published in the Federal Register on September 26, 2023, 88 Fed. Reg. 65835, and set the comment date as December 26, 2023. *Mitigation Methods for Launch Vehicle Upper Stages on the Creation of Orbital Debris*, 88 Fed. Reg. 65835 (proposed Sept. 26, 2023) (to be codified at 14 C.F.R. pts. 401 *et seq.*). These comments are timely filed. All citations to the NPRM are to Federal Register pages.

<sup>2</sup> *Continuing U.S. Leadership in Commercial Space at Home & Abroad: Hearing Before the H. Comm. on Space, Sci., & Tech.*, 118th Cong. (2023) (statement of James E. Dunstan, General Counsel, TechFreedom), <https://techfreedom.org/wp-content/uploads/2023/07/Space-Governance-Testimony-July-13-2023.pdf>; *Reopening the American Frontier: Exploring How the Outer Space Treaty Will Impact American Commerce and Settlement in Space: Before the Subcomm. on Space, Sci., & Competitiveness of the S. Comm. on Com., Sci., & Trans.*, 115th Cong. (2017) (statement of James E. Dunstan & Berin Szóka), <https://www.commerce.senate.gov/services/files/A9AD88B2-9636-4291-A5B0-38BC0FF6DA90> (for video of the hearing, see *Reopening the American Frontier: Exploring How the Outer Space Treaty Will Impact*

- Amicus briefs in key court cases related to outer space law and policy;<sup>3</sup>
- Scholarly articles addressing key issues of space law;<sup>4</sup>
- Presentations at scientific conferences on outer space law and policy, including on issues related to orbital debris;<sup>5</sup>
- Comments in agency proceedings on a variety of space-related issues;<sup>6</sup>

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*American Commerce and Settlement in Space*, U.S. SENATE COMMITTEE ON COMMERCE, SCIENCE, & TRANSPORTATION (May 23, 2017), <https://www.commerce.senate.gov/2017/5/reopening-the-american-frontier-exploring-how-the-outer-space-treaty-will-impact-american-commerce-and-settlement-in-space>).

<sup>3</sup> Brief for TechFreedom as Amicus Curiae Supporting Appellee, Int'l Dark-Sky Ass'n, Inc. v. Fed. Commc'ns Comm'n (D.C. Cir. Ct. App. 2023) (No. 22-1337), <https://techfreedom.org/wp-content/uploads/2023/06/TF-22-1337-International-Dark-Sky-Association-Inc.-v.-FCC.pdf>; Brief for TechFreedom as Amicus Curiae Supporting Respondent, Viasat, Inc. v. Fed. Commc'ns Comm'n, 47 F.4th 769 (D.C. Cir. 2022) (No. 21-1123), <https://techfreedom.org/wp-content/uploads/2021/09/File-Stamped-TechFreedom-Amicus-Brief-Viasat-v-FCC.pdf>.

<sup>4</sup> See James E. Dunstan, *"Space Trash": Lessons Learned (and Ignored) from Space Law and Government*, 39 J. OF SPACE L. 23 (2013), <https://airandspaceolemiss.edu/wp-content/uploads/2020/07/JSL-39.1.pdf> (hereinafter referred to as "*Space Trash*"); James E. Dunstan, *Toward a Unified Theory of Space Property Rights*, in *SPACE: THE FREE-MARKET FRONTIER* (2002); William J. Potts Jr. & James E. Dunstan, *Creeping CANCOM: Canadian Distribution of American Television Programming to Alaskan Cable Systems*, 7 PACE L. REV. 127 (1986); James E. Dunstan et al., *The Geostationary Orbit: Legal, Technical and Political Issues Surrounding Its Use in World Telecommunications*, 16 CASE WEST. RESERVE J. INT. L. 223 (1984).

<sup>5</sup> James E. Dunstan and Bob Werb, *Legal and Economics Implications of Orbital Debris Removal: Comments of the Space Frontier Foundation*, DARPA Orbital Debris Removal (ODR) Request for Information for Tactical Technology Office (TTO), DARPA-SN-09-68 (Oct. 30, 2009); James E. Dunstan et al., *Doing Business in Space: This Isn't Your Father's (or Mother's) Space Program Anymore*, *Space Manufacturing* 13 (2001); James E. Dunstan, *Earth To Space: I Can't Hear You; Selling Off Our Future To The Highest Bidder*, *Space Manufacturing* 11 (1997); James E. Dunstan, *Is Launching a Rocket Still an Ultra-Hazardous Activity? Toward a Negligence Theory for Launch Activities*, Proceedings of the Eleventh Space Studies Institute/Princeton Conference on Space Manufacturing (1993); James E. Dunstan, *From Flag Burnings to Bearing Arms to States Rights: Will the Bill of Rights Survive a Trip to the Moon?*, Proceedings of the Tenth Princeton/AIAA/Space Studies Institute Conference on Space Manufacturing (1991); James E. Dunstan, *Funding the High Frontier: Old Lessons We Must Once Again Learn*, Proceedings of the Ninth Princeton/AIAA/Space Studies Institute on Space Manufacturing (1989); James E. Dunstan, *Generating Revenues in Space: Challenging Some of the Economic Assumptions of Space Exploitation*, Proceedings of the NASA Symposium on Lunar Bases and Space Professional Activities in the 21st Century (Apr. 1988).

<sup>6</sup> See TechFreedom, Comments on Allocation of Spectrum for Non-Federal Space Launch Operations, ET Docket No. 13-115 (Sept. 10, 2021), <https://techfreedom.org/wp-content/uploads/2021/09/TechFreedom-Reply-Comments-13-115-9-10-21.pdf> (allocation of spectrum for non-federal space launches); Letter from TechFreedom to Fed. Commc'ns Comm'n (Nov. 2, 2020), <https://techfreedom.org/wp-content/uploads/2021/03/TechFreedom-Letter-to-FCC-11-2-20.pdf> (warning of danger of FCC granting "market access" to a company proposing very large satellites and licensed by a government (Papua New Guinea) which is not a signatory to the Liability Convention); TechFreedom, Comments on Rural eConnectivity Program, RUS-20-Telecom-0023 (Apr. 27, 2021), <http://techfreedom.org/wp-content/uploads/2021/04/TF-Comments-USDA-4-27-21.pdf> (urging that any grant for rural broadband deployment be technology-neutral such as to allow satellite broadband providers to participate).

- Submissions to Congress and the White House on key space law and policy issues;<sup>7</sup>
- Op-Eds commenting on U.S. policy related to orbital debris;<sup>8</sup> and
- Podcasts.<sup>9</sup>

We are therefore well-versed in issues related to space policy and welcome the opportunity to comment on the NPRM.

## II. The NPRM Properly Identifies the Nature and Extent of the Orbital Debris Problem

The NPRM does an excellent job of framing the issue of orbital debris. The key finding is that spent upper stages left in orbit for decades pose the greatest threat of future debris because of their mass and large cross sections.<sup>10</sup> The NPRM dovetails with other expert findings as to

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<sup>7</sup> TechFreedom, Comments on National Orbital Debris Research and Development Plan (Dec. 31, 2021), <https://techfreedom.org/wp-content/uploads/2022/01/TechFreedom-Comments-OSTP-Orbital-Debris-Strat-Plan.pdf>; Letter from TechFreedom to S. Subcomm. on Space & Sci. (July 21, 2021), <https://techfreedom.org/wp-content/uploads/2021/07/Letter-to-Senate-Space-Subcommittee-7-21-21.docx-1.pdf> (concerning the loophole allowing U.S. companies to get “flag of convenience” licenses from foreign jurisdictions).

<sup>8</sup> James E. Dunstan, *Who wants to step up to a \$10 billion risk?*, SPACE NEWS (June 25, 2021), <https://spacenews.com/op-ed-who-wants-to-step-up-to-a-10-billion-risk/>; James Dunstan, *The FCC and Spectrum Policy: Sometimes It Hz So Bad*, TOWNHALL (Nov. 16, 2020), <https://townhall.com/columnists/jamesdunstan/2020/11/16/the-fcc-and-spectrum-policy-sometimes-it-hz-so-bad-n2580049>; Corbin Barthold, *Rival Wants Regulators to Cripple Elon Musk’s Satellite Project*, THE BULWARK (Aug. 3, 2021), <https://www.thebulwark.com/rival-wants-regulators-to-cripple-elon-musks-satellite-project/>; James E. Dunstan, *Bring On the Space Barons* (Sept. 14, 2021), <https://medium.com/@TechFreedom/bring-on-the-space-barons-e425129fbff6>; James E. Dunstan, *Do we care about orbital debris at all?*, SPACE NEWS (Jan. 30, 2018), <https://spacenews.com/op-ed-do-we-care-about-orbital-debris-at-all/>; Berin Szóka & James E. Dunstan, *Space Property Rights: It’s Time, and Here’s Where to Start*, SPACE NEWS (Jan. 27, 2014), <https://spacenews.com/39294space-property-rights-its-time-and-heres-where-to-start/>; James Dunstan & Berin Szóka, *Beware of Space Junk*, FORBES (Dec. 17, 2009), <https://www.forbes.com/2009/12/17/space-junk-environment-global-opinions-contributors-berin-szoka-james-dunstan/?sh=6b7d6da16b6c>.

