

Calendar No. 525

116TH CONGRESS }
2d Session }

SENATE

{ REPORT
116-262 }

NATIONAL AERONAUTICS AND SPACE AD-
MINISTRATION AUTHORIZATION ACT OF
2019

R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND
TRANSPORTATION

ON

S. 2800



SEPTEMBER 8, 2020.—Ordered to be printed

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED SIXTEENTH CONGRESS

SECOND SESSION

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 2019

SEPTEMBER 8, 2020.—Ordered to be printed

Mr. WICKER, from the Committee on Commerce, Science, and
Transportation, submitted the following

R E P O R T

[To accompany S. 2800]

[Including cost estimate of the Congressional Budget Office]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 2800) to authorize programs of the National Aeronautics and Space Administration, and for other purposes, having considered the same, reports favorably thereon with an amendment (in the nature of a substitute) and recommends that the bill (as amended) do pass.

PURPOSE OF THE BILL

The purpose of S. 2800, the National Aeronautics and Space Administration Authorization Act of 2019, is to authorize programs of the National Aeronautics and Space Administration (NASA) for fiscal year 2020. The bill outlines key policies and authorities to advance space exploration, support science, enhance student engagement, and secure NASA's future workforce.

BACKGROUND AND NEEDS

Since Congress last passed a NASA authorization in 2017,¹ America's Government-led civil space program has seen dramatic changes in schedule and scope. Budgetary challenges and the Government shutdown from December 2018 to January 2019 have impeded the agency's progress toward its exploration and science

¹ NASA Transition Authorization Act of 2017; Pub. L. 115-10.

goals. This bill builds upon previous authorization efforts to guide the agency during this critical time.

HUMAN EXPLORATION: MOON TO MARS AND THE ARTEMIS PROGRAM

In December 2017, President Trump signed Space Policy Directive-1 (SPD-1), which directs NASA to lead an innovative and sustainable program of exploration to enable human expansion across the solar system. SPD-1 also instructs NASA to lead the return of humans to the Moon, for long-term exploration and utilization, followed by human missions to Mars and other destinations. NASA is taking a phased approach to meeting this goal, beginning with science and technology research on the International Space Station (ISS), unmanned lunar exploration missions, crewed missions around and to the surface of the Moon, and eventually, to the vicinity and surface of Mars.

On March 26, 2019, Vice President Pence announced an accelerated plan to land the first American woman and the next American man at the South Pole of the Moon by 2024 and establish a sustained presence on and around the Moon by 2028.² The intended goals of the lunar exploration program are to: (1) prove technologies that will facilitate sending humans to Mars in the future; (2) seed innovation and new technology development; (3) enhance U.S. industry and international partnerships in deep space; (4) expand U.S. global economic impact; (5) reinforce U.S. leadership and strategic presence in space; and (6) inspire a new generation of science, technology, engineering, and mathematics (STEM) professionals.³

The directive to return to the South Pole of the Moon by 2024 with a larger vision of sustained presence on the Moon was named the Artemis program, after the twin sister of the Greek god Apollo. Rather than one-off lunar missions, such as the ones performed during the Apollo program, NASA intends for the Artemis program to develop the capabilities for a sustained human presence on the Moon by 2028. By developing an exploration outpost and in-situ resource utilization, NASA intends for missions to the Moon to eventually enable human missions to Mars.

The Artemis program will utilize NASA's Space Launch System (SLS) heavy lift rocket. SLS will consist of a core stage with boosters, upper stage, and payload, which will hold either cargo or the Orion crew vehicle. The first flight of SLS, Artemis 1 (formerly Exploration Mission-1), will fly the Orion crew vehicle using the Interim Cryogenic Propulsion System (ICPS) upper stage, which is a modified version of the Delta IV rocket's upper stage currently used for national security and scientific payload launches. For later missions, NASA plans to develop a more powerful upper stage known as the Exploration Upper Stage (EUS), as required by the NASA Authorization Act of 2010.⁴ EUS will have nearly twice the power of the ICPS and will be able to launch heavier payloads to the

²Michael Pence, "Vice President's Remarks at the Fifth Meeting of the National Space Council-Huntsville, AL," Mar. 26, 2019 (<https://www.whitehouse.gov/briefings-statements/remarks-vice-president-pence-fifth-meeting-national-space-council-huntsville-al/>) (accessed May 1, 2020).

