

NOTE

OUTER SPACE RESOURCE EXTRACTION: THE REGULATION OF COMMERCIAL SPACE ACTORS

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Outer space resource extraction has become more feasible for the near future, with some companies already setting launch dates. The U.S. Commercial Space Launch Competitiveness Act of 2015 legalized resource extraction, but it did not resolve many challenges that resource extraction poses, such as safety risks while extracting; what, where, and how one can extract resources; and technology one can use. A patchwork of administrative agencies currently governs the regulatory field of outer space, and because it is such a novel procedure, it is unclear which administrative agency should assume regulatory authority over on-orbit resource extraction activities. Under a traditional Chevron analysis, the National Oceanic and Atmospheric Administration (“NOAA”) would have proper authority. However, because of West Virginia v. Environmental Protection Agency’s revitalization of the major questions doctrine, which agency has

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regulatory authority over on-orbit resource extraction activities would likely be a major question that Congress must answer clearly. This problem demonstrates the potential regulatory vacuum that could engulf all emerging technologies: if the regulation of everything that has vast political and economic significance requires clear congressional delegation, then many emerging technologies will simply go unregulated because of the unlikelihood of clear congressional delegation. To solve this problem for resource extraction, Congress should delegate regulatory authority over on-orbit resource extraction activities to NOAA because it is most suited to the task under a Gonzales v. Oregon analysis.

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INTRODUCTION

"I've been thinking about laws on Mars. There's an international treaty saying that no country can lay claim to anything that's not on Earth. And by another treaty if you're not in any country's territory, maritime law applies. So, Mars is international waters. . . . I'm about to leave for the Schiaparelli Crater where I'm gonna commandeer the Ares IV lander. Nobody explicitly gave me permission to do this, and they can't until I'm onboard the Ares IV. So that means I'm going to be taking a craft over in international

waters without permission. Which, by definition makes me a pirate.
Mark Watney: Space Pirate.
 —The Martian¹

Mark Watney's unclear authority to act in *The Martian* highlights the absence of clear regulation for many outer space activities.² One such activity is outer space resource extraction, which includes mining asteroids, planets, and other outer space objects for resources like precious metals and water.³ Outer space resource extraction can benefit society in a multitude of ways such as increasing wealth, diversifying the economy, and making Earth's environment more sustainable by reducing humanity's use of Earth's resources.⁴

With these benefits, however, come serious risks and hazards.⁵ Some of the most obvious hazards include those that pose a threat to the outer space environment, including depletion of resources and the effects of

1. THE MARTIAN (20th Century Fox 2015).

2. See Jeff Foust, *The Debate About Who Should Regulate New Commercial Space Activities*, SPACE REV. (Oct. 31, 2022), <https://www.thespaceview.com/article/4473/1> [<https://perma.cc/4LBJ-FBWB>] (providing a robust discussion of the debate surrounding the delegation of authority among agencies for new space activities, many of which would occur on-orbit, such as satellite decommissioning, satellite servicing, and commercial space stations).

3. See Alex Knapp, *This Asteroid Mining Startup Is Ready to Launch the First-Ever Commercial Deep Space Mission*, FORBES (Oct. 18, 2023), <https://www.forbes.com/sites/alexknapp/2023/10/18/this-asteroid-mining-startup-is-ready-to-launch-the-first-ever-commercial-deep-space-mission> [<https://perma.cc/4D8E-QX7N>] (discussing AstroForge's resource extraction mission that has a planned launch date of January 2024); Shriya Yarlagadda, *The Economics of Stars: The Future of Asteroid Mining and the Global Economy*, HARV INT'L REV. (Apr. 8, 2022), <https://hir.harvard.edu/economics-of-the-stars> [<https://perma.cc/2ZCD-DRJ5>] (relating the potential to extract water from asteroids to Earth's growing water shortage).

4. See, e.g., Chris Taylor, *The Asteroid Boom*, MASHABLE (May 10, 2019), <https://mashable.com/feature/asteroid-mining-space-economy> [<https://perma.cc/BW4A-98DK>] (articulating some of the benefits of outer space resource extraction, including providing the planet with the energy it needs to avert climate catastrophe, increasing wealth, and building solar power satellites).

5. See J.A. Dallas, S. Raval, J.P. Alvarez Gaitan, S. Saydam & A.G. Dempster, *Mining Beyond Earth for Sustainable Development: Will Humanity Benefit from Resource Extraction in Outer Space?*, 167 ACTA ASTRONAUTICA 181, 185–86 (2020) (describing measures that commercial actors will have to take to ensure outer space resource extraction is sustainable). *But see* Andreas M. Hein, Michael Saidani & Hortense Tollu, *Exploring Potential Environmental Benefits of Asteroid Mining*, 69th Int'l Astronautical Cong., Int'l Astronautical Fed'n Doc. IAC-18-D4.5.11 1, 5 (Oct. 1–5, 2018) (arguing that, at a certain point, resource extraction's benefits will outweigh its costs).

human machinery.⁶ Some researchers even claim that humanity could exhaust the solar system's consumable resources within 500 years.⁷ Resource extraction also poses other risks, including disruption to the current mining industry on Earth, the rapid increase of competition in a new industry, the inherent safety hazards of human space travel, international conflict among commercial and state actors, and benefit sharing challenges.⁸

A new space frontier, especially one with such a large potential impact, will necessitate a new legal frontier. The existing U.S. legal framework concerning resource extraction merely includes a statute legalizing resource extraction and a basic regulatory scheme for general outer space activities.⁹ Therefore, many resource extraction activities—especially on-orbit activities,¹⁰ which are activities that take place in space—are unregulated. Possible areas of regulation include what, where, and how much one can mine; what technologies one can

6. See Fengna Xu, *The Approach to Sustainable Space Mining: Issues, Challenges, and Solutions*, 738 IOP CONF. SERIES: MATERIALS SCI. & ENG'G, Dec. 6–8 2019, at 1, 5, <https://iopscience.iop.org/article/10.1088/1757-899X/738/1/012014/pdf> [<https://perma.cc/YZC3-PFQS>] (describing possible environmental contamination challenges and suggesting solutions to promote sustainable outer space resource extraction); THE WHITE HOUSE, UNITED STATES SPACE PRIORITIES FRAMEWORK 7 (2021) [hereinafter U.S. SPACE PRIORITIES FRAMEWORK].

7. Brandon Specktor, *Space Mining Could Ruin Our Solar System if We Don't Establish Protected Places Now, Researchers Warn*, LIVE SCI. (May 14, 2019), <https://www.livescience.com/65472-scientists-propose-solar-system-national-park.html> [<https://perma.cc/EZQ7-7FW2>] (summarizing a study of projected solar system resource depletion based on the historical growth of terrestrial economies).

8. See Yasemin Zeisl, *Three Salient Risks of Mining in Space*, GLOB. RISK INTEL (May 3, 2019), <https://www.globalriskintel.com/insights/three-salient-risks-mining-space> [<https://perma.cc/39VW-6W6J>] (explaining the risks to the current mining system, competitiveness, and safety); Xu, *supra* note 6, at 1, 4 (pointing to inter-state conflicts and inequalities in benefit-sharing as potential challenges of resource extraction).

9. See U.S. Commercial Space Launch Competitiveness Act, 51 U.S.C. § 51303 (legalizing resource extraction for U.S. citizens); *infra* Section I.A discussing the current framework for regulating outer space.

10. Some administrative agencies already have clear grants of authority over certain aspects of the outer space resource extraction process, such as the FCC over communications. *What We Do*, Fed. Commc'ns Comm'n, <https://www.fcc.gov/about-fcc/what-we-do> [<https://perma.cc/MG52-V8ML>]. The lack of clarity primarily arises in the parts of the process that take place in space, or the on-orbit resource extraction activities. Thus, the argument in this Note only concerns those on-orbit resource extraction activities that are not clearly controlled by one agency.

use to mine; and what safety precautions to undertake for both human and robot crews.¹¹

To protect against the practice's hazards and establish predictability, the United States must establish a clear regulatory framework for commercial outer space resource extraction.¹² Currently, commercial space actors must obtain approval from multiple agencies to conduct space activities. However, because of the lack of agency authority over on-orbit activities and the high amount of on-orbit activities involved in resource extraction, it is unclear from which agencies commercial actors should seek approval.¹³ The first step in establishing a clear regulatory framework for resource extraction, then, must be entrusting a particular administrative agency with authority over on-orbit resource extraction activities.

This Note argues that although the National Oceanic and Atmospheric Administration ("NOAA") would have administrative authority to regulate on-orbit resource extraction activities under a *Chevron* analysis, such regulation is a major question, and Congress must clearly indicate which agency should take on the role.¹⁴ Part I explains the basic regulatory framework for outer space activities and the enabling act for outer space resource extraction.¹⁵ It also describes how a *Chevron* analysis would have proceeded before the passage of *West*

11. For a possible regulatory scheme that could mitigate the environmental impact of resource extraction, see Erin C. Bennett, Note, *To Infinity and Beyond: The Future Legal Regime Governing Near-Earth Asteroid Mining*, 48 TEX. ENV'T L.J. 81 (2018), explaining that though there are no explicit laws regarding the specifics of asteroid mining, there are laws and treaties that could be used to regulate the acts involved in asteroid mining, such as the National Environmental Policy Act and the Moon Treaty. For an international, soft-law scheme based on existing mining laws, deep sea mining principles, and the Antarctic Treaty System, see Laura C. Byrd, Comment, *Soft Law in Space: A Legal Framework for Extraterrestrial Mining*, 71 EMORY L.J. 801 (2022), advocating for international laws and regulations that would (1) establish property rights to space resources; (2) consider safety concerns; and (3) consider environmental impacts of activities conducted in space.

12. See U.S. SPACE PRIORITIES FRAMEWORK, *supra* note 6, at 5 ("U.S. regulations must provide clarity and certainty for the authorization and continuing supervision of non-governmental space activities, including for novel activities such as . . . recovery and use of space resources.").

13. See Foust, *supra* note 2 (discussing the lack of a clear regulatory framework or agency hierarchy for many on-orbit activities, as agency jurisdiction is based on broad areas that interact with Earth's environment, such as communications or transportation).