<sup>9</sup> *Space Law! (Part 1)*, TECH POLICY PODCAST (Feb. 1, 2016), <https://techfreedom.org/13-space-law-part-1/>; *Space Law (Part 2) Property Rights in Space*, TECH POLICY PODCAST (Feb. 23, 2016), <https://techfreedom.org/28-space-law-part-2-property-rights-in-space/>; *Space Law (Part 3) Mining in Space*, TECH POLICY PODCAST (Mar. 1, 2016), <https://techfreedom.org/33-space-law-part-3-mining-in-space/>; *The New Space Race*, TECH POLICY PODCAST (Nov. 23, 2021), <https://podcast.techfreedom.org/episodes/306-the-new-space-race>.

<sup>10</sup> NPRM at 65846 (“In the current debris environment, the greatest risk to operational orbits is collision between objects having considerable mass. Spent upper stages are large, strong structures that contribute to the debris threat because their size increases the chance of a collision, and because their mass provides an ample source of fragmentation debris in the event of a collision.”).

the dangers upper stages pose to the space environment.<sup>11</sup> These should be the highest priority in attempts to clean up the LEO environment. But in embarking on this rulemaking, the FAA must acknowledge that the largest contributors to orbital debris, in terms of mass, number, and likelihood of future collisions, come from Russian (including Soviet) and China. The table below, compiled in 2012, analyzes orbital debris by country.<sup>12</sup>

Country of Origin	Payload	Rocket Bodies & Debris	Total	Percent of all Payloads in Space	Percent of Orbital Debris Generated	Ratio of Debris to Payload <sup>29</sup>	Ratio of Debris to Payloads (minus major accidents) <sup>30</sup>
China	140	3612	3752	3.90%	27.65%	25.80	5.37
ESA	42	46	88	1.17%	0.35%	1.10	1.10
France	56	442	498	1.56%	3.38%	7.89	7.89
India	49	125	174	1.37%	0.96%	2.55	2.55
Japan	125	83	208	3.48%	0.64%	0.66	0.66
Russia	1427	4830	6257	39.77%	36.98%	3.38	1.63
USA	1134	3804	4938	31.61%	29.12%	3.35	1.15
Other	615	119	734	17.14%	0.91%	0.19	0.19
	3588	13061	16649	100.00%	100.00%		

Equally important, but understated in the NPRM, is that the problem of future orbital debris does not fall at the feet of new mega-constellations, even though some commentators point

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<sup>11</sup> See *Space Trash*, *supra* note 4, at 62-63 (“The final reason why even the best debris mitigation strategies going forward are not going to solve the orbital debris problem, is the fact that, as noted above, the vast majority of new debris is caused not by recent launches or recently orbited satellites, but rather by the breakup of dormant satellites and upper stages, or the collision between such bodies, all of which long before became beyond the control of their human operators.”); 63-64 (“The fact is, the most dangerous pieces of orbital debris (in terms of the probability they could collide with other objects), are actually derelict upper stages, used to carry satellites to their final orbits, and then discarded in adjacent orbits that may be just as crowded as the orbit into which they deliver their payloads. These upper stages tend to be very large, with large surface area cross sections, increasing the likelihood that they can collide with other objects.” (citations omitted)).

<sup>12</sup> See *Space Trash*, *supra* note 4, at 30 tbl.1.

to them just because of the sheer number of satellites that are being deployed.<sup>13</sup> Some have even attempted to weaponize the National Environmental Policy Act (NEPA)<sup>14</sup> to try and slow down or stop these constellations for competitive reasons masquerading as environmental concerns.<sup>15</sup> As Figure 5 in the NPRM makes clear, even with “no future launches,” catastrophic collisions will continue to occur over the next century.<sup>16</sup> Further, if high levels of post-mission deorbit (PMD) can be achieved (approaching 99%), the collisions caused by the constellations are roughly equivalent to what would happen if the constellations were never deployed at all.<sup>17</sup> In other words, LEO constellations are not the major factor in future orbital debris scenarios. Indeed, as argued in *Space Trash*, future mitigation can only slow the increase in the rate of collisions, and remediation (removal of existing debris, especially derelict upper stages) is the only pathway to lowering the rate of collisions.<sup>18</sup>

This NPRM must be understood in this context—what the FAA is doing now will only impact future orbital debris at the margins. Because of this, as discussed more fully below, the FAA should weigh the costs of the proposed regulations against the burdens they place on the U.S. space industry—burdens to which foreign operators will not be subject—and against the relatively small benefits such regulations will lend to the sustainability of the LEO environment.

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<sup>13</sup> See, e.g., Jonathan O’Callaghan, *Satellite Constellations Could Harm the Environment*, *New Watchdog Report Says*, SCI. AM. (Nov. 24, 2022), [https://www.scientificamerican.com/article/satellite-constellations-could-harm-the-environment-new-watchdog-report-says/#:~:text=Satellite%20Constellations%20Could%20Harm%20the%20Environment%2C%20New%20Watchdog%20Report%20Says; Aaron C. Boley & Michael Byers, Satellite Mega-constellations create risks in Low Earth Orbit, the Atmosphere and on Earth, 11 SCI. REPORTS \(2021\), https://www.nature.com/articles/s41598-021-89909-7](https://www.scientificamerican.com/article/satellite-constellations-could-harm-the-environment-new-watchdog-report-says/#:~:text=Satellite%20Constellations%20Could%20Harm%20the%20Environment%2C%20New%20Watchdog%20Report%20Says; Aaron C. Boley & Michael Byers, Satellite Mega-constellations create risks in Low Earth Orbit, the Atmosphere and on Earth, 11 SCI. REPORTS (2021), https://www.nature.com/articles/s41598-021-89909-7).

<sup>14</sup> 42 U.S.C. §§ 4321 *et seq.*

<sup>15</sup> See, e.g., *Viasat, Inc. v. Fed. Commc’ns Comm’n*, 47 F.4th 769, 774 (D.C. Cir. 2022) (“The Federal Communications Commission approved a request by Space Exploration Holdings, LLC to fly its satellites at a lower altitude. One competitor contends that the FCC did not adequately consider the risk of signal interference, a claim we reject on the merits. Another competitor, joined by an environmental group, raises a claim under the National Environmental Policy Act. We decline to consider it because the environmental group lacks Article III standing, and the competitor’s asserted injury does not fall within the zone of interests protected by NEPA.”).

<sup>16</sup> NPRM at 65841 fig.5.

<sup>17</sup> *Id.* at 65842 fig.6.

<sup>18</sup> *Space Trash*, *supra* note 4, at 63-64. See also NPRM at 65847 (“The only option in the future for these upper stages would be remediation—dedicated missions to remove them from orbit. This kind of remediation is forecasted to be expensive and has not yet been shown to be a viable operation.”).

### III. The FAA Likely Lacks the Necessary Statutory Authority to Promulgate the Proposed Orbital Debris Rules

The NPRM claims authority to promulgate these regulations as follows:

The Commercial Space Launch Act of 1984, as codified and amended at 51 U.S.C.—Commercial Space Transportation, ch. 509, Commercial Space Launch Activities, 51 U.S.C. 50901–50923 (the Act), authorizes the Department of Transportation and thus the FAA, through delegations, to oversee, license, and regulate commercial launch and reentry activities, and the operation of launch and reentry sites as carried out by United States (U.S.) citizens or within the United States. Section 50905 directs the FAA to exercise this responsibility consistent with public health and safety, safety of property, and the national security and foreign policy interests of the United States. Pursuant to § 50903, the FAA is also responsible for encouraging, facilitating, and promoting commercial space launches by the private sector.<sup>19</sup>

Notably absent from Section 50905 is any mention of orbital debris or a “sustainable space environment.”<sup>20</sup> Indeed, the entire purpose of this proceeding appears to have little to nothing to do with the traditional role of the FAA in protecting the health and safety of the uninvolved public from launch and reentry activities.<sup>21</sup> There has never been a recorded incident of injury caused by a reentering man-made space object, not even from large objects

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<sup>19</sup> NPRM at 65836. In the section-by-section analysis, the NPRM lists in multiple places “51 USC 50101-50923” or “51 USC 50901-50923.” See, e.g., NPRM at 65859 *et. seq.* These, of course, represent the entirety of 51 U.S.C. Subtitle V, Chapters 501 through 509, not specific rulemaking authority conferred by Congress.

<sup>20</sup> *Id.* (“This proposed rule would require an operator licensed or permitted under this chapter to perform a launch or reentry with a planned altitude greater than 150 kilometers (km) to limit or dispose of debris at the end of a launch or reentry to maintain a sustainable space environment.”).

<sup>21</sup> Laura Montgomery, *Should Congress Extend the Moratorium on Regulating Human Spaceflight?* 1 (Ctr. for Growth and Opportunity, RIF Paper, Feb. 2023), <https://www.thecgo.org/wp-content/uploads/2023/02/Human-Spaceflight-Moratorium-RIF.pdf> (“The FAA’s safety role was initially confined to protecting the public—namely, people who are not involved in a given launch or reentry—from the hazards posed by these [expendable launch vehicles (ELVs)]. Because the vehicle’s stages are full of propellant with a high explosive yield, the FAA’s regulations require that a launch operator or a federal range have the capability to destroy the vehicle in the event of an anomaly so the launch vehicle does not reach a populated area like a city. The operator drops the rocket’s empty stages in the ocean. The FAA’s regulations require that the areas below be clear of aircraft and shipping, just as it requires such clearances at launch and reentry. The FAA’s regulations for protecting the public address the design, operation, and testing of a vehicle’s flight-termination system, acceptable levels of risk, and vehicle hazards, including debris, toxic releases, and overpressure.”).



such as the spent upper stages to which the proposed rules are directed.<sup>22</sup> Indeed, at multiple places in the NPRM, the FAA admits that calculating where a piece of man-made space debris will land, and thus calculating the probability of injury (i.e., “public safety”), is “virtually impossible.”<sup>23</sup> The NPRM thus admits that this proceeding has almost nothing to do with protecting the public, and is all about protecting the space environment.