³NASA, "Forward to the Moon: NASA Strategic Plan for Lunar Exploration," Sep. 4, 2019 (https://www.nasa.gov/sites/default/files/atoms/files/america_to_the_moon_2024_artemis_20190523.pdf) (accessed May 1, 2020).

⁴NASA Authorization Act of 2010; Pub. L. 111-267.

Moon and Mars. With EUS, SLS will be the most capable rocket ever built.⁵

A key component of the Artemis program will be the development of the Gateway, a command and service module that is capable of being positioned in a variety of lunar orbits.⁶ The Gateway would allow astronauts to access the entire lunar surface and support the development of a reusable human lander system for sustainable lunar exploration, scientific research, in-situ resource utilization, and other activities as capabilities evolve and advance. The Gateway is meant to prepare the United States for larger lunar robotic missions and is viewed by NASA as vital to advancing human space exploration goals, such as leading the return of humans to the surface of the Moon and future missions to Mars.⁷ The current plan is for Gateway to be constructed using the Orion spacecraft and the SLS launch vehicle, with the first element launching no earlier than 2022. NASA intends for the Gateway to be an extension of the international cooperation of the ISS partnership, with partner nations delivering key pieces of the Gateway infrastructure. In February of 2019, Canadian Prime Minister Justin Trudeau announced that Canada would partner with NASA on the Gateway and provide a robotic arm similar to the one on ISS.⁸

On May 23, 2019, NASA selected a contractor to develop and demonstrate power, propulsion, and communications capabilities for Gateway, including the solar electric power and propulsion element (PPE) that will make up the first module of the Gateway.⁹ The firm-fixed price contract has a maximum total value of \$375 million, and the PPE is expected to launch on a commercial rocket in late 2022. On June 14, 2019, NASA issued a draft solicitation for U.S. companies to deliver logistics services to the Gateway, including cargo, science, and supply payloads, with the maximum contract award for all Gateway services over 15 years valued at \$7 billion.¹⁰

The strategic changes that NASA intends to implement in order to successfully achieve the Moon by 2024 goal, compared to the previous 2028 plan, include reducing facility complexity for Gateway, simplifying crew operations on the lunar surface, accessing the lunar South Pole first before planning global access, and adjusting mission durations as needed.

In a May 2019 report, the Government Accountability Office (GAO) found that the cost, schedule, and performance of NASA's portfolio of major projects, including the systems being developed

⁵NASA, "NASA Explores with Space Launch System," Jan. 29, 2020 (<https://www.nasa.gov/exploration/systems/sls/index.html>) (accessed Apr. 30, 2020).

⁶NASA, "Sending Astronauts to Moon in 2024: NASA Accepts Challenge," Apr. 9, 2019 (<https://www.nasa.gov/feature/sending-american-astronauts-to-moon-in-2024-nasa-accepts-challenge>) (accessed Apr. 30, 2020).

⁷NASA, "Gateway Memorandum for the Record," May 2, 2018 (https://www.nasa.gov/sites/default/files/atoms/files/gateway_domestic_and_international_benefits-memo.pdf) (accessed Apr. 30, 2020).

⁸NASA, "Canada Commits to Joining NASA at the Moon," Feb. 28, 2019 (<https://blogs.nasa.gov/bridenstine/2019/02/28/canada-commits-to-joining-nasa-at-the-moon/>) (accessed Apr. 30, 2020).

⁹NASA, "NASA Awards Artemis Contract for Lunar Gateway Power, Propulsion," May 23, 2019 (<https://www.nasa.gov/press-release/nasa-awards-artemis-contract-for-lunar-gateway-power-propulsion>) (accessed Apr. 30, 2020).

¹⁰NASA, "NASA to Partner with American Industry to Supply Artemis Moon Missions," Jun. 14, 2019 (<https://www.nasa.gov/feature/nasa-to-partner-with-american-industry-to-supply-artemis-moon-missions>) (accessed Apr. 30, 2020).

for deep space exploration, have deteriorated over time.¹¹ The report highlighted technical challenges facing the SLS, Orion, and the Exploration Ground Systems (EGS), which have affected schedule and launch dates for Artemis 1 and Artemis 2 (formerly Exploration Mission-1 and Exploration Mission-2).¹² NASA generally agreed with the GAO's findings. Since then, NASA's prime contractor for SLS accelerated the delivery schedule for the first unit SLS Core Stage, allowing sufficient time for the completion of the complex engine section. The contractor-NASA team completed all SLS element integration in parallel with the development of the engine section. This has allowed the SLS program to recover approximately 6 to 7 months of its developmental timeline for SLS.