14. See *infra* Part II.

15. See *infra* Sections I.A–B.

*Virginia v. Environmental Protection Agency*¹⁶ (EPA); it then establishes a scheme under which to analyze the authority of administrative agencies after the passage of *West Virginia v. EPA*.¹⁷ Part II argues that NOAA has the authority to regulate on-orbit resource extraction activities under a *Chevron* analysis.¹⁸ Next, it posits that *West Virginia v. EPA* changes this analysis because the regulation of outer space resource extraction is a major question.¹⁹ Finally, Part II argues that, despite the confusing assortment of administrative agencies that regulate the commercial space industry, NOAA would be best suited to the task under the reasoning set forth in *Gonzales v. Oregon*.²⁰

I. BACKGROUND

Before determining whether an agency may regulate on-orbit resource extraction activities, it is first important to understand the underlying agency framework and how courts would analyze such agency authority. This Part begins by discussing the current agency framework in outer space and the U.S. Commercial Space Launch Competitiveness Act, which enabled outer space resource extraction. It then explains what a *Chevron* analysis looked like before *West Virginia v. EPA*. Finally, it explains *West Virginia v. EPA* and how it has changed analyses of administrative authority.

A. Existing Administrative Agency Jurisdictional Framework

Currently, jurisdiction over outer space activities is split among several U.S. agencies, namely the National Aeronautics and Space Administration (NASA), the Federal Aviation Administration (FAA),

16. 142 S. Ct. 2587 (2022).

17. See *infra* Sections I.C–D.

18. See *Chevron U.S.A. Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837, 865 (1984) (holding that agencies should be given deference and establishing a framework to do so); *infra* Section II.B.

19. See *West Virginia*, 142 S. Ct. at 2609 (finding that where an agency's action concerns a major question, congressional delegation of authority must be clear); *infra* Section II.C.

20. See 546 U.S. 243, 266 (2006) (holding that where multiple agencies have authority to regulate, a court should presume that Congress delegated power to the agency with the most familiarity and expertise in the area) (citing *Martin v. Occupational Safety & Health Rev. Comm'n*, 499 U.S. 144, 153 (1991)); *infra* Section II.D.

the Federal Communications Commission (FCC), and NOAA.²¹ Each of these agencies focuses on a specific area within outer space and, when needed, coordinates with the other agencies.²² NASA oversees the civilian space sector; the FCC oversees radio and satellite communications; the FAA oversees launches, reentry, and safety; and NOAA oversees remote sensing technology and growth of the space economy.²³ Congress delegates jurisdiction to each of these agencies, though sometimes the President offers recommendations for allocation of responsibility.²⁴

Probably the most well-known space agency in the United States, NASA was established in 1958 by the National Aeronautics and Space Act.²⁵ NASA conducts research and development of federal government space activities.²⁶ In other words, NASA only controls the civilian space sector and has no regulatory power over the commercial space sector.²⁷

Congress established the FCC through the Communications Act of 1934,²⁸ which gave the FCC authority to regulate interstate and international commerce through telephone, telegraph, and radio communications.²⁹ Within the space sector, the FCC regulates radio and

21. See generally Scot W. Anderson, Korey Christensen & Julia LaManna, *The Development of Natural Resources in Outer Space*, 37 J. ENERGY & NAT. RES. L. 227, 244 (2018) (explaining the division of jurisdiction over spacecraft launch and reentry (FAA), satellite transmissions (FCC), commercial remote sensing aircrafts (NOAA), and debris mitigation (FCC and NOAA)).

22. See *id.* at 244–46 (discussing the responsibilities of NASA, the FAA, the FCC, and NOAA).

23. *Id.* at 244.

24. See, e.g., Exec. Order No. 13914, 85 Fed. Reg. 20381, 20381–82 (Apr. 6, 2020) (offering recommendations for cooperation between administrative agencies who have jurisdiction in space); see also Anderson et al., *supra* note 21, at 242, 244–45 (describing the interaction between congressional acts granting agency jurisdiction and presidential recommendations); *Chevron U.S.A. Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837, 865–66 (1984) (“[A]n agency to which Congress has delegated policymaking responsibilities may, within the limits of that delegation, properly rely upon the incumbent administration’s views of wise policy to inform its judgments.”).

25. 51 U.S.C. §§ 20101–20164 (establishing NASA and its functions).

26. See *Space, FAQ*, FED. AVIATION ADMIN., https://www.faa.gov/space/additional_information/faq [<https://perma.cc/5225-7NHH>] (explaining NASA’s role in the space industry).

27. See 51 U.S.C. § 20112 (directing NASA to, *inter alia*, conduct and encourage space activities for the use of the federal government).

28. Communications Act, 47 U.S.C. § 151.

29. *Id.*

satellite communications and space stations.³⁰ The FCC's regulatory authority extends to outer space because spacecraft communicate with the United States via radio transmissions.³¹ Consequently, whenever a private U.S. company wishes to go to space, it must obtain licenses from the FCC to establish communications to or from the United States.³²

The Commercial Space Launch Act of 1984³³ delegates to the FAA the authority to regulate, promote, and encourage commercial launches and to ensure compliance with international law.³⁴ This authority is centered in the FAA's Office of Commercial Space Transportation.³⁵ The FAA's main role in space is to control safety protocols on space flights.³⁶ Private U.S. companies that wish to go to space must obtain a license from the FAA after the FAA reviews their processes to ensure they meet promulgated safety standards.³⁷

NOAA is within the Department of Commerce and generally regulates the "natural world."³⁸ As part of the Department of

30. *See, e.g.*, 47 C.F.R. § 25 (2022) (regulating satellite and radio communications); 47 C.F.R. § 97.207 (2021) (regulating space stations).

31. *See id.* § 152(a) (delegating regulatory authority over all radio communications to and from the United States to the FCC).

32. *See* 47 U.S.C. § 158 (prescribing the schedule of fees for FCC-issued licenses for satellite communications and space stations). For an example of the FCC expanding its authority in outer space regulation, see Letter from Anthony Serafini, Chief Experimental Licensing Branch, Fed. Trade. Comm'n, to Sara Spangelo, Swarm Technologies, Inc. (Dec. 12, 2017), <https://apps.fcc.gov/els/GetAtt.html?id=203152&ex=> [<https://perma.cc/U6RS-4WQC>]. The FCC claimed the authority to prevent a company from launching miniature satellites due to environmental and safety concerns, citing the FCC's duty to decide whether a commercial space activity is within the public interest. *Id.*

33. 51 U.S.C. § 50901.

34. *Id.* § 50903.

35. *Id.*; *see also* *About the Office of Commercial Space Transportation*, FED. AVIATION ADMIN., https://www.faa.gov/about/office_org/headquarters_offices/ast [<https://perma.cc/N33U-CQWS>] (discussing the FAA's role in space).

36. *See* 51 U.S.C. § 50903 (noting that one role of the FAA is to protect public health and safety).

37. *See id.* (delegating licensing and regulatory authority to the FAA to ensure the safety of launches); 14 C.F.R. § 450 (2022) (establishing requirements for launch and reentry licenses).

38. *About Our Agency*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., <https://www.noaa.gov/about-our-agency> [<https://perma.cc/4XRV-AL3R>] (last updated March 2, 2023) (stating that NOAA's mission is "[t]o understand and predict changes in climate, weather, ocean, and coasts, to share that knowledge and information with others, and to conserve and manage coastal and marine ecosystems and resources" and that its "reach goes from the surface of the sun to the depths of the ocean floor"); *see, e.g.*, 30 U.S.C. § 1412 (regulating deep seabed mining).

Commerce, NOAA participates in the Department's mission to promote job creation, ensure free and fair trade, and foster innovation.³⁹ Some of NOAA's responsibilities regarding commerce include fostering economic growth within the U.S. commercial space industry and coordinating commercial space policies within the Department of Commerce.⁴⁰ Specifically, NOAA's Office of Space Commerce is dedicated to the regulation of commercial space activity.⁴¹ Meanwhile, NOAA's Office of Commercial Remote Sensing Regulatory Affairs primarily regulates remote sensing technology, or the use of sensors to obtain information about objects or areas from a distance, usually via aircraft or satellite, by detecting reflected energy waves.⁴² Although these two offices coordinate agency efforts regarding space activities, this Note refers in general to NOAA when referencing powers given to these offices or to the Department of Commerce.

The U.S. Commercial Space Launch Competitiveness Act,⁴³ which enables resource extraction, states that the purpose of NOAA's Office of Space Commerce is "to coordinate space commerce policy issues and actions within the Department of Commerce."⁴⁴ The White House Memorandum on National Space Policy also recently provided some guidance to NOAA concerning its regulation of outer space.⁴⁵ It asked NOAA to determine whether planned space activities meet international obligations and to "[l]ead, if necessary," the effort to develop efficient authorization and supervision processes to ensure that activities are "consistent with national security and public safety interests."⁴⁶

39. See 51 U.S.C. § 50702 (setting forth NOAA's functions); see also *About Commerce*, U.S. DEP'T OF COM., <https://2017-2021.commerce.gov/about.html> [<https://perma.cc/5ZP6-ML3T>] (last updated Jan. 2021) (describing the Department of Commerce's purpose).

40. See 51 U.S.C. § 50702 (giving NOAA authority).

41. See *id.* (establishing the Office of Space Commerce).

42. *What Is Remote Sensing?*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., <https://oceanservice.noaa.gov/facts/remotesensing.html> [<https://perma.cc/FH26-LHAD>] (last updated Jan. 20, 2023); see 51 U.S.C. § 60121 (establishing NOAA's authority to regulate remote sensing technology). Remote sensing has a variety of applications, such as managing natural resources by monitoring land use and wildlife habits. *Id.*

43. 51 U.S.C. § 10101.

44. *Id.* §§ 50702(c)(2), 50703, 51303.

45. Memorandum on the National Space Policy, 85 Fed. Reg. 81755, 81766 (Dec. 16, 2020).

46. *Id.*

Furthermore, in 2018, the House of Representatives passed the American Space Commerce Free Enterprise Act,⁴⁷ which proposed giving NOAA the authority to issue certifications and regulations for resource extraction; however, this bill did not pass the Senate.⁴⁸

NASA, the FCC, the FAA, and NOAA all coordinate with the State Department to ensure compliance with foreign policy objectives.⁴⁹ The State Department has no regulatory power over the commercial space sector; rather, its jurisdiction in space is limited to foreign policy.⁵⁰ For example, the State Department is responsible for engaging in space diplomacy and garnering international support for U.S. space activities.⁵¹ This role often entails negotiating new treaties and encouraging support for ongoing or future U.S. space activities.⁵² Additionally, Executive Order 13914, which affirms the legality of

47. H.R. 2809, 115th Cong. § 1 (2018).

48. *Id.* § 7; see *All Information (Except Text) for H.R. 2809—American Space Commerce Free Enterprise Act*, CONGRESS.GOV, <https://www.congress.gov/bill/115th-congress/house-bill/2809/all-info> [<https://perma.cc/9RDT-TBLA>] (showing that the latest action on the Act was the Senate receiving and reviewing it on April 25, 2018); see also Loren Grush, *House Bill Would Regulate Bold Commercial Space Missions—But Not Very Closely*, VERGE (Apr. 24, 2018, 11:51 AM), <https://www.theverge.com/2018/4/24/17272338/hr-2809-american-space-commerce-free-enterprise-act-regulation> [<https://perma.cc/7MQ3-DHKC>] (explaining that the bill would likely not pass in the Senate because many senators wanted stricter regulations for outer space resource extraction).