Bear in mind that the FAA only has regulatory authority over “launch” and “reentry.”<sup>24</sup> It has no statutory authority over “on-orbit” activities, a gap that is often noted,<sup>25</sup> and sometimes lamented.<sup>26</sup> The fundamental question that the NPRM raises, therefore, is how far the FAA’s launch and reentry regulatory authority extends. Can the agency promulgate *ex ante* launch and reentry rules that so impact the on-orbit activities of commercial space companies that it acts to fill this gap in its authority? Would the proposed rules violate current congressional direction that the agency can regulate *only* launch and reentry?

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<sup>22</sup> The uncontrolled reentry of Skylab (weighing 170,000 pounds) on July 11, 1979, produced no damage. See John Uri, *40 Years Ago: Skylab Reenters Earth’s Atmosphere*, NASA (July 11, 2019), <https://www.nasa.gov/history/40-years-ago-skylab-reenters-earths-atmosphere/>. This is not to argue that we should not be concerned about the uncontrolled reentry of objects, pieces of which can survive traveling through the atmosphere. It is only raised here in the context that the low probability of injury or damage to property on Earth must be weighed against the costs to implement such regulations.

<sup>23</sup> NPRM at 65850 (“Furthermore, the science of predicting impact points for uncontrolled disposals is limited. Reentry Assessment is difficult. It is virtually impossible to precisely predict where and when space debris will impact. This is due to limitations in the U.S. tracking system as well as environmental factors that impact on the debris.”); 65855 (“Due to limitations in the U.S. tracking system and environmental factors that impact debris, it is virtually impossible to precisely predict when and where debris disposed through natural decay will impact. Instead, consistent with the USGODMSP, the FAA would require that operators performing uncontrolled atmospheric disposal ensure that either (i) the effective casualty area for any surviving debris will be less than 7 square meters; or (ii) the risk to the public on the ground will not exceed 1 Ec in 10,000 events or  $1 \times 10^4$ .”).

<sup>24</sup> NPRM at 65836, quoted above. See also 51 U.S.C. § 50905(b)(2)(B).

<sup>25</sup> See, e.g., RACHEL LINDBERGH, CONG. RESEARCH SERV., IF12508, COMMERCIAL HUMAN SPACEFLIGHT SAFETY REGULATIONS (Oct. 13, 2023), <https://sgp.fas.org/crs/space/IF12508.pdf> (“Operations on orbit, following launch and prior to reentry, are not under FAA jurisdiction.”).

<sup>26</sup> See, e.g., *Necessary Updates to the Commercial Space Launch Act: Hearing Before the Subcomm. On Space of the H. Comm. on Sci., Space, & Tech.*, 113th Cong. (2014) (statement of Dr. George Nield, Fed. Aviation Admin.), <https://www.govinfo.gov/content/pkg/CHRG-113hhr88133/html/CHRG-113hhr88133.htm> (“The FAA believes it is time to explore the orbital safety of commercial space transportation under the Commercial Space Launch Act licensing regime.”).

## A. Agencies Are Not Free to Promulgate Rules Beyond the Powers Delegated by Congress

As the Supreme Court has long recognized, “an agency literally has no power to act . . . unless and until Congress confers power upon it.”<sup>27</sup> While lower courts have long deferred to agency interpretations of ambiguous statutory language under *Chevron v. Natural Resources Defense Council* (1984),<sup>28</sup> the so-called “Chevron Doctrine” has come under fire,<sup>29</sup> and the Supreme Court is currently considering whether to overrule *Chevron* or curtail its application.<sup>30</sup> The Court’s decision in these cases will impact how executive agencies approach their rulemaking authority, and in this case require the FAA to reassess its theory of statutory authority. At a minimum, the agency would be wise to wait to issue a rule here until the Court decides these cases, likely by the end of its term in June.

Whatever the Supreme Court decides, it has been increasingly unwilling to defer to agency interpretations of ambiguous language as grants of authority. Indeed, the Court has not upheld such a claim under *Chevron* since 2016.<sup>31</sup> This is particularly true in cases involving “major questions.” In *West Virginia v. EPA*, Chief Justice Roberts summarized the Court’s decisions:

Extraordinary grants of regulatory authority are rarely accomplished through “modest words,” “vague terms,” or “subtle device[s].” Nor does Congress typically use oblique or elliptical language to empower an agency to make a

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<sup>27</sup> *La. Pub. Serv. Comm’n v. Fed. Commc’ns Comm’n*, 476 U.S. 355, 374 (1986).

<sup>28</sup> *Chevron U.S.A. v. Nat. Res. Def. Council*, 467 U.S. 837 (1984).

<sup>29</sup> *See, e.g.*, Brett M. Kavanaugh, *Fixing Statutory Interpretation*, 129 HARV. L. REV. 2118, 2150 (2016); *Michigan v. Env’tl. Prot. Agency*, 576 U.S. 743, 762 (2015) (Thomas, J., concurring) (pointing out “the scope of the potentially unconstitutional delegations we have come to countenance in the name of Chevron deference”); *Buffington v. McDonough*, No. 21-972, slip. op. \*8 (Gorsuch, J., dissenting from the denial of certiorari); *Gutierrez-Brizuela v. Lynch*, 834 F.3d 1142, 1152 (10th Cir. 2016) (Gorsuch, J., concurring) (“In this way, *Chevron* seems no less than a judge-made doctrine for the abdication of the judicial duty.”). *See also* Kristin E. Hickman, *To Repudiate or Merely Curtail? Justice Gorsuch and Chevron Deference*, 70 ALA. L. REV. 733 (2019); Kristin E. Hickman & Aaron L. Nielson, *Narrowing Chevron’s Domain*, 70 DUKE L.J. 931, 935 (2021) (“Hence, today, the Court may have enough votes to step back from *Chevron*.”).

<sup>30</sup> *Loper Bright Enterprises v. Raimondo*, No. 22-451 (U.S. argument scheduled Jan. 17, 2024); *Relentless Inc. v. Dep’t of Com.* No. 22-1219 (U.S. argument scheduled Jan. 17, 2024). *See also* Brief for TechFreedom as Amicus Curiae Supporting Petitioners at 15-25, *Loper Bright Enterprises v. Raimondo* (No. 22-451), [https://www.supremecourt.gov/DocketPDF/22/22-451/272431/20230720091857380\\_tsac%20TechFreedom%20No.%2022-451.pdf](https://www.supremecourt.gov/DocketPDF/22/22-451/272431/20230720091857380_tsac%20TechFreedom%20No.%2022-451.pdf).

<sup>31</sup> Brief for Cato Inst. & Liberty Justice Center as Amici Curiae Supporting Petitioners at 16-17, *Loper Bright Enterprises v. Raimondo* (No. 22-451), [https://www.supremecourt.gov/DocketPDF/22/22-451/249633/20221209162017525\\_Loper%20Bright\\_Final%20Brief.pdf](https://www.supremecourt.gov/DocketPDF/22/22-451/249633/20221209162017525_Loper%20Bright_Final%20Brief.pdf) (“Although this Court has not overruled *Chevron*, it has not deferred under the doctrine at Step Two in six years.”).

“radical or fundamental change” to a statutory scheme. Agencies have only those powers given to them by Congress, and “enabling legislation” is generally not an “open book to which the agency [may] add pages and change the plot line.” We presume that “Congress intends to make major policy decisions itself, not leave those decisions to agencies.”

Thus, in certain extraordinary cases, both separation of powers principles and a practical understanding of legislative intent make us “reluctant to read into ambiguous statutory text” the delegation claimed to be lurking there. To convince us otherwise, something more than a merely plausible textual basis for the agency action is necessary. The agency instead must point to “clear congressional authorization” for the power it claims.<sup>32</sup>

This may well be such an “extraordinary case.” Whether or not the “economic significance”<sup>33</sup> of orbital debris regulation qualifies as “major,” the underlying question may: Did Congress, in authorizing the FAA to license launch and reentry, also authorize the FAA to regulate anything that happens between launch and reentry? It is difficult to see what limiting principle would cabin the FAA’s interpretation of the statute—or prevent it from being limited to activities in Earth orbits. If the FAA can regulate the creation of orbital debris because of risks to “safety of property,” could it, for example, regulate the operation of a vehicle sent to the Moon, to Mars, or deep into the solar system to protect the “safety or property” on those celestial bodies? Could the FAA write zoning regulations for the Moon to ensure that one licensee’s activities do not jeopardize the “safety of property” of another, interpreting the foreign policy interests of the United States under Section 50903 to grant it these powers? Just how far must one lunar base’s launch pad be located away from another base’s telescope, for instance to protect that “property”?