THE INTERNATIONAL SPACE STATION AND THE FUTURE OF LOW-EARTH ORBIT

With the current authorization for the ISS expiring in 2024, the future of microgravity research remains in flux. This bill would introduce certainty by extending authorization to 2030, while directing NASA to continue efforts aimed at fostering a robust economy in low-Earth orbit (LEO) through commercial utilization and expansion of LEO infrastructure.

As NASA prepares for human expeditions into deep space, the ISS remains a critical testbed for technologies and procedures that will be required to keep astronauts healthy and productive on long-duration missions away from Earth. According to NASA's Human Research Program, a LEO platform like the ISS is necessary to develop effective mitigations for human health hazards inherent in the space environment, such as microgravity. The LEO environment is also ideal for testing technological systems such as life support, power generation, and communications, in a location close enough to Earth for easy troubleshooting and resupply.

NASA largely relies on traditional Federal Acquisition Regulations contracts with private corporations for much of the day-to-day operation and maintenance of the non-Russian portions of the ISS. NASA has also had success using public-private partnerships to achieve some of the agency's key missions, resulting in an expansion of the commercial space sector. The ISS, including the ISS national laboratory, is fostering the development of a self-sustaining economy in LEO, in part by providing a platform for commercial and academic research in microgravity. The success of NASA's commercial cargo resupply effort is now paving the way for private, crewed flights to orbit. NASA's commercial LEO development program is aimed at expanding opportunities for private entities to further utilize and expand upon ISS infrastructure with private free-flyer modules of their own.¹³

CARGO RESUPPLY AND COMMERCIAL CREW PROGRAM

Part of NASA's current balanced approach to space exploration is the development of vehicles capable of conducting both commercial and Government missions. NASA has partnered with the com-

¹¹ U.S. Government Accountability Office, *NASA: Assessment of Major Projects*, GAO-19-262SP, May 2018 (<https://www.gao.gov/products/GAO-19-262SP>) (accessed Apr. 30, 2020).

¹² Artemis-2 is the first crewed integrated flight test of the SLS and the Orion spacecraft.

¹³ NASA, "NASA's Vision for Low Earth Orbit Economy," Jun. 7, 2019 (<https://www.nasa.gov/leo-economy/vision-for-low-earth-orbit-economy>) (accessed Apr. 30, 2020).

mercial space industry for cargo and crew delivery to the ISS as part of both the Commercial Resupply Services Program and Commercial Crew Program.¹⁴ To address the cargo resupply needs, NASA initiated the Commercial Orbital Transportation Services (COTS) program in 2006 to partner with commercial aerospace companies to develop orbital transportation services for delivering cargo to the ISS. This program resulted in two new U.S. launch vehicles and two automated cargo spacecraft that are providing orbital transportation services and are currently supplying cargo to the ISS under the Commercial Resupply Services (CRS) program.¹⁵ In addition, on January 14, 2016, NASA awarded three CRS-2 contracts to fulfill the next phase of cargo delivery service missions to and from the ISS.¹⁶

Since the end of the Space Shuttle Program in July 2011, the United States has lacked the domestic capability to transport crew to the ISS, and has had to rely on the Russian Federal Space Agency to transport U.S. astronauts at prices ranging from \$21 million to \$82 million per roundtrip.¹⁷ NASA's Commercial Crew Program seeks to foster the development of a U.S. commercial space transportation capability to transport astronauts to and from the ISS. In 2014, NASA awarded fixed-priced contracts worth a total of \$6.8 billion to provide commercial crew transportation to the ISS.¹⁸ These contracts include specific milestones that each company must meet to secure payment, and will culminate in certification by NASA that the companies' systems meet the agency's safety and performance requirements.