49. See *Office of Space Affairs*, U.S. DEP'T OF STATE, <https://www.state.gov/bureaus-offices/under-secretary-for-economic-growth-energy-and-the-environment/bureau-of-oceans-and-international-environmental-and-scientific-affairs/office-of-space-affairs> [<https://perma.cc/7FPX-6SYP>] (explaining that the State Department “carries out diplomatic and public diplomacy efforts to strengthen American leadership in space exploration”); *Assistant Secretary of Defense for Space Policy*, U.S. DEP'T OF DEF., <https://policy.defense.gov/OUSDP-Offices/ASD-for-Space-Policy> [<https://perma.cc/S3ZT-KXB8>] (explaining that the Department of Defense (DOD) is “responsible for interagency coordination and international engagement on space policy and strategy”).

50. See Hillary Lebail, *State in Space: The Department's Role in the U.S. Space Program*, U.S. DEP'T OF STATE (July 15, 2019), <https://2017-2021.state.gov/state-in-space-the-departments-role-in-the-u-s-space-program/index.html> [<https://perma.cc/WLF8-X63E>] (describing the State Department's past efforts to educate the public on the space program, negotiate and implement the Outer Space Treaty, and use the space program to promote international cooperation).

51. Exec. Order No. 13914, 85 Fed. Reg. 20381, 20381–82 (Apr. 6, 2020) (authorizing the “Secretary of State, in consultation with [the heads of other agencies] to encourage international support” for outer space resource extraction).

52. See *id.* at 20382 (instructing the Secretary of State to negotiate agreements with other countries concerning outer space activities).

resource extraction, directed the Secretary of State to “take all appropriate actions to encourage international support for the public and private recovery and use of resources in outer space.”⁵³

NASA, the FCC, the FAA, and NOAA also coordinate with the Department of Defense (DOD) to ensure compliance with national security policy.⁵⁴ Instead of issuing commercial regulations, the DOD is in charge of the military and U.S. national security in relation to outer space.⁵⁵ Other agencies may fill in some of the regulatory gaps, depending on an agency’s specialization and delegated powers.⁵⁶

B. The U.S. Space Launch Competitiveness Act

The possibility of outer space resource extraction is still relatively novel, and its legal boundaries are still being defined. In 2015, Congress passed the U.S. Commercial Space Launch Competitiveness Act,⁵⁷ which included a provision on resource extraction:

A United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law, including the international obligations of the United States.⁵⁸

While this Act allows U.S. citizens to extract resources from space, it also requires that they do so in compliance with applicable law,

53. *Id.*

54. *See* National Security Act, 50 U.S.C. § 3002 (declaring that the DOD shall provide a unified direction for the individual military departments). The DOD oversees defense-related outer space policy and military services like the U.S. Space Command. *See* Dep’t of Defense Directive 3100.10, Space Policy, 4 (2022), <https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/310010p.PDF> [<https://perma.cc/NX9F-YCQ5>] (explaining the role of the U.S. Space Command and other DOD services).

55. *See* The United States Space Force, 10 U.S.C. § 9081 (establishing the United States Space Force, within the Department of the Air Force).

56. For example, because of the many environmental risks that space activities pose, the EPA cooperates with the above space agencies to assess and protect the space environment in accordance with the National Environmental Policy Act. *See, e.g., EPA and NASA Administrators to Extend Environmental and Earth Science Agreement / Agencies to Help Grow America’s Next Generation of Scientists*, EPA, (Apr. 26, 2010), https://www.epa.gov/archive/epapages/newsroom_archive/newsreleases/1b158b981848e86985257711005ad13f.html [<https://perma.cc/VV4Y-J8G3>] (listing projects on which NASA and the EPA collaborate).

57. H.R. 2262, 114th Cong. (2015); 51 U.S.C. § 51303.

58. U.S. Commercial Space Launch Competitiveness Act, 51 U.S.C. § 51303.

including U.S. international obligations.⁵⁹ Thus, most scholars agree that this statute is legal under international law.⁶⁰ For example, the Outer Space Treaty prohibits any nation from claiming sovereignty over outer space territory; to comply with this obligation in the Act, the United States disclaimed sovereignty over any celestial bodies from which someone may extract resources.⁶¹ Because this Act establishes resource extraction as lawful, it may offer guidance on delegation of regulatory authority over on-orbit resource extraction activities.

C. *The Chevron Doctrine*

When determining whether an agency is acting within its scope of authority, courts have historically followed the standard announced in *Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.*⁶² Under this *Chevron* doctrine, courts avoid interfering in an agency's actions when those actions are based on the agency's discretion.⁶³ The *Chevron* case established a multi-step analysis to determine whether an agency had the authority to act.⁶⁴

59. *Id.*

60. Since its enactment, many scholars have discussed the legality of the Act, with most endorsing its legality. *See, e.g.*, John Wrench, Note, *Non-Appropriation, No Problem: The Outer Space Treaty Is Ready for Asteroid Mining*, 51 CASE W. RESV. J. INT'L L. 437, 437, 460 (2019) (arguing that outer space resource extraction is legal under international law); Philip De Man, *The Exploitation of Natural Resources in Outer Space*, in OUTER SPACE LAW: LEGAL POLICY AND PRACTICE 243, 244–49 (Yanal Abul Failat & Anél Ferreira-Snyman eds., 2017) (explaining how resource extraction interacts with the Outer Space Treaty's principle of freedom of exploration and use and focusing on the difference between appropriation and exploitation).

61. U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, § 403, 129 Stat. 722 (2015) (Disclaimer of Extraterritorial Sovereignty); *see also* Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

62. *See Chevron U.S.A. Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837 (1984) (establishing the doctrine).

63. *Id.* at 844, 865–66.

64. *See id.* at 842–43 (articulating the two steps of the *Chevron* standard); *see, e.g.*, Epic Sys. Corp. v. Lewis, 138 S. Ct. 1612, 1629 (2018) (following a *Chevron* analysis). Besides the commonly mentioned two steps, a *Chevron* inquiry includes other analyses as well. *See* Kristin E. Hickman & R. David Hahn, *Categorizing Chevron*, 81 Ohio State L.J. 611, 614–16 (2020) (describing interpretations of *Chevron* that conduct fewer or more than two steps); *e.g., id.* at 656–61 (explaining that *Chevron*'s step two includes an “arbitrary and capricious” analysis). *But see Humane Soc'y of United States v. Zinke*, 865 F.3d 585, 605 (D.C. Cir. 2017) (treating an “arbitrary and capricious” analysis as

Before reaching the traditional *Chevron* two-step analysis, the first stage, or *Chevron* Step Zero, is whether the *Chevron* doctrine should apply at all.⁶⁵ During this stage, courts ask whether Congress delegated broad and narrow power to an agency in the relevant area.⁶⁶ The broad power inquiry determines the general area that an agency has the authority to regulate.⁶⁷ The narrow power inquiry examines an agency's specific authority to complete their proposed action.⁶⁸ If an agency has both the broad power over the area in question and the narrow power to act, then a court will continue to the traditional *Chevron* two-step analysis.⁶⁹ However, if the agency fails either the broad or narrow power inquiry, then *Chevron* deference will not apply, and the court will strike the agency action because failing Step Zero necessarily means the agency did not have the authority to act.⁷⁰

After *Chevron* Step Zero, step one of the traditional *Chevron* analysis is whether the enabling statute of an agency is ambiguous or clear.⁷¹ If the court decides that the statute is ambiguous, then the gap Congress left indicates an express delegation of authority to the agency to fill the gap.⁷² Courts reason that where a statute is ambiguous, an agency, unlike a court, can rely on its expertise in the field to inform its judgments.⁷³ If the statute is clear, on the other hand, the analysis ends there because Congress has already expressed a clear intent with which agencies must comply.⁷⁴

included in *Chevron* step two *and* as a separate, necessary analysis to be completed after *Chevron*).

65. *Gonzales v. Oregon*, 546 U.S. 243, 258 (2006); *see also* Cass R. Sunstein, *Chevron Step Zero*, 92 VA. L. REV. 187 (2006) (explaining the *Gonzales* opinion and naming that type of analysis "*Chevron* Step Zero").

66. *See Gonzales*, 546 U.S. at 258 (starting its analysis with whether a rule was "promulgated pursuant to authority Congress has delegated to the official").

67. *See id.* at 258–59 (explaining that, generally, the Attorney General has rulemaking authority to fulfill their powers under the Controlled Substances Act).

68. *See id.* at 259 (finding that the Attorney General's rulemaking authority under the Controlled Substances Act is limited to rules relating to registration and control).

69. *See id.* (striking down a rule because the Attorney General did not have the narrow power to promulgate the rule at issue).

70. *See id.*

71. *Chevron U.S.A. Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837, 843–44 (1984).

72. *Id.*

73. *Id.* at 865.

74. *Id.* at 842–43.

Step two of the traditional *Chevron* analysis is whether an agency's regulatory action was reasonable and permissible.⁷⁵ Because reasonableness and permissibility constitute deferential standards, once a court establishes that a statute is ambiguous, it generally gives "controlling weight" to an agency's decisions.⁷⁶ The court provides this amount of deference so that it does not encroach on the policy process allocated to the legislative and executive branches.⁷⁷ Despite this high deference, however, courts are reluctant to uphold a regulation in which an agency expands its jurisdiction, but courts will allow an agency to interpret the scope of its jurisdiction so long as it stays within the bounds of its statutory authority.⁷⁸

After completing the two-step analysis, courts still must ascertain whether an agency gave notice and whether that notice and the procedure were fair.⁷⁹ Then, courts must also decide whether an agency's actions were arbitrary or capricious, a lenient standard that, again, gives agencies broad deference.⁸⁰ Because this Note is forward-looking in examining an agency's authority instead of examining a past agency action, it only focuses on Step Zero and the traditional *Chevron* two-step analysis.

In the event that multiple agencies satisfy the *Chevron* standard and have proper authority to regulate one area, the courts will defer to one agency.⁸¹ The Court in *Gonzales* decided that in areas where multiple

75. *Id.* at 866.

76. 467 U.S. at 844.

77. *Id.* at 865–66. Because this Note is forward-looking, its *Chevron* analysis is slightly different. Instead of analyzing an agency's interpretation of an enabling statute and deciding whether that interpretation deserves deference, this Note examines whether, under the traditional *Chevron* analysis, NOAA would prospectively have authority to issue broad regulations regarding outer space resource extraction, pursuant to its existing enabling statutes.