The Federal Communications Commission (FCC), on many occasions has attempted to stretch its statutory authority to regulate in the “public interest” under “ancillary authority.” The result has been a long stream of court reversals. Judge Tatel of the D.C. Circuit put it best in 2010:

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<sup>32</sup> *West Virginia v. Env'tl. Prot. Agency*, 142 S. Ct. 2587, 2609 (2022) (internal citations omitted).

<sup>33</sup> *Id.* at 2608 (“Precedent teaches that there are ‘extraordinary cases’ in which the ‘history and the breadth of the authority that [the agency] has asserted,’ and the ‘economic and political significance’ of that assertion, provide a ‘reason to hesitate before concluding that Congress’ meant to confer such authority.’” (citations omitted)). As discussed *infra*, Section VI.A, we believe that the cost/benefit analysis conducted in the NPRM fails to capture all of the costs associated with the proposed rules, especially if American aerospace companies are forced to redesign upper stages in a short time period.

[T]he Commission maintains that congressional policy by itself creates “statutorily mandated responsibilities” sufficient to support the exercise of section 4(i) ancillary authority. Not only is this argument flatly inconsistent with *Southwestern Cable*, *Midwest Video I*, *Midwest Video II*, and *NARUC II*, but if accepted it would virtually free the Commission from its congressional tether.<sup>34</sup>

More recently, in *NAB v. FCC*,<sup>35</sup> the FCC attempted to bootstrap off the statutory language of Section 317 of the Communications Act regarding foreign-government sponsored programming to require broadcast stations to “independently confirm the sponsor’s status, at both the time of the lease and the time of any renewal, by checking the Department of Justice’s Foreign Agents Registration Act website and the FCC’s U.S.-based foreign media outlets reports.”<sup>36</sup> The problem, the court found, was that this latter requirement was nowhere articulated in the statute. The FCC argued that the language of Section 317 was broad enough to encompass the layering on of this additional requirement. The court disagreed:

[T]he FCC argues that even if § 317(c) does not affirmatively authorize it to require searches of the federal sources, it can require the searches as part of its general authority to “prescribe appropriate rules and regulations to carry out the provisions” of § 317. A generic grant of rulemaking authority to fill gaps, however, does not allow the FCC to alter the specific choices Congress made. Instead, the FCC must abide “not only by the ultimate purposes Congress has selected, but by the means it has deemed appropriate, and prescribed, for the pursuit of those purposes.”<sup>37</sup>

The same reasoning applies here. Congress has made “specific choices”: it has delegated to the FAA only the statutory authority to regulate launches and reentry.

The NPRM’s claim that it may promulgate rules to protect property in space is inconsistent with the vast majority of the FAA’s own regulations, which speak almost exclusively to property on Earth, such as this:

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<sup>34</sup> *Comcast Corp. v. Fed. Comm’n Comm’n*, 600 F.3d 642, 655 (D.C. Cir. 2010) (citations omitted).

<sup>35</sup> *Nat’l Ass’n of Broads. v. Fed. Comm’n’s Comm’n*, No. 39 F.4th 817 (D.C. Cir. 2022).

<sup>36</sup> *Id.* at 819 (citing *In the Matter of Sponsorship Identification Requirements for Foreign Government-Provided Programming*, 36 FCC Rcd. 7702, ¶ 35 (2021)).

<sup>37</sup> *Id.* at 820 (citations omitted).

Public safety means, for a particular licensed launch, the safety of people and property that are not involved in supporting the launch and includes those people and property that may be located within the boundary of a launch site, such as visitors, individuals providing goods or services not related to launch processing or flight, and any other launch operator and its personnel.<sup>38</sup>

The only time the FAA has addressed the issue of property in space (or “on orbit”) is in Section 450.101, recently updated in 2020:

(e) Protection of people and property on orbit.

(1) A launch or reentry operator must prevent the collision between a launch or reentry vehicle stage or component and people or property on orbit, in accordance with the requirements in § 450.169(a).

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<sup>38</sup> 14 C.F.R. § 401.5. Many other launch regulations make clear that the “property” involved in the regulation related only to property on the ground. *See* 14 C.F.R. § 400.2(c)(3) (“Separation distances. The launch operator must separate its launch from the public and the property of the public by a distance no less than that provided for each quantity of propellant listed in Table A of this section.”); 14 C.F.R. § 415.31(a) (“The FAA issues a safety approval to a license applicant proposing to launch from a Federal launch range if the applicant satisfies the requirements of this subpart and has contracted with the Federal launch range for the provision of safety-related launch services and property, as long as an FAA launch site safety assessment shows that the range’s launch services and launch property satisfy part 417 of this chapter”); 14 C.F.R. § 417.9(b)(2) (“Coordinate with the launch site operator and provide any information on its activities and potential hazards necessary for the launch site operator to determine how to protect any other launch operator, person, or property at the launch site as required by the launch site operator’s obligations under § 420.55 of this chapter.”); 14 C.F.R. § 417.13(a) (“Enter into an agreement with a Federal launch range to provide access to and use of U.S. Government property and services required to support a licensed launch from the facility and for public safety related operations and support.”); 14 C.F.R. § 417.101 (“the FAA will treat the Federal launch range’s launch service or property as that of a launch operator without need for further demonstration of compliance to the FAA if a launch operator has contracted with a Federal launch range for the provision of the safety-related launch service or property.”); 14 C.F.R. § 437.55(a)(3)(ii) (“Ensure that the likelihood and consequence of each hazard meet the following criteria through risk elimination and mitigation measures: The likelihood of any hazardous condition that may cause major property damage to the public, major safety-critical system damage or reduced capability, a significant reduction in safety margins, or a significant increase in crew workload must be remote.”); 14 C.F.R. § 437.63(a) (“A permittee must have an agreement in writing with a Federal launch range operator, a licensed launch site operator, or any other party that provides access to or use of property and services required to support the safe launch or reentry under a permit.”); 14 C.F.R. § 450.101(a)(4)(v) (“The risk criteria in paragraph (a)(4)(i) of this section do not apply to property, facilities, or infrastructure supporting the launch that are within the public area distance, as defined in part 420, appendix E, tables E1 and E2 or associated formulae, of the vehicle’s launch point.”). The hundreds of other references to “property” in the regulations all merely parrot the general statutory language of “public health and safety or safety of property” in Section 50905. We can find no instances in current FAA launch and reentry regulations where the term “property” specifically refers to property in outer space.

(2) For any launch vehicle stage or component that reaches Earth orbit, a launch operator must prevent the creation of debris through the conversion of energy sources into energy that fragments the stage or component, in accordance with the requirements in § 450.171.<sup>39</sup>

The 2020 Order adopting the “streamlined” regulations cites the identical legal authority as the current NPRM.<sup>40</sup> The FAA even admits that it possesses

limited authority on orbit. For a launch vehicle that will eventually return to Earth as a reentry vehicle, its on-orbit activities after deployment of its payload or payloads, or completion of the vehicle’s first steady-state orbit if there is no payload, are not licensed by the FAA.<sup>41</sup>

Nonetheless, the agency concluded that it could adopt the rules. Those rules have never been challenged in court and may be subject to the same infirmities that exist in the currently proposed rules related to upper stages.

Thus, unless the FAA can tie these regulations directly to the protection of “public health and safety, safety of property” on *Earth*, or congressionally articulated “national security and foreign policy interests of the United States,”<sup>42</sup> the regulations proposed in the NPRM will be subject to challenge, especially given that Congress, in Section 50901, clearly states that the FAA may regulate “only to the extent necessary.”<sup>43</sup> Given that Congress has never explicitly granted the FAA either general “on-orbit” regulatory authority, or more specific authority to regulate orbital debris, the statutory authority basis of the NPRM is highly suspect.

In short, the current NPRM attempts to directly regulate the orbital environment indirectly through regulations that extend “launch” regulations to the entire orbital life of an upper stage, when its statutory authority specifically excludes any authority to regulate “in orbit.” Extreme caution is therefore warranted.<sup>44</sup>

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<sup>39</sup> 14 C.F.R. § 450.101. *See* 85 Fed. Reg. 79566 (Dec. 10, 2020).

<sup>40</sup> 85 Fed. Reg. 79566.

<sup>41</sup> *Id.* at 79583.

<sup>42</sup> 51 U.S.C. § 50901(a)(7).

<sup>43</sup> *Id.*

<sup>44</sup> Again, we do not dispute that orbital debris is a problem and needs to be regulated. But multiple agencies issuing orbital debris regulations without direct congressional authority may well lead to kneecapping American companies vis-à-vis foreign competitors.

## **B. Reliance on Other Executive Branch Agencies or International Organizations Is Insufficient to Show Congressional Authority**

Beyond the legal authority quoted at the beginning of this section and generalized references to the entire U.S. Code applying to the FAA's activities related to commercial space activities, the only other "authorities" referenced in the NPRM are other executive agencies, departments, committees, and international organizations. "For this proposed rulemaking, the FAA considered the orbital debris requirements of NASA, FCC, NOAA, and the IADC, in an effort to align commercial standards and government standards and to address the persistent risks associated with heavy upper stages abandoned in orbit."<sup>45</sup> Such a self-licking ice cream cone cannot be substituted for clear congressional authority to promulgate orbital debris rules.