SCIENCE

NASA's science portfolio encompasses an array of disciplines, including planetary science, heliophysics, astrophysics, astrobiology, Earth science, life sciences, physical sciences, and more. NASA's Science Mission Directorate currently oversees a portfolio of 86 active missions, with 31 more in the planning or development stage.¹⁹ In addition to flagship missions, such as the Hubble Space Telescope and Mars rovers, NASA has numerous Principal Investigator-led missions that yield impactful science discoveries while providing hands-on training to the next generation of scientists, engineers, and project managers. NASA's Science Mission Directorate also serves as the primary home for the agency's supercomputing capabilities, including quantum supercomputers, which benefit users across the agency.

JAMES WEBB SPACE TELESCOPE

The James Webb Space Telescope (JWST) is an infrared observatory with a 6.5-meter mirror that will orbit nearly a million miles

¹⁴NASA Authorization Act of 2010; Pub. L. 111-267, sections 401-402.

¹⁵NASA, "Commercial Crew and Cargo Program Office" (<http://www.nasa.gov/offices/c3po/home/#.U78CUPldURo>) (accessed Apr. 30, 2020).

¹⁶Sierra Nevada Corporation, "NASA Selects Sierra Nevada Corporation's Dream Chaser® Spacecraft for CRS2 Contract," Jan. 14, 2016 (<http://spaceref.com/news/viewpr.html?pid=47688>) (accessed Apr. 30, 2020).

¹⁷NASA, Office of Inspector General, *NASA's Commercial Crew Program: Update on Development and Certification Efforts*, IG-16-028, Sep. 1, 2016 (<https://oig.nasa.gov/docs/IG-16-028.pdf>) (accessed Apr. 30, 2020).

¹⁸Ibid.

¹⁹NASA, "NASA Science Missions" (https://science.nasa.gov/missions-page?field_division_tid=All&field_phase_tid=29) (accessed Apr. 30, 2020).

from Earth.²⁰ The scientific successor to the Hubble Space Telescope, JWST will study “every phase in the history of our Universe, ranging from the first luminous glows after the Big Bang, to the formation of solar systems capable of supporting life on planets like Earth, to the evolution of our own Solar System.”²¹ JWST will launch on an Ariane 5 rocket in 2021 from French Guiana as part of the European Space Agency’s contribution to the mission. Significant cost and schedule overruns have plagued JWST.²²

WIDE FIELD INFRARED SURVEY TELESCOPE

The Wide Field Infrared Survey Telescope (WFIRST) will be an orbiting observatory designed to “settle essential questions in the areas of dark energy, exoplanets, and infrared astronomy.”²³ It is expected to be roughly the same size as the Hubble Space Telescope, but will have a field of view 100 times greater, allowing it to survey the sky for nearby exoplanets and detect oxygen, water vapor, and other signatures of life in the exoplanets’ atmospheres.²⁴ The NASA Transition Authorization Act of 2017²⁵ directed NASA to continue concept definition and pre-formulation work on WFIRST while JWST is completed. However, the President’s fiscal year (FY) 2020 budget request “proposes to terminate funding for the [WFIRST] mission and focus on the completion of [JWST], now planned for launch in 2021.”²⁶ The Consolidated Appropriations Act, 2020,²⁷ provided NASA with \$510.7 million for FY 2020 for WFIRST. NASA has completed its preliminary design review (PDR) phase for the mission—a significant milestone for the program.²⁸

AERONAUTICS RESEARCH

Since the creation of NASA from the legacy National Advisory Committee on Aeronautics, the agency’s aeronautics research has played a key role in supporting and advancing U.S. aviation technology. The FY 2020 Consolidated Appropriations Act provided \$784 million in funding for aeronautics research.²⁹

NASA’s current array of flight demonstration, materials testing, and systems development programs include the X-59 Low-Boom Flight Demonstrator, as well as experiments to test electric propulsion and advanced composite materials. The X-59, which is currently in development, may reduce the loudness of a sonic boom to

²⁰ NASA, “NASA’s James Webb Space Telescope” (<http://webbtelescope.org/>) (accessed Apr. 30, 2020).

²¹ NASA, “About Webb Space Telescope” (<https://jwst.nasa.gov/about.html>) (accessed Apr. 30, 2020).

²² U.S. Government Accountability Office, *James Webb Space Telescope: Opportunity Nears to Provide Additional Assurance That Project Can Meet New Cost and Schedule Commitments*, GAO-19-189, Mar. 26, 2019 (<https://www.gao.gov/products/gao-19-189>) (accessed Apr. 30, 2020).