78. Compare *FDA v. Brown & Williamson Tobacco Corp.*, 529 U.S. 120, 142 (2000) (holding that the Food and Drug Administration did not have jurisdiction over tobacco products), with *City of Arlington v. FCC*, 569 U.S. 290, 297 (2013) (establishing that courts should complete a *Chevron* analysis of an agency's statutory interpretation, even when it interprets that agency's jurisdiction). In distinguishing between an agency expanding its jurisdiction and an agency reasonably interpreting its jurisdiction, the Court has said, "[w]here Congress has established a clear [jurisdictional] line, the agency cannot go beyond it; and where Congress has established an ambiguous line, the agency can go no further than the ambiguity will fairly allow." *City of Arlington*, 569 U.S. at 307.

79. See *Chevron*, 467 U.S. at 863 (discussing notice and comment rulemaking).

80. *Id.* at 844.

81. *Gonzales v. Oregon*, 546 U.S. 243, 266 (2006).

agencies may have authority to regulate, the court will presume that Congress has delegated interpretive power to the agency with the most familiarity and expertise in the area.⁸² Courts make this presumption because “Congress [must have] intended to vest interpretive power in the administrative actor in the best position to develop these attributes.”⁸³ This presumption prevents overlapping and contradictory regulations coming from multiple agencies.⁸⁴

D. *The Revitalization of the Major Questions Doctrine*

The *Chevron* doctrine guided courts and the administrative state for over thirty years, and it spawned a slew of subsequent case law responsible for significant changes in how the government functions.⁸⁵ However, in 2022, the Supreme Court decided *West Virginia v. EPA*, which did not afford *Chevron* deference to the EPA’s interpretation of its statutory authority to regulate emissions.⁸⁶ While the impact of *West Virginia* is still unclear, the decision at least limits *Chevron* deference to administrative agencies; however, *West Virginia* can operate in harmony with *Chevron*.⁸⁷

In *West Virginia*, the Court examined the EPA’s authority to regulate carbon dioxide emissions from coal- and natural gas-fired power plants by requiring such facilities to either reduce their own energy production or subsidize increased sustainable energy production.⁸⁸ The Supreme Court held that this attempted regulation was a major

82. *Id.*

83. *Id.*

84. *See, e.g., id.* at 265–66 (comparing the Attorney General’s authority in the area to the Secretary of Health and Human Services’ authority).

85. *See generally* THOMAS W. MERRILL, *THE CHEVRON DOCTRINE* (2022) (providing an in-depth history of the *Chevron* doctrine). When Congress delegates regulatory functions to an agency, the permissible scope of the agency’s authority is governed by the agency’s enabling statutes. BENJAMIN M. BARCZEWSKI, *CONG. RSCH. SERV.*, R44954, *CHEVRON DEFERENCE: A PRIMER* summ. (2023). An agency must interpret these statutory authorizations to determine what Congress has authorized. *Id.*

86. *West Virginia v. EPA*, 142 S. Ct. 2587, 2614, 2616 (2022).

87. *See id.* at 2609 (reading previous cases decided under the *Chevron* doctrine, such as *FDA v. Brown & Williamson Tobacco Corp.*, 529 U.S. 120 (2000) and *Gonzales v. Oregon*, 546 U.S. 243 (2006), as being in line with the holding of *West Virginia* because, in those cases, the agencies were not “asserting highly consequential power beyond what Congress could reasonably be understood to have granted”).

88. *Id.* at 2599.

question under the major questions doctrine.⁸⁹ When an action poses a major question, meaning a question of vast economic or political significance, courts “expect Congress to speak clearly” to specifically authorize that action.⁹⁰

Because the Court in *West Virginia v. EPA* did not explicitly overrule *Chevron*, courts should read the two cases in harmony.⁹¹ Specifically, while a major questions analysis is a vital first step in deciding whether an administrative agency may have authority to perform a particular action, courts must still complete a *Chevron* analysis.⁹² If the action at issue does not present a major question *and* the action passes a *Chevron* analysis, then the court should afford the agency *Chevron* deference.⁹³ The steps for analysis then become the following:

89. *Id.* at 2610. While the Court has previously alluded to the major question doctrine in rejecting agency claims of authority, see, for example, *Brown & Williamson Tobacco*, 529 U.S. at 160 (finding that Congress would not have delegated “a decision of such economic and political significance to an agency in so cryptic a fashion”), *West Virginia* marks the first instance where the majority of the Court used the term “major questions doctrine” and officially incorporated it into the analysis for interpretation of agency action. See KATE R. BOWERS, CONG. RSCH. SERV. IF12077, MAJOR QUESTIONS DOCTRINE 1–2 (2022) (expressly referencing the term despite the doctrine’s implicit use in previous cases).

90. *Util. Air Regul. Grp. v. EPA*, 573 U.S. 302, 324 (2014) (expanding on the need for explicit delegation from Congress); see also *West Virginia*, 142 S. Ct. at 2605 (relaying the EPA’s description of the major questions doctrine and citing *Utility Air Regulatory Group*).

91. See Donald L. R. Goodson, *The Supreme Court Has Not Turned out the Lights on Chevron, and Lower Courts Should Continue to Apply It*, YALE J. REGUL.: NOTICE & COMMENT (Dec. 21, 2022), <https://www.yalejreg.com/nc/chevron-continue-to-apply> [<https://perma.cc/E7RG-JER8>] (encouraging lower courts to follow *Chevron* until the Supreme Court overrules it).

92. See *Util. Air Regul. Grp.*, 573 U.S. at 324 (completing a *Chevron* analysis *and* considering whether the agency’s interpretation presents a major question); BOWERS, *supra* note 89 (citing several cases in which courts found a lack of authority for agency interpretation under the major questions doctrine and, thus, declined to engage in a *Chevron* analysis).

93. See BOWERS, *supra* note 89 (enumerating in past cases the different approaches courts have taken in interpreting the relation between the major questions doctrine and *Chevron* analysis).

1. Does the regulation pose a major question?⁹⁴ If it does, then Congress must have spoken clearly on it.⁹⁵ If it does not, then *Chevron* analysis may continue.

2. Does the regulation fall under the agency's broad delegation of authority?⁹⁶

3. Does the regulation fall under the agency's narrow delegation of authority?⁹⁷

4. Is the regulation ambiguous?⁹⁸

5. Is the regulation reasonable?⁹⁹

If the answer is no to any of steps two through five, then the regulation may not stand.¹⁰⁰ However, if it passes the above steps, then a court may afford it the high level of *Chevron* deference.¹⁰¹

94. See *West Virginia*, 142 S. Ct. at 2609 (explaining the definition of a major question).

95. *Id.* Although these theoretical steps place the major questions doctrine before *Chevron*'s questions of ambiguity and reasonableness, this Note will conduct a complete *Chevron* analysis followed by a major questions analysis for simplicity and to demonstrate how the major questions doctrine changes the analysis of agency authority.

96. See *Gonzales v. Oregon*, 546 U.S. 243, 258 (2006) (explaining that the first step is whether *Chevron* should apply at all). See generally Sunstein, *supra* note 65 (explaining this step and the following step—step three—as *Chevron* “Step Zero”).

97. See *Gonzales*, 546 U.S. at 259 (focusing on the regulation at hand). See generally, Sunstein, *supra* note 65 (providing a comprehensive explanation of *Chevron* Step Zero).

98. See *Chevron U.S.A. Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837, 843–44, 862 (1984) (assessing whether the enabling statute was ambiguous).

99. See *id.* at 865–66 (assessing whether the enabling statute was reasonable and permissible). Although courts look to requirements beyond these, such as whether the regulation was arbitrary or capricious, this Note only focuses on the aspects of the test for regulatory authority that come from a traditional *Chevron* analysis combined with the major questions doctrine. *Cf. id.* at 844 (explaining courts still must examine whether a regulation is arbitrary or capricious).

100. See, e.g., *West Virginia*, 142 S. Ct. at 2610, 2616 (striking down an agency interpretation under the major questions doctrine). Compare *Encino Motorcars, LLC v. Navarro*, 138 S. Ct. 1134, 1139 (2018) (not affording deference where the agency did not list adequate reasons for its statutory interpretation), with *City of Arlington v. FCC*, 569 U.S. 290, 307 (2013) (affording an agency interpretation *Chevron* deference where there was no major question, the statute was ambiguous, and the agency's interpretation was reasonable).

101. See BOWERS, *supra* note 89 (describing how courts interpret the major questions doctrine in conjunction with the *Chevron* test); *Chevron*, 467 U.S. at 837, 843–44, 862, 865–66 (1984) (establishing *Chevron* deference).

II. ANALYSIS

While numerous agencies regulate commercial outer space activities, the traditional *Chevron* doctrine allows any agency with proper statutory authority to regulate.¹⁰² This Part demonstrates that under a traditional *Chevron* analysis, the Commercial Space Launch Competitiveness Act is ambiguous, allowing any agency with proper authority to regulate on-orbit resource extraction activities. It next argues that NOAA has proper authority under the *Chevron* doctrine to regulate on-orbit resource extraction activities.¹⁰³ This Part then illustrates how *West Virginia v. EPA* changes this analysis, and it juxtaposes *West Virginia v. EPA* and *Chevron* by discussing their advantages and disadvantages. Finally, it offers possible solutions to the lack of clear regulatory authority in the area.

A. *The Commercial Space Launch Competitiveness Act*

In finding the basis for agency authority over on-orbit resource extraction activities, the first place to look must be the U.S. Commercial Space Launch Competitiveness Act,¹⁰⁴ which establishes U.S. citizens' ability to extract resources in the first place.¹⁰⁵ While an agency claiming authority to regulate on-orbit resource extraction activities must also pass *Chevron* Step Zero, the U.S. Commercial Space Launch Competitiveness Act must serve as the initial statutory authority.¹⁰⁶ In the absence of any such explicit instruction, the analysis moves on to a more specific examination of each agency's authority.¹⁰⁷

The Act leaves the question of which agency would have the authority to regulate on-orbit resource extraction activities completely open.¹⁰⁸ It does not name any specific agency or imply any delegation; the only place where the statute mentions laws or regulations is when it cites, "in accordance with applicable law, including the international

102. *City of Arlington*, 569 U.S. at 297 (illustrating that the principal question under *Chevron* allows for multiple agencies, not just one, to have statutory authority).

103. While this Note argues that NOAA should act as the primary regulator of on-orbit resource extraction activities, other agencies, like the FAA and the FCC, would likely maintain their current roles in the regulation of outer space, such as approval of launches and communications, respectively.

104. U.S. Commercial Space Launch Competitiveness Act, 51 U.S.C. § 51303.

105. *Id.*

106. *See Chevron*, 467 U.S. at 843 (discussing explicit delegation of congressional power).