Reliance on foreign entities' proclamations of their goals for controlling orbital debris is particularly suspect.<sup>46</sup> Foreign entities cannot convey any legal authority to the FAA. More importantly, such foreign statements of policy have rung hollow in the past: ESA, for example, has built in exemptions that have all but swallowed its own rules.<sup>47</sup>

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<sup>45</sup> NPRM at 65844. *See, e.g.*, NPRM at 65843 (referencing its orbital debris regulations adopted in 2000, "the FAA aimed to align with then-current international practice without negatively affecting U.S. launch competition in the international market"; "[i]n 2010, the National Space Policy specifically encouraged the development and adoption of industry standards for the purpose of minimizing debris and preserving the space environment for the responsible, peaceful, and safe use of all users. Subsequent policies have retained similar language"; "[i]n 2011, the National Research Council recommended incorporating orbital debris mitigation practices into regulations.").

<sup>46</sup> *See* NPRM at 65838 ("For example, the European Space Agency (ESA) is implementing a Zero Debris Approach to stop the growth of orbital debris from their operations by 2030. ESA's policy acknowledges that if the status quo of orbital debris generation continues, future on-orbit operations will be hindered unless actions like remediation (active debris removal) are enacted."); 65844 ("For example, the French space agency, Centre National d'Études Spatiales (CNES), issued technical regulations in 2009 that extend beyond the requirements of the IADC guidelines and spell out the acceptable reentry risk from orbital debris for those with French space operation licenses.").

<sup>47</sup> *See Space Trash*, *supra* note 4, at 60-61 ("In 2002, ESA launched Envisat, an 8,000 kilogram Earth observation satellite into the highly crowded 790 km polar orbit. At 26 meters x 10 meters, by 5 meters, it is one of the largest satellites orbiting Earth. It had an expected operational life of five years, but continued to operate for an additional five years. In April of 2012, ground controllers lost contact with the satellite. Although being operated well beyond its expected operational life, no efforts were made to deorbit the satellite, move it to a safer orbit, or [save] the fuels and batteries onboard. It is estimated that the satellite will remain in orbit, and a danger to space navigation, for between 100 and 150 years. ESA's response to why nothing was done to prepare Envisat for its inevitable end of life? According to one report, 'ESA officials insist that the international guidelines on disposal of debris were not in force when Envisat was designed.' So apparently, the international community will have to wait decades or more to even begin to slow the increase of orbital debris if spacefaring nations take the position that the orbital debris mitigation guidelines only apply to satellites designed after 2007." (citations omitted)).

#### IV. The NPRM Is Correct That NEPA Is Not Implicated by This Rulemaking

TechFreedom is pleased that the NPRM specifically concludes that any orbital debris regulations are categorically exempt from environmental assessments or environmental impact statements under NEPA.

FAA Order 1050.1F identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act in the absence of extraordinary circumstances. The FAA has determined this rulemaking action qualifies for the categorical exclusion identified in paragraph 5–6.6f for regulations and involves no extraordinary circumstances.<sup>48</sup>

NEPA is quickly becoming the weapon of choice for those opposed to the U.S. commercial space industry, or even for American aerospace companies wishing to stop, or at least slow down, their competitors.<sup>49</sup> Twice TechFreedom has filed amicus briefs in appeals of FCC decisions related to satellite licensing where claims were made that the FCC must undertake an environmental assessment of the impact of their actions.<sup>50</sup> We’ve said there:

“It is a longstanding principle of American law that legislation of Congress, unless a contrary intent appears, is meant to apply only within the territorial jurisdiction of the United States.” A court is to “presume,” in other words, “that statutes do not apply extraterritorially[.]” What this means, in concrete terms, is that “absent clearly expressed congressional intent to the contrary, federal laws will be construed to have only domestic application.” Any “lingering doubt” should be “resolved” against extraterritoriality.<sup>51</sup>

There are also strong foreign policy reasons why the United States should not apply its domestic environmental laws to outer space when other countries have failed to do so:

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<sup>48</sup> NPRM at 65858.

<sup>49</sup> See TechFreedom, Comments on National Orbital Debris Research and Development Plan (Dec. 31, 2021), <https://techfreedom.org/wp-content/uploads/2022/01/TechFreedom-Comments-OSTP-Orbital-Debris-Strat-Plan.pdf>.

<sup>50</sup> See Brief for TechFreedom as Amicus Curiae Supporting Respondent, *Viasat, Inc. v. Fed. Commc’ns Comm’n*, 47 F.4th 769 (D.C. Cir. 2022) (No. 21-1123), <https://techfreedom.org/wp-content/uploads/2021/09/File-Stamped-TechFreedom-Amicus-Brief-Viasat-v-FCC.pdf>.

<sup>51</sup> *Id.* at 7 (citing *Equal Emp. Opportunity Comm’n v. Arabian Am. Oil Co.*, 499 U.S. 244, 248 (1991); *Hernandez v. Mesa*, 140 S. Ct. 735, 747 (2020); *RJR Nabisco, Inc. v. Euro. Cmty.*, 136 S. Ct. 2090, 2100 (2016) (emphasis added); *Smith v. United States*, 507 U.S. 197, 203-04 (1993)).



Congress presumably wants the foreign-policy benefits of American-provided satellite broadband. It presumably doesn't want to cede those benefits to another nation, such as China. And it presumably doesn't want private parties meddling in these foreign-policy issues by claiming to "represent" other countries' "environment." Nothing in NEPA unsettles any of these presumptions. And the presumptions hold even though satellite launches can conceivably create ancillary costs (e.g., a small chance of falling debris) back on Earth. There is no sign in NEPA that Congress would want the mitigation of those costs to be prioritized over the acquisition of the benefits, in soft power and international good will, that could come from an American company's providing Internet to remote and poverty-stricken regions around the world.

At the very least, this Court cannot know whether applying NEPA in outer space would erroneously create "foreign policy consequences not clearly intended by the political branches." That uncertainty is all it takes for NEPA not to apply in outer space.<sup>52</sup>

Whatever the FAA can legally do in terms of space sustainability, it should not establish a regulatory regime that competitors can weaponize to slow down innovators, or allow foreign competitors to catch up and surpass our commercial launch industry by turning our own rules against us. Any regulations promulgated in this proceeding must be accompanied by an order which makes clear that NEPA does not apply to those regulations.

## **V. The NPRM Fails to Analyze the Potential New U.S. Treaty Liability the Proposed Regulations Might Create**

One of the truly perverse results if the proposed rules are adopted is that, for the first time, commercial launch providers and the United States itself may be accepting international liability for the upper stages launched under U.S. jurisdiction. Further future attempts to remove upper stages may be more difficult legally because of this new liability. This new

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<sup>52</sup> *Id.* 17-18 (citing Andrew Jones, *China establishes company to build satellite broadband megaconstellation*, SPACENEWS, (May 26, 2021), <https://spacenews.com/china-establishes-company-to-build-satellite-broadband-megaconstellation/>; *Nat. Resources Def. Couns. v. Nuclear Reg. Comm'n*, 647 F.2d 1345, 1367 (D.C. Cir. 1981); *Mesa*, 140 S. Ct. at 747). In *Viasat, Inc. v. Fed. Commc'ns Comm'n*, 47 F.4th 769 (D.C. Cir. 2022), the court dismissed the appeals on procedural grounds and did not reach the question of whether NEPA applies to outer space, notwithstanding substantial discussion of the issue at oral argument. *See generally* Oral Argument, *Viasat* (No. 21-1123), <https://www.courtlistener.com/audio/78782/viasat-inc-v-fcc/>. In *Int'l Dark-Sky Ass'n, Inc. v. Fed. Commc'ns Comm'n* (D.C. Cir. Ct. App. 2023) (No. 22-1337), decision still pending, again, the panel spent significant time discussing the applicability of NEPA to outer space. *See generally* Oral Argument, *International Dark-Sky Association*, <https://www.courtlistener.com/audio/89415/international-dark-sky-association-inc-v-fcc/>.

potential international liability would exist only for U.S. operators, and it is not assumed by other nations. Requiring U.S. launch companies to retain control over their upper stages until they are no longer orbital debris departs from the international practice, however despicable, of merely leaving derelict upper stages where they are.

**A. New Regulations May Create U.S. Liability for Upper Stages Different From Current International Norms**

Spacefaring nations have had every reason to ignore the orbital debris problem: to acknowledge it, and to establish norms of conduct, would go a long way toward establishing the “duty” and a “standard of care,” as is commonly found in negligence liability analysis. The 1995 Inter-Agency Report on Orbital Debris explained the perverse incentives created by current international law and the resulting conundrum this way:

Although the Liability Convention provides a legal mechanism for establishing liability and damages, there would likely be problems of proof associated with a claim based on damage caused by orbital debris. In the likely event that damage to or destruction of a space objects was caused by a small, unobservable fragment, it would be difficult to establish the identity of the launching state and therefore to invoke the Liability Conventions.

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Liability would then depend on whether a state’s actions in controlling its space objects were ‘reasonable.’ The present state of space technology does not permit activities in space that are completely debris free; hence, a negligence regime might imply an obligation of states to take reasonable steps to prevent foreseeable damage. Many factors would come into play in decide what steps are reasonable and what damage is foreseeable, including the proximity of other space objects, the reason for the creation of the debris, the cost of preventing the creation of the debris, and the feasibility of providing warnings to states potentially affected by the debris.<sup>53</sup>

Thus, it has always been easier for countries to act as if there wasn’t any actual duty to remove their orbital debris, just vague, unenforceable guidelines, and let “God sort it out.”