107. *See id.* at 842–43 (explaining the correct analysis).

108. *See* 51 U.S.C. § 51303.

obligations of the United States.”¹⁰⁹ The language “in accordance with applicable law” is vague because it does not reference any of the applicable laws to which an agency should refer when attempting to comply.¹¹⁰ Because the Act is ambiguous about whether Congress has delegated regulatory authority over on-orbit resource extraction activities to a specific agency, such authority must emanate from an existing source of agency authority.¹¹¹

Furthermore, the President has never clearly recommended an agency to oversee regulation of on-orbit resource extraction activities.¹¹² For example, Executive Order 13914 directed the Secretary of State to coordinate with other agencies and “take all appropriate actions to encourage international support” for outer space resource extraction.¹¹³ However, the State Department does not have regulatory power over commercial outer space activities, so other agencies are not precluded from such a regulatory role.¹¹⁴ Instead, the Executive Order directs the State Department to encourage international support and solidify the legality of resource extraction.¹¹⁵

Moreover, the White House’s National Space Policy declared U.S. policy goals for outer space operations, and it repeatedly advocated for the development of resource extraction technologies.¹¹⁶ However, it did not indicate a specific agency that would regulate outer space resource extraction.¹¹⁷ The report explained, “[t]he heads of *all* executive departments and agencies . . . , *consistent with their respective*

109. *See id.*

110. *See id.*

111. *See Chevron*, 467 U.S. 837, 842 (1984) (explaining that the first step is determining whether Congress has clearly spoken on the issue).

112. Agencies operate under the supervision of the President. *Kisor v. Wilkie*, 139 S. Ct. 2400, 2413 (2019) (plurality opinion). Thus, while a *Chevron* analysis focuses on congressional authority, the President’s recommendations may be pertinent in determining whether an agency acted reasonably. *See supra* note 24 and accompanying text.

113. Exec. Order. No. 13914, 85 Fed. Reg. 20381, 20381–82 (Apr. 6, 2020).

114. *See id.* (focusing on international actions and not mentioning regulation of such activities); *supra* note 50 and accompanying text (explaining the State Department’s role in the space program and that it does not have regulatory power over outer space activities).

115. *See* Exec. Order. No. 13914, 85 Fed. Reg. 20381, 20381–82 (Apr. 6, 2020) (ordering the State Department to negotiate treaties that encourage international support and establish safety standards for resource extraction).

116. *See* Memorandum on the National Space Policy, 85 Fed. Reg. 81755, 81756–57, 81761 (Dec. 9, 2020).

117. *See id.* at 81757.

missions and authorities, shall execute the guidance provided in this section *consistent with applicable law*.¹¹⁸ Again, like the U.S. Commercial Space Launch Competitiveness Act, this provision uses vague language with the phrase “consistent with applicable law” rather than referring to the specific applicable law.¹¹⁹ Furthermore, leaving execution of this guidance open to “*all* executive departments and agencies” creates maximum ambiguity concerning regulatory authority over resource extraction.¹²⁰ Because the report’s only limiting requirement is for agencies to regulate consistently with their respective missions and authorities, agencies must derive their authority to regulate resource extraction from existing law.¹²¹ By deferring to authority that Congress has previously delegated, this provision refrains from specifying an agency that would regulate the area.¹²² Therefore, not even the Executive Branch has spoken clearly on whether a specific agency should regulate on-orbit resource extraction activities.

Thus, Congress—along with the Executive Branch—has opted for vague and ambiguous language concerning agencies’ authority to regulate outer space resource extraction and has stated that agencies should rely on authority already delegated to them.¹²³ Congress is aware of how heavily regulated space travel already is and how many agencies have regulatory authority over commercial space travel because Congress is the body that delegated those regulatory powers.¹²⁴ If Congress had wanted to designate an agency to regulate on-orbit resource extraction activities, it would have done so. Therefore, any agency with reasonable statutory authority over the area could regulate on-orbit resource extraction activities according to a *Chevron*

118. *Id.* (emphasis added).

119. *Id.*; *see also supra* notes 109–10 and accompanying text (discussing the Commercial Space Launch Competitiveness Act’s language, “in accordance with applicable law” (quoting 51 U.S.C. § 51303.)).

120. *See* Memorandum on the National Space Policy, 85 Fed. Reg. at 81757 (emphasis added).

121. *See id.* (“[C]onsistent with their respective missions and authorities.”).

122. *See id.* (deferring to the authority that Congress previously delegated and *not* referring to a specific agency).

123. *See* U.S. Commercial Space Launch Competitiveness Act, 51 U.S.C. § 51303 (*not* clearly specifying an agency); Exec. Order No. 13914, 85 Fed. Reg. 20381, 20381–82 (Apr. 6, 2020) (same); Memorandum on the National Space Policy, 85 Fed. Reg. at 81757 (same).

124. *See supra* Section I.A (discussing the administrative jurisdictional framework and the various agencies that currently have regulatory power over commercial space actions).

analysis.¹²⁵ Consequently, the analysis turns to specific agencies' enabling acts to determine whether Congress has more clearly delegated authority to regulate on-orbit resource extraction activities outside of the U.S. Commercial Space Launch Competitiveness Act.

B. NOAA's Authority Under Chevron

Although NOAA is a lesser-known agency within the sphere of outer space activities regulation, it is best positioned to regulate on-orbit resource extraction activities. The act that enables NOAA to regulate outer space activities, via the Department of Commerce, is ambiguous as to whether NOAA has authority over on-orbit resource extraction activities.¹²⁶ Further, it would be reasonable and permissible for NOAA to regulate such activities. Therefore, under a *Chevron* analysis, NOAA would be afforded deference.

Since NOAA already regulates a range of activities in outer space, a court would likely find that it has broad authority to regulate outer space generally under a Step Zero Analysis.¹²⁷ Under Step Zero's broad power inquiry that examines the area over which an agency has authority, NOAA has authority over outer space activities.¹²⁸ NOAA currently regulates remote sensing technologies.¹²⁹ Additionally, NOAA has a specific office dedicated to the regulation of space commerce—the Office of Space Commerce—so it has broad authority over space commerce.¹³⁰

NOAA also passes the narrow power inquiry that examines whether an agency has the power to accomplish a specific act. NOAA has the narrow power to regulate commercial activities in outer space because it already issues regulations concerning commercial actors' remote sensing technologies.¹³¹ Because NOAA has both the broad and the

125. See *Chevron*, 467 U.S. 837, 865–66 (1984) (explaining that when a statute is left ambiguous, deference is given to the agency).

126. See 51 U.S.C. § 50702 (listing several broad outer space activities that NOAA may regulate via the Department of Commerce).

127. See *id.* (giving administrative authority to the Secretary of Commerce); see also *Gonzales v. Oregon*, 546 U.S. 243, 258 (2006) (explaining that the first question in a *Chevron* analysis is whether the *Chevron* standard should apply at all). See generally Sunstein, *supra* note 65 (explaining the concept of a *Chevron* Step Zero analysis).

128. See 51 U.S.C. §§ 50702, 60123 (providing NOAA authority over outer space).

129. See *id.* § 60123 (giving NOAA the power to regulate remote sensing technologies).

130. See *id.* § 50702 (establishing the Office of Space Commerce).

131. See 15 C.F.R. § 960 (governing remote sensing technology).

narrow power to regulate on-orbit resource extraction activities, it passes Step Zero and proceeds to the official *Chevron* analysis.

NOAA's enabling act¹³² is ambiguous because it leaves the scope of NOAA's authority open. Indeed, it provides a broad list of responsibilities.¹³³ Many of these specific responsibilities, such as "foster[ing] the conditions for the economic growth" and "coordinat[ing] space commerce policy," are equivocal.¹³⁴ For example, fostering economic growth can include actions to promote resource extraction, such as issuing regulations so that commercial actors who wish to participate in resource extraction have the benefit of predictability and run less risk of violating applicable laws.¹³⁵ Thus, while Congress specifies that NOAA has the authority to regulate remote sensing technologies, it uses ambiguous terms for NOAA's other responsibilities and does not set clear limitations on the extent of NOAA's authority in outer space.¹³⁶

Having established that the act providing NOAA with authority to regulate commercial outer space activities is ambiguous, NOAA's regulation of on-orbit resource extraction activities is also reasonable and permissible under a *Chevron* analysis. The 2020 White House Memorandum on Space Policy directed NOAA to take on a broad array of responsibilities.¹³⁷ Perhaps most importantly, the President instructed NOAA to delineate the existing processes necessary to meet international obligations and *lead* the development of regulations for planned space activities, including resource extraction activities.¹³⁸ Because of these provisions, NOAA would be acting reasonably and permissibly if it were

132. Specifically, this Section analyzes the Office of Space Commerce's Enabling Act, 51 U.S.C. § 50702.

133. See 51 U.S.C. § 50702 (defining the authority of NOAA's Office of Space Commerce).

134. *Id.*

135. See *id.*; Exec. Order. No. 13563, 76 Fed. Reg. 3821, 3821 (Jan. 11, 2011) (listing several aims for regulation, such as "promot[ing] predictability and reduc[ing] uncertainty").

136. See 51 U.S.C. § 50702 (establishing NOAA as the "principal unit for the coordination of space-related issues, programs, and initiatives within the Department of Commerce" and listing some, but not all, of its responsibilities within that role).

137. Memorandum on the National Space Policy, 85 Fed. Reg. 81755, 81766 (Dec. 16, 2020); see also Anderson et al., *supra* note 21 (explaining how a President's recommendations may be pertinent in determining the reasonableness of an agency's actions).

138. See Memorandum on the National Space Policy, 85 Fed. Reg. at 81769 (assigning new responsibilities to NOAA).

to regulate on-orbit resource extraction activities because it would be acting on the President's orders.¹³⁹

Congress's establishment of the Office of Space Commerce would also make NOAA's regulation of resource extraction reasonable.¹⁴⁰ Congress established the Office to "foster the conditions for the economic growth and technological advancement of the United States space commerce industry."¹⁴¹ Like the U.S. Commercial Space Launch Competitiveness Act, this provision establishing the Office of Space Commerce refers to an expansive authority to foster and facilitate economic growth and activity.¹⁴² The use of analogous language between these two statutes suggests that congressional intent was similar for each.¹⁴³ The fact that this language was included as an amendment in the same act that establishes private citizens' ability to conduct resource extraction, which is one possible way to foster economic growth and advance technologies, further connects NOAA with outer space resource extraction.¹⁴⁴ Furthermore, an alternate title to the U.S. Commercial Space Launch Competitiveness Act is the Space Resource Exploration and Utilization Act, suggesting that the focus of the act and its amendments was to promote outer space resource extraction.¹⁴⁵

The reasonableness of NOAA's regulation of on-orbit resource extraction activities is also supported by the fact that the American Space Commerce Free Enterprise Act, while never passing the Senate, proposed giving NOAA such authority.¹⁴⁶ While Congress has never

139. *See id.* at 81756, 81767, 81769 (listing the President's orders, including to lead the development of regulation for resource extraction).