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<sup>53</sup> See OFFICE OF SCI. & TECH. POL’Y, INTERAGENCY REPORT ON ORBITAL DEBRIS 12, 46 (Nov. 1995), <https://ntrs.nasa.gov/api/citations/20000011871/downloads/20000011871.pdf>.

Prior to adopting any regulations related to upper stages, therefore, the FAA should fully consult with the State Department to determine whether such regulations would inadvertently create new U.S. liability for upper stages.

**B. The Proposed Regulations May Inadvertently Hinder Future Attempts to Remediate Derelict Upper Stages**

States sincerely interested in cleaning up the cluttered space environment face the same legal conundrum, in that it can be argued that the removal of someone else's junk is a violation of international law: The ownership and nominal "control" of the object remains with the launching state under Article VIII of the Outer Space Treaty, even if the launching state no longer has any actual ability to control the object, whether to use it or to remove it. As the 1995 Interagency Report concluded:

If the launching state consented to the destruction or removal of its orbital debris, or if it abandoned its rights to the debris through a clear expression of intent, destruction or removal could be considered lawful. However, under customary international law, state property remains state property unless expressly relinquished. (Under maritime law, for example, the U.S. has consistently maintained that sunken state ships remain the property of the flag state until title is expressly transferred or abandoned, and that abandonment cannot be implied from the absence, even over a long period of time, of acts evidencing an interest in such property.)<sup>54</sup>

As that same report points out, however, such a refusal to allow removal of hazardous debris directly conflicts with the duty established under Article IX of the Outer Space Treaty, of states to conduct their activities "with due regard to the corresponding interests of all other States Parties to the Treaty."<sup>55</sup> Article I guarantees the right of all states to enjoy the "exploration and use" of outer space, Article XI creates a consultation mechanism by which states can vindicate this right if they expect interference with their operations, and the Liability Convention implements that principle. But in practice, there is no effective remedy: a state would have to prove the element of negligence, which means establishing that there is a duty of care as it relates to orbital debris that has been violated, which brings us back where we started, with no enforceable international norms for liability for orbital debris, no

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<sup>54</sup> *Id.* at 47.

<sup>55</sup> *Id.* See Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies art. IX, Dec. 5, 1979, 18 U.S.T. 2410, 610 U.N.T.S. 205 (hereinafter "Outer Space Treaty").

sanctions for a country that fails to deorbit or move satellites to safe orbits at end-of-life, and nothing more than “irate expressions of disdain for the violator.”<sup>56</sup>

The 1995 Interagency Report on Orbital Debris notes that, like the Outer Space Treaty, maritime law establishes that ownership of a seagoing vessel remains with the state of flagging even after such a vessel is sunk.<sup>57</sup> But in most instances, sunken ships sit quietly on the ocean floor, posing little danger to navigation. Derelict satellites, and upper stages, however, pose real hazards to space navigation, and must be treated as such. Another maritime law concept can help resolve this problem: under both international and U.S. domestic law, vessel owners are required to clear their vessels from navigable waters and not place impediments to free passage within their territorial waters,<sup>58</sup> and, more importantly, failure to do so constitutes abandonment.

Under customary international law, the rules of navigation and the right of “innocent passage” have existed for hundreds if not thousands of years.<sup>59</sup> Article 17 of the Law of the Sea Convention guarantees that ships of all states “enjoy the right of innocent passage through the territorial sea.”<sup>60</sup> Furthermore, coastal states may adopt laws and regulations relating to innocent passage that provide for “the safety of navigation and the regulation of maritime traffic.”<sup>61</sup>

The United States, although not a signatory to the Law of the Sea Convention, has adopted specific rules as to vessels which endanger the safety of navigation, for instance:

It shall not be lawful to tie up or anchor vessels or other craft in navigable channels in such a manner as to prevent or obstruct the passage of other vessels or craft; or to sink, or permit or cause to be sunk, vessels or other craft

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<sup>56</sup> ANDREW G. HALEY, *SPACE LAW AND GOVERNMENT* 150 (1963).

<sup>57</sup> INTERAGENCY REPORT ON ORBITAL DEBRIS, *supra* note 53, at 47.

<sup>58</sup> See *Corfu Channel Case (U.K. v. Alb.)*, 1949 I.C.J. 4 (Apr. 9) In *Corfu Channel*, the International Court of Justice (ICJ) held Albania liable for damage caused to two Royal Navy destroyers by mines placed in its territorial waters in the Corfu Channel. The court further found that Albania had a duty to notify both the international shipping community, and to warn the destroyers once they entered the Channel of the existence of these mines.

<sup>59</sup> See *SPACE LAW AND GOVERNMENT*, *supra* note 56, at 57 (“A judicial decision of 1871 [The *Scotia*, 81 U.S. (14 Wall.) 170 (1871)], in a case involving a collision of a British and an American ship, held that the pertinent rules of navigation having been accepted as obligatory by more than thirty of the principal commercial states of the world, these rules became the law of the sea.”).

<sup>60</sup> United Nations Convention on the Law of the Sea, art. XVII, Dec. 10, 1982, 1833 U.N.T.S. 397, [https://www.un.org/depts/los/convention\\_agreements/texts/unclos/unclos\\_e.pdf](https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf) (hereinafter “Law of the Sea Convention”).

<sup>61</sup> *Id.* art. XXI.

in navigable channels . . . . And whenever a vessel, raft or other craft is wrecked and sunk in a navigable channel, it shall be the duty of the owner, lessee, or operator of such sunken craft to immediately mark it with a buoy or beacon . . . and it shall be the duty of the owner, lessee, or operator of such sunken craft to commence the immediate removal of the same, and prosecute such removal diligently, and failure to do so shall be considered as an abandonment of such craft, and subject the same to removal by the United States as provided for in sections 411 to 416, 418, and 502 of this title.<sup>62</sup>

Many U.S. state laws declare as abandoned “any watercraft that is inoperative and neglected, submerged or partially submerged or that has been left by the owner in coastal waters without intention of removal.”<sup>63</sup> Under the Federal Abandoned Barge Act of 1992, it is illegal to abandon a barge in navigable waters. “Barge” is defined as a “non-self-propelled vessel,”<sup>64</sup> and “abandoned” is defined as “to moor, strand, wreck, sink, or leave a barge of more than 100 gross tons . . . for longer than forty-five days.”<sup>65</sup> Under general American maritime law, “abandonment” is

an intentional relinquishment of all right, title and possession of a thing without the intention of ever reclaiming it. It consists of two elements, act and intention, with intention to abandon being the most important. It is a question of fact determined from all the circumstances. A mere passage of time will not necessarily work an abandonment if the owner has clearly shown a constant intent to salvage it.<sup>66</sup>

The analogy to space and orbital debris is clear. Space orbits, like the waters of the oceans, must be free for passage by all—a concept already at the heart of Article I of the Outer Space Treaty. Hazards to navigation need to be removed. This is especially true for derelict or abandoned vessels and space objects. The same definitions of “abandoned” used in maritime law can easily be applied to space objects. Indeed, the Inter-Agency Space Debris Coordination Committee (IADC) orbital debris guidelines already make a clear distinction between “spacecraft” and “space debris,” which is defined as “all man made objects including

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<sup>62</sup> 33 U.S.C. § 409.

<sup>63</sup> See, e.g., ME. REV. STAT. tit. 12, § 1866.

<sup>64</sup> 46 U.S.C. § 102.

<sup>65</sup> 46 U.S.C. § 4701.

<sup>66</sup> See Lawrence Lipka, *Abandoned Property at Sea: Who Owns the Salvage “Finds”?*, 12 WM. & MARY L. REV. 97, 102, n. 28 (1970).

fragments and elements thereof, in Earth orbit or re-entering the atmosphere, that are non functional.”<sup>67</sup>

Some might dispute this analogy because the United States, and other countries, claim that government property in the form of shipwrecks can never become abandoned under Articles 95 and 96 of the Law of the Sea Convention,<sup>68</sup> and that under Article VIII of the OST, jurisdiction over all manmade objects placed in space remains with the launching state and can never be lost.<sup>69</sup> Yet Articles 95 and 96 cannot be read in total isolation. Rather, Articles 95 and 96 of the Law of the Sea Convention must be read against the provisions cited above that guarantee the right of safe passage. As the *Corfu Channel* case makes clear, the fact that an object obstructing safe passage belongs to a state government (it is not a state-flagged vessel belonging to a private entity) does not absolve the state from its duties to protect the right of safe passage. Articles 95 and 96 are clearly intended to protect states from the seizing or looting of their property, including shipwrecks. They do not trump states’ responsibilities to take *due regard* of the activities of others under customary international maritime law. In the aviation context, this has been made clear via treaty. While the Convention on International Civil Aviation of 1944 (Chicago Convention) exempts “state aircraft” from International Civil Aviation Organization (ICAO) procedures, it nonetheless requires “state aircraft” to fly with “due regard for the safety of civil aviation.”<sup>70</sup>

In the same way, we must balance the rights *and responsibilities* established under OST Articles I, VII, VIII, and IX to bring them into conformity with maritime and aviation law. Maritime law strikes just such a balance in how it defines abandonment. A state should not retain jurisdiction over a satellite, escape liability for the destruction a collision would cause, and allow that satellite to remain in an uncontrollable orbit, contaminating outer space and interfering with the rights of others. Yet the proposed regulations effectively do just this—the regulations apply to all forms of debris removal, including uncontrolled reentry up to 25 years later.

Some have suggested that this legal conundrum can be solved only by amending either the OST or the Liability Convention. In fact, the problem can be solved through use of customary international law, which can develop far more quickly in the context of an area of the law

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<sup>67</sup> INTER-AGENCY SPACE DEBRIS COORDINATION COMM., IADC SPACE DEBRIS MITIGATION GUIDELINES, IADC-02-01, arts. 3.1 & 3.2 (2020) (hereinafter “IADC Guidelines”).

<sup>68</sup> Law of the Sea Convention, *supra* note 60, arts. 95 & 96.

<sup>69</sup> Outer Space Treaty, *supra* note 55, art. VIII.

<sup>70</sup> Convention on International Civil Aviation, art. 3, Dec. 7, 1944, 61 Stat. 1180, 15 U.N.T.S. 295.

that remains underdeveloped, and where activities are open and apparent to all. As a foundational space law treatise predating the Outer Space Treaty observed:

There is in any event, no rule in international law which would require that consent, clearly shown, must be fortified by prolonged usage. Long ago Triepel recognized that under certain conditions one single act of international practice based on usage might suffice for a rule of international law. Normally a long period of usage has been required before a principle could become established as a part of international law, but this is so only because in most cases the consent of nations could not be ascertained by other nations except over a long period of years. . . . The present situation, however, is entirely different. An earth satellite will pass over numerous countries in a period of hours and these nations are immediately aware of the launching. Knowledge of the impending launching may even have been available for a considerable time prior to the actual event. In view of this, the nations could be expected to express their consent—or non-consent—in a timely manner.<sup>71</sup>

We can learn much from the writings of this treatise’s author, early space lawyer Andrew G. Haley. He concluded that the concept of free overflight was established by the single event of the Soviets orbiting Sputnik I.<sup>72</sup> Other events in the history of spaceflight have established customary international law through single events, or a small series of events. For example, the right to own objects found in space returned to Earth was established by the United States (and to a lesser extent the Soviet Union) through their Apollo and Luna sample return missions and their approaches to those samples.<sup>73</sup>

These issues are expanded upon in our comments to the White House’s Office of Science Technology and Policy (OSTP) regarding its Strategic Plan on Orbital Debris.<sup>74</sup> They are raised in this proceeding to warn the FAA not to get out ahead of formal U.S. space policy,

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<sup>71</sup> SPACE LAW AND GOVERNMENT, *supra* note 56, at 60-61.

<sup>72</sup> *Id.*

<sup>73</sup> See James E. Dunstan, *Toward a Unified Theory of Space Property Rights*, in SPACE: THE FREE-MARKET FRONTIER 225 (Edward L. Huggins ed., 2002) (wherein this author pointed out that the United States claims the Apollo samples as a “national resource,” citing NASA policy as to release of Apollo samples, and argued that the exchange of Apollo samples for Soviet Luna samples evidenced one of the classic indicia of ownership—the ability to exchange a piece of property for another piece of property).

<sup>74</sup> See Comments of TechFreedom in the Matter of National Orbital Debris Research and Development Plan, 12-14 (Jan. 2021), <https://techfreedom.org/wp-content/uploads/2022/01/TechFreedom-Comments-OSTP-Orbital-Debris-Strat-Plan.pdf>.

and most important, not to inadvertently place liability on U.S. commercial space companies different from what their competitors are subject to under international law.

## **VI. Regulations Have Costs**

The FAA's goal to reduce orbital debris and enhance space sustainability cannot be absolute: space operations cannot be made so difficult, or so expensive, that no American company can afford to participate. This is especially true if the United States is alone in imposing these regulatory burdens. More importantly, such outsized burdens must not be employed by foreign enemies and domestic competitors to build "moats"<sup>75</sup> around their incumbent space users that choke off future innovative uses of space.

### **A. The Cost/Benefit Analysis in the NPRM Is Insufficient**

Make no mistake, the NPRM undertakes a significant trade-off analysis as to what the FAA should regulate. For example, it concludes that the regulations should not apply to any debris smaller than 5 mm created by an upper stage,<sup>76</sup> and gases and liquids from upper stages.<sup>77</sup> While the NPRM notes that the regulations will impose some costs on space launch companies, it downplays them. For example, for operations above 700 km, the FAA states that the "launch operator must prevent objects [larger than 5 mm] from separating from the launch vehicle," and that a "launch operator could do so by redesigning the separation system (a common source of debris) or by using lanyards or other means to prevent debris release."<sup>78</sup> The NPRM fails to quantify these or any other costs associated with the new regulations, instead merely stating:

Given that most current launch vehicles have been designed to minimize or eliminate normal operations debris release, the FAA anticipates that this proposed requirement would impose no more than a minimal burden on operators for compliance. Operators usually meet this requirement because

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<sup>75</sup> It's a time-honored tradition in the American economy that when a disruptive technology comes along, entrenched users attempt to spin the levers of the regulatory system to slow down or stop the new entrant in order to protect their lines of business. *See generally* George J. Stigler, *The theory of economic regulation*, 3 BELL J. OF ECON. & MGMT. SCI. 3 (1971), <https://publics22.classes.ryansafner.com/readings/Stigler-1971.pdf>. In doing so, a business attempts to build a "moat" (a term popularized by Warren Buffet in 1999) around its business to keep its market advantage. *See, e.g.*, Talmon Joseph Smith, *What Is a 'Moat'?*, N.Y. TIMES (Sept. 29, 2023), <https://www.nytimes.com/2023/09/29/business/what-is-a-moat.html>.

<sup>76</sup> NPRM at 65845 ("The FAA is not, however, proposing to regulate debris smaller than 5 mm, paint flakes, or solid rocket motor slag of any size, due to the current impracticality of tracking and mitigating the propagation of such small items.").

<sup>77</sup> *Id.* at 65844. ("The FAA does not believe addressing the release of gases and liquids is necessary at this time because the risk is low.").

<sup>78</sup> *Id.* at 65845.



they want to minimize the release of debris and the possibility of damage to their deployed payloads. Since commercial launches are deploying increasing numbers of payloads, which could result in additional debris release, the FAA finds it appropriate to require that all operators limit their release of debris.<sup>79</sup>

The NPRM reaches all of these conclusions while nonetheless admitting that “The FAA recognizes that this standard is new, and the commercial space industry has not had an opportunity to weigh in on the effectiveness or operational implications of this requirement.”<sup>80</sup>

TechFreedom is not able to comment on the estimated \$24 million in compliance costs,<sup>81</sup> but believes, based on its experience in interfacing with a number of technology-related industries, that the costs will be significantly higher than that. We are hopeful that space launch operators will weigh in on this issue.

But most important, the “benefit” side of the cost-benefit analysis encompasses many items that are not within the FAA’s statutory authority.<sup>82</sup> Indeed, only the last listed benefit is something Congress has tasked the FAA with “protecting human spaceflight.”<sup>83</sup> However, since that benefit is not separately assessed, it is impossible to determine this lone statutory benefit exceeds the costs of these regulations. Clearly, the FAA needs to do much more work here before moving to adopt the proposed regulations.

## **B. The FAA Must Give the U.S. Commercial Space Launch Industry Time to Develop Technologies to Comply with Any New Regulations**

As the NPRM notes, this is the first time the FAA has moved to adopt regulations related to upper stages and orbital debris.<sup>84</sup> The NPRM further notes that compliance with the new regulations may require launch operators to modify their systems.<sup>85</sup> Such modifications may

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<sup>79</sup> *Id.*

<sup>80</sup> *Id.* at 65846.

<sup>81</sup> *Id.* at 65856-7.

<sup>82</sup> *Id.* (benefits listed as: Preventing 427 used upper stages from becoming orbital debris over the 15 years; avoiding orbital remediation costs in the long run; mitigating risks to valuable space assets; internalizing the externality (spill-over cost) to benefit the satellite industry; aligning FAA requirements with interagency policies and common standards for orbital debris mitigation, and encouraging reciprocal regulatory action in foreign countries, which will further benefit U.S. commercial and government space operations by reducing space debris; and preventing collisions and protecting human spaceflight.).

<sup>83</sup> *Id.*

<sup>84</sup> *Id.* at 65844.

<sup>85</sup> *Id.* at 65845.

require installation of maneuvering or deorbiting capabilities on upper stages that are completely new to the industry. Yet the NPRM calls for the new rules to be fully in effect within one year of adoption.<sup>86</sup>

Mandating such significant engineering changes to launch systems, especially for smaller operators, may pose significant if not insurmountable burdens on the U.S. commercial space launch industry.<sup>87</sup> TechFreedom therefore urges the FAA to confer with industry to determine a rational and reasonable transition period that will not negatively impact the competitive status of the U.S. launch industry. If there is any stand-down period for U.S. launchers, it will negatively impact both their competitive posture and the national security interests of the United States.