140. *See* 51 U.S.C. § 50702(a) (establishing the Office of Space Commerce).

141. *Id.* § 50702.

142. *Id.* §§ 50702, 51302.

143. *See id.* (using the similar language of "foster the conditions for the economic growth and technological advancement of the United States space commerce industry" in § 50702 and "facilitate commercial exploration for and commercial recovery of space resources by U.S. citizens" in § 51302).

144. *See id.* § 50702 (aiming to facilitate economic growth).

145. *See* U.S. Commercial Space Launch Competitiveness Act, Pub. L. No. 114-90, 129 Stat. 704, 704, 720 (2015) (containing the Space Resource Exploration and Utilization Act of 2015).

146. American Space Commerce Free Enterprise Act, H.R. 2809, 115th Cong. § 3 (2018) (proposing delegating broad authority to the Department of Commerce for the certification of all nongovernmental space objects, which would include those objects used for commercial resource extraction); *see* Grush, *supra* note 48 (explaining how the bill's broad delegation of authority would allow the Department of Commerce to regulate commercial resource extraction).

explicitly delegated the authority to regulate outer space resource extraction to any one agency, the American Space Commerce Free Enterprise Act considered delegating that authority to NOAA by giving it broad regulatory power over all commercial space objects.¹⁴⁷ However, the fact that the bill never passed does not indicate that NOAA lacks the authority to regulate this area.¹⁴⁸ Rather than disagreeing on whether NOAA has the required expertise to take on more control over the regulation of commercial space, the bill was defeated because senators wanted closer regulation than the Act proposed.¹⁴⁹ Consequently, this Act and its legislative history further demonstrate congressional intent for NOAA to regulate on-orbit resource extraction activities, which makes NOAA's authority in this area more reasonable.¹⁵⁰

NOAA's authority to regulate resource extraction would also be reasonable because NOAA regulates analogous issues, such as deep seabed mining, which gives it expertise in issuing regulations in a similar area to outer space resource extraction.¹⁵¹ Resource extraction is analogous to deep seabed mining because both involve advanced technology that extracts resources from remote and harsh environments, and both have similar international legal schema.¹⁵² Space is treated as international waters, like the waters where deep seabed mining occurs.¹⁵³ To solve some of the legal issues surrounding deep seabed

147. H.R. 2809, 115th Cong. § 3 (giving the Secretary of Commerce certification authority over commercial space objects), modifying 51 U.S.C. § 80102.

148. See Grush, *supra* note 48 (explaining that many senators wanted stricter regulations of outer space resource extraction).

149. See *id.* (discussing the debate over the Act). In fact, while some legislators question whether the FAA would have the expertise to regulate this area, many senators want to develop this bill further, giving NOAA even more authority and implying that it does have the requisite expertise, at least in comparison to the FAA. *Id.*

150. *Id.*; see also D.J. Tice, *The Age of Indecision*, STAR TRIB. (June 26, 2021, 6:00 PM), <https://www.startribune.com/the-age-of-indecision/600072447> [<https://perma.cc/UF4B-7AYM>] (explaining and lamenting the current age of indecision and inaction in Congress).

151. See, e.g., 30 U.S.C. § 1412 (providing licenses for deep seabed exploration and permits for resource recovery).

152. See Hope M. Babcock, *The Public Trust Doctrine, Outer Space, and the Global Commons: Time to Call Home ET*, 69 SYRACUSE L. REV. 191, 234–35 (2019) (explaining some similarities between deep seabed mining and outer space resource extraction).

153. Compare 30 U.S.C. § 1401 (establishing the regulatory framework for deep seabed mining and declaring that the “mineral resources of the deep seabed are the common heritage of mankind”), with Outer Space Treaty, *supra* note 61, at 2412–13 (“The exploration and use of outer space . . . shall be the province of all mankind.”).

mining, NOAA issues licenses dictating where private parties can mine, and it requires reports from licensees on what has been mined.¹⁵⁴ NOAA could use a similar system to regulate outer space resource extraction, making its authority over the area even more reasonable.¹⁵⁵ Moreover, similar to outer space resource extraction, one issue with deep seabed mining is environmental protection.¹⁵⁶ Deep seabed mining involves taking resources from the deep seabed, which could lead to a potential depletion of oceanic resources, similar to the risk of depletion of outer space resources that resource extraction carries.¹⁵⁷

By only regulating remote sensing technology, NOAA may currently have a smaller area of authority in commercial space compared to the FAA and the FCC.¹⁵⁸ However, being within the Department of Commerce uniquely positions NOAA to regulate on-orbit resource extraction activities because, at its heart, resource extraction will be a new industry whose ultimate goal is commerce.¹⁵⁹ Moreover, resource extraction involves a myriad of complex issues, and because NOAA has experience with many of the same issues through regulating remote sensing technology, it could be better prepared for the specific regulation of on-orbit resource extraction activities.¹⁶⁰ For example,

154. See 15 C.F.R. § 970.102 (licenses); *id.* §§ 970.602, 970.2502 (mandatory reporting).

155. See 15 C.F.R. § 970.102 (licenses); *id.* §§ 970.602, 970.2502 (mandatory reporting).

156. See K. A. Miller, K. Bridgen, D. Santillo, D. Currie, P. Johnston & K. F. Thompson, *Challenging the Need for Deep Seabed Mining from the Perspective of Metal Demand, Biodiversity, Ecosystems Services, and Benefit Sharing*, 8 FRONTIERS MARINE SCI. 1, 4 (2021) (“Seabed mining will cause unavoidable, irreversible harm to deep-sea ecosystems and puts the health of the wider ocean at risk.”).

157. Compare *id.* (discussing the risk of deep seabed mining), with Specktor, *supra* note 7 (discussing the risk of depletion of outer space resources).

158. See 51 U.S.C. § 60125 (delegating the regulation of remote sensing technology to NOAA); see also *supra* notes 28–48 (comparing the regulatory authorities of the FCC, FAA, and NOAA).

159. See *National Oceanic and Atmospheric Administration*, DEP’T OF COM., <https://www.commerce.gov/bureaus-and-offices/noaa> [<https://perma.cc/7RMP-SCKA>] (stating that NOAA is within the Department of Commerce); Leonard David, *Space Mining Startups See a Rich Future on Asteroids and the Moon*, SPACE (Jan. 7, 2023), <https://www.space.com/space-mining-grinding-into-reality> [<https://perma.cc/ST6A-JJZV>] (discussing the financial opportunities of outer space mining).

160. See *Joint United Kingdom-United States Statement Regarding Global Positioning System (GPS) Intellectual Property*, GPS (2013), <https://www.gps.gov/policy/cooperation/uk/2013-joint-statement> [<https://perma.cc/2W4F-LPQR>] (discussing a joint statement between the United States and the United Kingdom regarding intellectual property rights).

remote sensing is one of only two on-orbit activities that an agency has clear statutory authority to regulate; due to such authority, NOAA already has distinctive experience in regulating on-orbit activities.¹⁶¹ The field of remote sensing also includes many commercial actors, so NOAA has experience in regulating commercial space activities.¹⁶²

Therefore, while NOAA may be lesser known than other space agencies, and while its current regulatory activities may focus primarily on remote sensing technology, the regulation of remote sensing technology would be advantageous and make it more reasonable for NOAA to regulate on-orbit resource extraction activities.¹⁶³ Moreover, Congress has implied a broad potential for NOAA to expand its regulation of outer space activities, especially commercial space activities.¹⁶⁴ Because NOAA's enabling act is ambiguous and its regulation of on-orbit resource extraction would be reasonable, it has proper authority under *Chevron* to regulate on-orbit resource extraction activities.

C. *Resource Extraction and the Major Questions Doctrine*

While NOAA's authority to regulate on-orbit resource extraction activities passes a *Chevron* analysis, such authority would fail under the major questions doctrine because it concerns a major question of vast economic and political significance. Like many outer space activities, outer space resource extraction is still being developed, let alone

related to GPS); *Unearthing the Future: The Vital Role of Remote Sensing and GIS in Mining*, SATPALDA (Sept. 27, 2023), <https://satpalda.com/blogs/the-vital-role-of-remote-sensing-and-gis-in-mining> [<https://perma.cc/X6LK-9KW2>] [hereinafter *Unearthing the Future*] (describing the use of remote sensing technology in resource extraction operations).

161. See Matthew Schaefer, *The Contours of Permissionless Innovation in the Outer Space Domain*, 39 U. PENN. J. INT'L L. 103, 117–18 (2017) (noting that remote sensing is one of only two on-orbit activities that Congress has clearly delegated to an agency).

162. See Todd Harrison & Matthew Strohmeier, *Commercial Space Remote Sensing and Its Role in National Security*, CTR. FOR STRATEGIC & INT'L STUDS. (Feb. 2, 2022), <https://www.csis.org/analysis/commercial-space-remote-sensing-and-its-role-national-security> [<https://perma.cc/NES7-CRC3>] (explaining how the high level of commercial competition in remote sensing technologies benefits the national security sector).

163. See *Unearthing the Future*, *supra* note 160.

164. See American Space Commerce Free Enterprise Act, H.R. 2809, 115th Cong. § 3 (2018) (granting NOAA an expanded purview for regulating commercial space activities).

carried out.¹⁶⁵ When companies commence regular resource extraction activities, it will have a major impact on the U.S. economy and society in general.¹⁶⁶ Outer space resource extraction could open an entirely new market, replete with new actors and problems.¹⁶⁷ Although these are reasons in support of regulating the area, they are also reasons why an agency cannot act without a clear congressional grant of authority under the major questions doctrine.¹⁶⁸

One example of a problem that could arise in the wake of outer space resource extraction is the advent of interstate conflicts over outer space resources.¹⁶⁹ With the possibility of U.S. citizens' actions causing or contributing to an international conflict, the authority of an agency to regulate these actions must be clear.¹⁷⁰ There can be no equivocality in the grant of authority because resource extractors will look to such agency to simultaneously protect them and constrain other actors.¹⁷¹ This potential for international impact further demonstrates that regulation of outer space resource extraction is a major question that Congress must decide.

The patchwork of agencies that currently regulate outer space activities makes the regulation of on-orbit resource extraction activities less clear and more indicative of a major question. Numerous agencies currently regulate commercial outer space activities, including the FCC, the FAA, and NOAA, which is to say nothing of the agencies that

165. See Knapp, *supra* note 3 (describing AstroForge's upcoming mission and previous failures in the industry).

166. See *supra* notes 4–7 and accompanying text (discussing the various benefits and costs of outer space resource extraction, including the potential to upend the U.S. economy).

167. See, e.g., Sarah Cruddas, *The Truth About Asteroid Mining*, BBC FUTURE (Jan. 5, 2016), <https://www.bbc.com/future/article/20160103-the-truth-about-asteroid-mining> [<https://perma.cc/VTR7-P6K6>] (considering the potential to make rocket fuel from water in space and discussing its advantages).

168. See *West Virginia v. EPA*, 142 S. Ct. 2587, 2609 (2022) (finding that where an agency action concerns a major question, the agency must point to a clear congressional grant of authority to uphold its authority for the action).

169. See Xu, *supra* note 6 (discussing the various conflicts that could arise from outer space resource extraction).

170. See *West Virginia*, 142 S. Ct. at 2609 (emphasizing the need for clarity); see also *Util. Air Regul. Grp. v. EPA*, 573 U.S. 302, 324 (2014) (emphasizing the need for clear congressional authorization when an agency action would entail a transformative expansion in the agency's authority).

171. Cf. *West Virginia*, 142 S. Ct. at 2612 (lamenting the danger of the EPA's actions if taken without clearer congressional delegation).

have a supplementary role.¹⁷² Because so many agencies are currently responsible for outer space regulation, giving the authority to regulate on-orbit resource extraction activities to one agency would upend the current order and significantly impact politics and the economy. For one agency to step up and regulate resource extraction would be for that agency to step outside the existing regulatory framework and throw it into disarray. To ignore the boundaries of such a framework would be to “use oblique or elliptical language to empower an agency to make a ‘radical or fundamental change’ to a statutory scheme,” which the Supreme Court has said would likely not be Congress’s intent.¹⁷³ To have the authority to assume such responsibility, an agency must have “more than a merely plausible textual basis for the agency action.”¹⁷⁴ While there are strong reasons for the FCC, the FAA, and NOAA to each have the authority to regulate on-orbit resource extraction activities, the existing complicated regulatory framework casts doubt on whether Congress has granted that authority; thus, courts have more reason to wait for Congress to plainly speak on the issue than to assume an agency has the authority to regulate on-orbit resource extraction activities.¹⁷⁵ Therefore, even assuming NOAA has authority under a *Chevron* analysis to regulate on-orbit resource extraction activities, it cannot do so without explicit indication from Congress.

The major questions doctrine’s consequence of confining agencies to regulate only those areas for which they have explicit congressional approval could promote inter-agency harmony by preventing agencies from regulating in another agency’s area. Doing so may also prevent a kind of “agency-shopping,” whereby commercial outer space actors ask permission for a resource extraction mission from whichever agency is

172. See Anderson et al., *supra* note 21, at 243–44 (explaining the basic regulatory framework for commercial outer space activities); see also *supra* note 56 (discussing the EPA’s coordination with space agencies).

173. *West Virginia*, 142 S. Ct. at 2609 (quoting *MCI Telecomms. Corp. v. Am. Tel. & Tel. Co.*, 512 U. S. 218, 229 (1994)) (“Extraordinary grants of regulatory authority are rarely accomplished through modest words, vague terms, or subtle device[s]” (internal quotations omitted) (quoting *Whitman v. Am. Trucking Ass’ns*, 531 U.S. 457, 468 (2001))).

174. *Id.*

175. See *Util. Air Regul. Grp.*, 573 U.S. at 324 (explaining that the lack of congressional approval is a factor contributing to the unreasonableness of the EPA’s action).

most likely to grant such permission.¹⁷⁶ However, these problems are more indicative of the *Chevron* doctrine's disadvantages in fields of overlapping agency authority—such as disputes over agency jurisdiction and lack of clarity about which agency can help with a problem—rather than the disadvantages of one agency acting as the primary regulator of on-orbit resource extraction activities.¹⁷⁷

On the contrary, however, the major question doctrine's consequence of forcing agencies to share responsibilities for regulating on-orbit resource extraction activities decreases the efficiency of outer space regulation and increases the risk of inter-agency discord.¹⁷⁸ If even one of a group of agencies with regulatory authority did not approve the same on-orbit resource extraction activities, it could create conflict.¹⁷⁹ Further, such an instance would promote confusion among outer space actors who are unsure to which agency they should listen.¹⁸⁰

The confusion surrounding the regulation of outer space resource extraction demonstrates the adverse impact that the major questions doctrine could have on the entire field of technology. Technological capabilities are continuously growing.¹⁸¹ Technology also often significantly impacts policy and the economy.¹⁸² Consequently, new

176. Cf. Patrick Mullinger, *The Mall of Litigation: The Dangers and Benefits of Forum Shopping in American Jurisprudence*, U. CIN. L. REV. (Nov. 17, 2021), <https://uc-lawreview.org/2021/11/17/the-mall-of-litigation-the-dangers-and-benefits-of-forum-shopping-in-american-jurisprudence> [<https://perma.cc/92SJ-L4P4>] (explaining the dangers of forum shopping).

177. See *Chevron, U.S.A., Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837, 865 (1984) (explaining the *Chevron* analysis).

178. See, e.g., Taylor Anne Moffett, *CFTC & SEC: The Wild West of Cryptocurrency Regulation*, 57 U. RICH. L. REV. 713, 720–21 (2023) (describing a turf war resulting from “open-ended jurisdictional boundaries”).

179. Cf. *Frequently Asked Questions (FAQs) NOAA Regulated Overflight Zones of West Coast National Marine Sanctuaries*, OFF. OF NAT'L MARINE SANCTUARIES, <https://sanctuaries.noaa.gov/flight/faqs.html> [<https://perma.cc/S23L-RBPT>] (explaining that the FAA does not view NOAA's flight regulations over certain marine sanctuaries as airspace regulations nor as infringing on the FAA's authority).

180. See *supra* Section I.A for an explanation of the maze of agencies that regulate outer space activities.

181. See, e.g., Paul Michael, *Technology Statistics: How Fast Is Tech Advancing?*, MEDIA PEANUT (Feb. 12, 2023), <https://mediapeanut.com/how-fast-is-technology-growing-statistics-facts> [<https://perma.cc/HN64-WZKD>] (explaining that computer processing speed doubles about every eighteen months).

182. See Zia Qureshi, *Technology and the Future of Growth: Challenges of Change*, BROOKINGS (Feb. 25, 2020), <https://www.brookings.edu/articles/technology-and-the-future-of-growth-challenges-of-change> [<https://perma.cc/7H9A-7P2B>] (explaining

technological developments will frequently be a major question because, like outer space resource extraction, new technological developments constantly bring in new actors and problems that could cause considerable conflict among agencies, individuals, and States.¹⁸³

The reinvention of the major questions doctrine in *West Virginia v. EPA* thus poses serious problems for fields closely linked to technology: technology develops quickly, and technological leaps often impact both politics and the economy greatly.¹⁸⁴ Consequently, the regulation of many new technologies could constitute major questions.¹⁸⁵ However, categorizing the regulation of a technological leap as a major question would mean that Congress would have to speak clearly on the regulation of every technological leap.¹⁸⁶ Because of the slow movement of Congress, clarity on agency authority in these

the major economic impacts that technology can have on sectors like the labor market). Technology also significantly impacts the rules and regulations passed by government agencies, influencing the issues on which these agencies focus. *See, e.g.*, Denise Grady, Abby Goodnough & Noah Weiland, *F.D.A. Authorizes Moderna Vaccine, Adding Millions of Doses to U.S. Supply*, N.Y. TIMES (Dec. 18, 2020), <https://www.nytimes.com/2020/12/18/health/covid-vaccine-fda-moderna.html> [<https://perma.cc/XJP6-RQK5>] (discussing the red tape that the FDA “cut through” to make COVID vaccines available for Americans).

183. *Cf. supra* notes 169–71 and accompanying text for a description of the possibility that outer space resource extraction will lead to international conflict.

184. *See, e.g.*, Vinod Yeruva, *Autonomous Vehicles and Their Impact on the Economy*, FORBES (Feb. 14, 2022), <https://www.forbes.com/sites/forbestechcouncil/2022/02/14/autonomous-vehicles-and-their-impact-on-the-economy> [<https://perma.cc/Z9KF-DRWB>] (explaining how significant the economic impact of self-driving cars will be); BARBARA M. HARDING, JEFFERY J. JONES, CHARLES H. MOELLENBERG JR., MAURICIO F. PAEZ, JEFF RABKIN, EMILY J. TAIT & CHARLOTTE H. TAYLOR, JONES DAY, *AUTONOMOUS VEHICLES: LEGAL AND REGULATORY DEVELOPMENTS IN THE UNITED STATES* 5–6 (Jul. 2021), <https://www.jonesday.com/-/media/files/publications/2021/05/autonomous-vehicles-legal-and-regulatory-developments-in-the-us/files/autonomous-vehicles-legal-and-regulatory-developme/fileattachment/autonomous-vehicles-legal-and-regulatory-developm.pdf> [<https://perma.cc/A4KC-F97H>] (describing the patchwork of agencies that regulate driving, as well as the lack of regulation or a primary agency that could decisively regulate self-driving cars).

185. *See West Virginia*, 142 S. Ct. 2587, 2605 (2022) (indicating that a decision constitutes a major question when it carries “vast economic and political significance”); *see also* Walter G. Johnson & Lucille M. Tournas, *The Major Questions Doctrine and the Threat to Regulating Emerging Technologies*, 39 SANTA CLARA HIGH TECH. L.J. 137, 168–73 (2023) (discussing the inherently economic and political nature of emerging technologies, the inability of agencies to regulate emerging technologies under the major questions doctrine, and the resulting policy issues and absurd outcomes).

186. *See West Virginia*, 142 S. Ct. at 2605 (requiring Congress to clearly delegate regulation concerning major questions to a particular agency).

areas would languish.¹⁸⁷ Without a clear statutory mandate, no agency could issue regulations to govern that new technology.¹⁸⁸ To require Congress to speak clearly on every major question would therefore cripple the government's ability to regulate new technological advancements.¹⁸⁹ Without intervention from Congress or an administrative agency, technology will continue to advance exponentially, unchecked by regulations, which is evident from the government's inability to regulate the emerging practice of outer space resource extraction. The "arrival" of the major questions doctrine will thus hinder the essential regulation of such technological advancements.¹⁹⁰

D. *The Most Familiarity and Expertise*

Because the regulation of on-orbit resource extraction activities is a major question, Congress must clearly designate an agency to which to delegate regulatory authority. Congress could either create a new agency or designate an existing agency.¹⁹¹ NOAA would have proper authority under a traditional *Chevron* analysis, meaning it is poised to be the primary regulator.¹⁹² Further, of the numerous space agencies, NOAA is best suited to the task because it has the most familiarity and expertise.¹⁹³ Where multiple agencies may have authority to regulate, courts will presume that Congress has delegated interpretive power to the agency in the "best position to develop these attributes."¹⁹⁴

187. See Tice, *supra* note 150 (describing the slow pace at which Congress moves).

188. See *West Virginia*, 142 S. Ct. at 2616 (rejecting the EPA's rule on emission reduction because it was a major question on which Congress needed to speak clearly).