### **C. The Regulations Must Allow Licensees to Easily Amend Their Disposal Method to Account for Changed Circumstances and Advancing Remediation Technologies**

TechFreedom understands the NPRM's approach to disposal methods, which offers five different ways that launch providers can satisfy the new rules.<sup>88</sup> TechFreedom urges the FAA to adopt regulations that easily allow launch providers the opportunity to amend their Orbital Debris Assessment Plan (ODAP) showings to allow for a different compliance method to recognize changed circumstances, or more importantly, technological developments that may allow a launch provider the ability to remove the orbital debris hazard more quickly. Launch providers may be loath to amend their applications or licenses if doing so puts them back at square one—requiring substantial new review or setting them back in the processing line. If the goal of these regulations truly is the reduction of orbital debris, then agency regulatory convenience should not take precedence. TechFreedom has seen this before—well-meaning agency officials propose comprehensive regulations that turn into compliance nightmares, and force technology companies to build for the bureaucrats rather than building to meet market needs, or even overall regulatory goals.

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<sup>86</sup> *See id.* at 65864.

<sup>87</sup> Notably, this fast transition period is not addressed in the NPRM's cost/benefit analysis. *See supra* Section VI.A.

<sup>88</sup> NPRM at 65836 (“The FAA proposes to allow operators to meet this criterion by performing one of five disposal options. Operators may choose to dispose of the debris within 30 days of mission completion through (1) controlled disposal; (2) maneuver to a disposal orbit; or (3) Earth-escape orbit. Alternatively, an operator could elect to (4) retrieve the debris within 5 years of mission completion; or (5) perform atmospheric uncontrolled disposal or natural decay within 25 years, if the debris disposal meets the risk criteria.”).

#### **D. The Regulations Must Be Flexible Enough to Adapt to the Ever-Increasing Launch Cadence of the U.S. Commercial Space Launch Industry**

If there's one thing that's clear from recent history, it's that there is an ever-increasing "need for speed" when licensing space launches. Since it received explicit congressional authority to regulate launches, the FAA has overseen 617 licensed launches.<sup>89</sup> Certainly, we are years, if not decades, away from the time when space launches will be as prevalent as airline travel, where each leg of a trip is not separately licensed. Although the proposed requirement that an ODAP must be filed at least 60 days prior to launch may work today,<sup>90</sup> the FAA's rules today should build in flexibility for a time when the entire licensing process, not just the filing of ODAPs, can occur in a timeframe shorter than 60 days.

#### **VII. Regulations Must Not Allow Foreign Competitors the Opportunity to Overtake U.S. Leadership in Commercial Space**

Yes, the United States should take the lead on the critical orbital debris issue. That leadership must be at the highest levels, and as noted above, must include clear congressional direction on which federal agencies are responsible for taking charge. But at the same time America leads, it can't hamstring the U.S. launch industry and allow foreign competitors, especially those that do not share our democratic values, to catch up with and surpass U.S. dominance in commercial space.

Space is fundamentally and inherently international. The domestic actions we take have a ripple effect internationally. This impact can be positive, as envisioned by the NPRM, or negative, if foreign interests are able to leverage the U.S.-only regulatory burdens to their own competitive benefit.

Policies that squander U.S. dominance in space are nothing new. In 1998, U.S. companies were found to have inadvertently assisted in the troubleshooting of a Long March launch failure in 1995, thus providing valuable "technical assistance" to China.<sup>91</sup> In response, Congress placed virtually all space payloads on the Munitions List, subject to tight regulation under the International Trafficking in Arms Regulations (ITAR).<sup>92</sup> Within a decade, the U.S. went from a dominant position in satellite manufacturing to an also-ran. The industry is just

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<sup>89</sup> See *Commercial Space Data*, FED. AVIATION ADMIN., [https://www.faa.gov/data\\_research/commercial\\_space\\_data/](https://www.faa.gov/data_research/commercial_space_data/) (last updated Aug. 31, 2023).

<sup>90</sup> NPRM at 65845 ("The FAA proposes to require that operators submit their ODAP no later than 60 days prior to the launch or reentry subject to part 453 to be consistent with the timeframes in part 450 and in the legacy regulations.").

<sup>91</sup> John Mintz, *Panel Faults Space Aid to China*, WASH. POST (Dec. 31, 1998), <https://www.washingtonpost.com/wp-srv/politics/special/campfin/stories/satellite123198.htm>.

<sup>92</sup> *Id.*

beginning to recover from this debacle—thanks largely to the Obama Administration’s decision to move communications and most exploration satellites and their components back to the regulatory authority of the Department of Commerce in 2013.<sup>93</sup>

Thus, in placing any additional burdens on U.S. companies to combat orbital debris, the United States government must consider the approaches taken by our competitors and adversaries. America cannot so shackle the U.S. space industry that we repeat the ITAR mistake of 1998; doing so would cede space operations to other countries, which may have far more lenient approaches to combating orbital debris.

### **A. China Is Catching Up**

In adopting any U.S. regulations burdening our commercial space industry, the FAA must understand that China seeks to be the dominant force in outer space.

China views space as critical to its future security and economic interests due to its vast strategic and economic potential. Moreover, Beijing has specific plans not merely to explore space, but to industrially dominate the space within the moon’s orbit of Earth. China has invested significant resources in exploring the national security and economic value of this area, including its potential for space-based manufacturing, resource extraction, and power generation, although experts differ on the feasibility of some of these activities.<sup>94</sup>

It is interesting that the NPRM, when it discusses China, does so only in two regards: China’s negative impact on the orbital debris environment,<sup>95</sup> and China’s interest in orbital debris remediation (active debris removal), presumably as a business enterprise.<sup>96</sup> There is no discussion of any actions China is taking toward mitigating future orbital debris. This asymmetry should be fully examined by U.S. policymakers in the context of any orbital debris rules. It’s also why the FAA should only act upon explicit congressional authority to issue costly orbital debris regulations. Given Chinese desire to become the dominant force in outer

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<sup>93</sup> See Pat Host, *Obama Administration Issues Final Rules for Export Control Reform*, DEFENSE DAILY (Apr. 16, 2013), <https://www.defensedaily.com/obama-administrationissues-final-rules-for-export-control-reform/budget/>.

<sup>94</sup> U.S.-CHINA ECON. & SEC. REV. COMM’N, ANN. REP. 16 (2019), <https://www.uscc.gov/sites/default/files/2019-11/2019%20Annual%20Report%20to%20Congress.pdf>.

<sup>95</sup> NPRM at 65840 (discussing the Fengyun-1C antisatellite test, and the collision between a fragment of the exploded third stage of a Chinese CZ-4 launch vehicle and a derelict Thor-Burner 2A upper stage); 65842 (discussion of the uncontrolled reentry of a Chinese Long March stage on May 9, 2021).

<sup>96</sup> *Id.* at 65847, n. 53 & 65849, n. 74 (“On October 24, 2021, China launched a mission with the stated aim of testing space debris removal technologies.”).

space, it would run directly against national policy and U.S. national defense interests to adopt rules for U.S. launch providers that hinder launch providers' ability to compete with Chinese enterprises, which are not bound by similar regulations.

## **B. Burdensome Regulations Risk Sending Our Commercial Space Sector Offshore**

As has been stated above, space is inherently international. There is nothing about the United States, as a matter of physics and orbital mechanics, that gives us an advantage over other countries in launching space vehicles. It is only because of our laws, regulations, culture, and national interest, that companies choose to form under the jurisdiction of the United States and conduct business here. Make the regulatory environment too burdensome, and U.S. businesses will leave for friendlier shores.

For example, the FCC's "open skies" policies, which allow satellite operators to be licensed by foreign jurisdictions and then seek approval to provide services in the United States, have led to a flight offshore to seek licenses from other jurisdictions without either expertise or inclination to regulate in the public interest. This flight has included many U.S. companies, who have found "flag of convenience" jurisdictions that will license their operations far quicker and more cheaply than can the FCC.<sup>97</sup>

In pursuing the regulations contemplated in the NPRM, therefore, it would behoove the FAA to consider this issue. Again, further consultation with the U.S. launch industry is the best path forward to formulating policies and regulations that keep this vital part of the American economy here.

## **CONCLUSION**

These comments in no way should be interpreted as saying that TechFreedom does not care about orbital debris. Undersigned counsel has been working on orbital debris issues for decades. The fundamental problem is that under our republic and Constitution, Congress legislates, and executive agencies implement. It cannot be the other way around. Congress has not given statutory authority to the FAA to regulate orbital debris, especially when such

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<sup>97</sup> Adrian Taghdiri, *Flags of Convenience and the Commercial Space Flight Industry*, 19 B.U. J. SCI. & TECH. L. 405, 422 (2013) ("Further, the FAA and the Federal Communications Commission also consider orbital debris issues in the spacecraft licensing process. Consequently, these established domestic regulations increase the incentive for space-faring companies to register in flag of convenience states."). See also James E. Dunstan, *Who wants to step up to a \$10 billion risk?* SPACENEWS (June 25, 2021), <https://spacenews.com/op-ed-who-wants-to-step-up-to-a-10-billion-risk/>.

regulations impact the entire life cycle of objects in orbit. Orbit debris is a major problem, but the solution is not rogue agencies granting themselves the authority to try and fix it.

Respectfully submitted,

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James E. Dunstan

General Counsel

TechFreedom

[jdunstan@techfreedom.org](mailto:jdunstan@techfreedom.org)

1500 K Street NW

Floor 2

Washington, DC 20005

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