189. For a more in-depth discussion on the specific challenges the major questions doctrine poses to regulation of emerging technologies, which often includes novel rulemaking and inherited regulation, see Johnson & Tournas, *supra* note 185.

190. See *West Virginia v. EPA*, 142 S. Ct. 2587, 2633–34 (2022) (Kagan, J., dissenting) (bemoaning the "arrival" of the major questions doctrine); *id.* at 2642 (explaining that Congress cannot keep up with the fast evolution of regulatory techniques, particularly in scientific and technical fields, and so agencies should fill the gap to ensure a statutory scheme remains effective); see also Johnson & Tournas, *supra* note 185 (discussing the ramifications of *West Virginia v. EPA* for scientific and technical fields).

191. See Todd Garvey & Daniel J. Sheffner, *Congress's Authority to Influence and Control Executive Branch Agencies*, Cong. Rsch. Serv. 1, 2 (2018) (explaining Congress's authority to create federal executive agencies).

192. See *supra* Section II.B arguing for NOAA's authority over outer space resource extraction activities.

193. See *supra* Section II.B.

194. See *Gonzales v. Oregon*, 546 U.S. 243, 266–67 (2006) (quoting *Martin v. Occupational Safety & Health Rev. Comm'n*, 499 U.S. 144, 153 (1991)).

Certain delegations of regulatory authority over general resource extraction activities are already clear; for example, the FAA clearly has the authority to approve launch and reentry, whereas the FCC clearly has the authority to regulate in-flight communications.¹⁹⁵ While maintaining this dispersion of regulatory authority may make the process of obtaining government approval for commercial space activities more inefficient, it also provides more checks and balances and allows agencies to specialize more narrowly.¹⁹⁶ However, Congress should only entrust regulatory authority over *on-orbit* resource extraction activities to one agency to create predictability rather than confusion for commercial actors.¹⁹⁷ Other space agencies can maintain their grant of authority over what they already regulate while the primary agency regulates all other on-orbit resource extraction activities, such as where to mine and what technology to use, thus streamlining and clarifying the process.¹⁹⁸

In entrusting regulatory authority over on-orbit resource extraction activities to one agency, Congress could create a new agency. By creating a new agency, that agency could focus on many different problems in the emerging commercial space economy, such as safety and environmental concerns. It could also contribute to the regulation of other emerging areas of commercial space activities, such as the

195. See *supra* notes 28–44 discussing the FCC’s and the FAA’s authority to regulate commercial space activities.

196. See *CFTC v. Schor*, 478 U.S. 833, 845 (1986) (explaining when an agency’s expertise is superior to that of a court); see also Gerardo Inzunza Higuera, *What Got Us Here, Won’t Get Us There: Why U.S. Commercial Space Policy Must Lie in an Independent Regulatory Agency*, 73 *HASTINGS L.J.* 105, 112–17 (2022) (deploring the inefficiency of the patchwork of agencies who managed emergencies before the introduction of the Federal Emergency Management Agency and the inefficiency of the current patchwork of outer space regulation).

197. *Gonzales*, 546 U.S. at 266.

198. While a dispersion of agency power may seem less than ideal, there are numerous activities over which multiple agencies hold concurrent regulatory authority. See, e.g., Clean Diamond Trade Act, 19 U.S.C. § 3905 (delegating authority over import regulation to U.S. Customs and Border Protection and authority over data collection to the Bureau of the Census). While U.S. Customs and Border Protection is the primary regulator over importation of conflict diamonds, the Bureau of the Census oversees “collecting, compiling, and publishing” statistics on the export and import of conflict diamonds because of its expertise in producing data about the economy. Carolyn Francis, *Census Bureau Key to Tracking Conflict Diamonds Data*, U.S. CENSUS BUREAU (May 4, 2018), <https://www.census.gov/library/stories/2018/05/diamonds-kimberley-process.html> [<https://perma.cc/2TVW-DFG9>].

colonization of other planets.¹⁹⁹ However, a new agency would also have to be built from the ground up. It would likely be more difficult to establish a new agency than to simply delegate authority to an existing agency because a new agency would take more congressional action than would delegation to an existing agency.²⁰⁰ Additionally, a new agency would not have the same expertise that existing agencies have developed in the field.

Congress could also explicitly delegate authority to an existing agency. Because the Court in *Gonzales* held that where multiple agencies have overlapping authority, the one with the most expertise should have priority, NOAA would be the best agency to assume authority to regulate on-orbit resource extraction activities.²⁰¹ As opposed to a brand new agency, NOAA already has existing infrastructure and experience in the field of regulation of commercial space activities because it regulates remote sensing technologies, an area inhabited by many commercial space actors.²⁰² As a part of the Department of Commerce, NOAA is also uniquely situated to regulate on-orbit resource extraction activities because resource extraction is transactional in nature and involves obtaining, selling, and trading resources.²⁰³

NOAA also regulates deep seabed mining, which is closely analogous to resource extraction.²⁰⁴ Not only are the two activities similar in their highly technical nature and their goal of extracting resources in harsh and largely unexplored environments, but the current international

199. See *Mars & Beyond*, SPACE X (2022), <https://www.spacex.com/human-spaceflight/mars> [<https://perma.cc/5QY9-RZ9L>] (discussing SpaceX's idea for a colony on Mars).

200. See Tice, *supra* note 150 (lamenting the "age of indecision" in which Congress is currently frozen).

201. See *Gonzales*, 546 U.S. at 266–67 (quoting *Martin v. Occupational Safety & Health Rev. Comm'n*, 499 U.S. 144, 153 (1991)); *supra* notes 151–64 and accompanying text (describing NOAA's expertise and familiarity with deep seabed mining and remote sensing).

202. See 15 C.F.R. § 960 (2020) (regulating remote sensing); see also Sandra Erwin, *Remote Sensing Companies Try to Capture Bigger Piece of Satellite Imaging Market*, SPACE NEWS (Mar. 26, 2023), <https://spacenews.com/remote-sensing-companies-try-to-capture-bigger-piece-of-satellite-imaging-market> [<https://perma.cc/K6SP-2EZQ>] (describing the expanding scope of remote sensing companies' activities).

203. See *supra* notes 159–63 and accompanying text for a discussion of the extent to which commerce will be involved in the practice of outer space resource extraction.

204. See, e.g., Babcock, *supra* note 152 (analogizing deep seabed mining to resource extraction).

legal schemes for these activities are also similar.²⁰⁵ The two activities also pose similar risks, such as environmental hazards and global benefit sharing challenges.²⁰⁶ Thus, NOAA's experience regulating deep seabed mining would allow it to develop a similar regulatory framework for on-orbit resource extraction.²⁰⁷

Congress has also already given NOAA an expansive delegation of power, with a great deal of potential to develop and expand its current role in commercial outer space activities, meaning NOAA is most likely in the "best position to develop these attributes."²⁰⁸ Furthermore, Congress has already proposed that NOAA oversee regulation in this area in a bill that passed in the House but failed in the Senate for reasons unrelated to NOAA's proposed authority.²⁰⁹

Regardless of whether Congress creates a new agency or explicitly delegates authority to an existing agency, it should supplement the new or existing agency with other agencies' enforcement mechanisms, especially during the transition period. These supplementary mechanisms can provide support while building the necessary infrastructure within the primary regulatory agency.²¹⁰ They can also create a coordinated effort that will be able to consider all aspects of resource extraction.²¹¹

205. See Lisa A. Levin, Diva J. Amon & Hannah Lily, *Challenges to the Sustainability of Deep-Seabed Mining*, 3 NAT. SUSTAINABILITY 784, 786 (2020) (explaining that "[t]he remoteness of most of the deep ocean combined with the harsh operating conditions . . . requir[e] expensive and technical equipment"); David Sarnacki, *Property Rights in Space: Asteroid Mining*, 2 TEX. A&M J. PROP. L. 123, 134–37 (2014) (analogizing the Moon Treaty's treatment of resource extraction to the Law of the Sea Treaty's treatment of deep seabed mining).

206. See K. A. Miller, K. Brigden, D. Santillo, D. Currie, P. Johnston & K.F. Thompson, *Challenging the Need for Deep Seabed Mining from the Perspective of Metal Demand, Biodiversity, Ecosystems Services, and Benefit Sharing*, 8 FRONTIER MARINE SCI. 1, 4–5 (2021) (explaining some of the consequences of deep seabed mining); *supra* notes 5–6 and accompanying text (discussing the hazards of outer space resource extraction).

207. See 15 C.F.R. Part 971 (2020) (establishing a licensing scheme for extracting minerals from the deep seabed); *supra* notes 155–57 and accompanying text (suggesting that NOAA develop a similar licensing scheme for resource extraction).

208. See *Gonzales*, 546 U.S. at 266–67 (quoting *Martin v. Occupational Safety & Health Rev. Comm'n*, 499 U.S. 144, 153 (1991)).

209. See American Space Commerce Free Enterprise Act, H.R. 2809, 115th Cong. § 7 (2018) (expanding licensing for the registration of space objects).

210. See *supra* note 191 (explaining Congressional authority for creating new federal executive agencies for regulatory purposes).

211. See *supra* note 186 (utilizing Congress' ability to create federal executive agencies to foster interagency cooperation on resource extraction).

CONCLUSION

Outer space resource extraction is growing more feasible as technologies advance and humans move farther into space. Because of this inevitable advancement, the United States must establish a regulatory framework so that commercial actors can act with certainty and predictability. Establishing a regulatory framework will also help ensure that humans conduct resource extraction activities safely, with due regard for both the space and Earth environments. If the United States does not establish a regulatory framework, outer space exploration may go the same way that exploration on Earth did, with people tearing across new lands and depleting them of resources.

NOAA currently has authority under *Chevron* to regulate on-orbit resource extraction activities. However, because authority over such regulation is a major question, Congress must clearly delegate such authority to a specific agency. Under *Gonzales*, NOAA would be in the best position to assume this role because it regulates analogous areas, has expertise in the field, and has the broadest delegation of authority, especially with regard to space commerce. By establishing NOAA as the controlling authority for the regulation of on-orbit resource extraction activities, Congress can avoid potentially irreversible environmental effects, accidents in outer space due to a lack of safety regulations, unregulated competition and trade disputes, and much more.