²³ NASA, “About WFIRST” (<https://wfirst.gsfc.nasa.gov/about.html>) (accessed Apr. 30, 2020).

²⁴ NASA, “How Do We Find Life” (<https://exoplanets.nasa.gov/the-search-for-life/life-signs/>) (accessed Apr. 30, 2020).

²⁵ Pub. L. 115-10.

²⁶ NASA, See “FY 2020 President’s Budget Request Summary” in FY 2020 Budget Estimates (https://www.nasa.gov/sites/default/files/atoms/files/fy_2020_congressional_justification.pdf) (accessed Apr. 30, 2020).

²⁷ Pub. L. 116-93.

²⁸ Jeff Foust, “WFIRST Passes Preliminary Design Review,” Space News, Nov. 11, 2019 (<https://spacenews.com/wfirst-passes-preliminary-design-review/>).

²⁹ Pub. L. 116-93.

that of a gentle thump,³⁰ potentially enabling commercial supersonic flights over land. The program also will gather data on aircraft noise and community input to assist in supersonic regulatory reform.

NASA is also continuing research into Unmanned Aircraft Systems Traffic Management, which will “monitor and manage drones weighing less than 55 pounds flying at or below 500 feet.”³¹ The program is being run in collaboration with the Federal Aviation Administration (FAA), which will seek to implement the results of NASA’s research into the National Airspace System.

SPACE TECHNOLOGY

Created in 2013 and codified by the NASA Transition Authorization of 2017, NASA’s Space Technology Mission Directorate (STMD) leverages government, university, and private sector research to serve as a catalyst for revolutionary technologies and solve the Nation’s toughest challenges in space. STMD currently oversees a portfolio of programs enabling cutting edge technology development, including the Emerging Space Office, Flight Opportunities program, Game Changing Development program, and Small Business Innovation Research/Small Business Technology Transfer programs. STMD is helping develop technologies that will enhance U.S. space superiority in areas such as in-space nuclear propulsion, nuclear surface power, optical communications, precision atmospheric entry, descent, and landing, and spacecraft autonomous systems.

INTERNATIONAL EXPLORATION CONSIDERATIONS

NASA is leveraging the ISS partnership as a starting point for broad international collaboration in space exploration beyond LEO. NASA states that “underscoring broad international support for a gateway, the 14 space agencies participating with NASA in the International Space Exploration Coordination Group have reached consensus regarding the importance of a gateway in expanding human presence to the Moon, Mars, and deeper into the solar system.”³² NASA will continue its ISS role as the lead integrator of spaceflight capabilities and contributions from both international and commercial partners. Since November 2011, appropriations legislation has prohibited NASA from directly partnering with the People’s Republic of China (PRC) on human spaceflight.³³ Unlike NASA’s mission as a civil space agency, China’s space enterprise remains a joint civil-military effort, aimed at establishing the PRC as the world’s dominant power in space.³⁴ Efforts by the PRC to obtain foreign technology and recruit foreign talent have become increasingly aggressive, and the Chinese Government has exploited

³⁰NASA, “Low-Boom Flight Demonstration Overview” (https://www.nasa.gov/mission_pages/lowboom/overview) (accessed Apr. 30, 2020).

³¹NASA, “Drone Traffic Management Researcher Nominated for Federal Award” (<https://www.nasa.gov/feature/ames/drone-traffic-management-researcher-nominated-for-federal-award>) (accessed Apr. 30, 2020).

³²NASA, Gateway Memorandum for the Record, May 2, 2018 (https://www.nasa.gov/sites/default/files/atoms/files/gateway_domestic_and_international_benefits-memo.pdf) (accessed Apr. 30, 2020).

³³Pub. L. 116–9, sec. 530 (<https://www.congress.gov/116/bills/hjres31/BILLS-116hjres31enr.pdf>) (accessed Apr. 30, 2020).

³⁴U.S.-China Economic and Security Review Commission, *2019 Annual Report to Congress* (<https://www.uscc.gov/annual-report/2019-annual-report>) (accessed Apr. 30, 2020).

various loopholes in U.S. export control laws to obtain ownership or influence in U.S. firms with advanced space capabilities.³⁵

Outside of NASA's exploration plans, China is continuing with an increasingly robust space exploration program, including plans for both a space station in LEO and a lunar exploration campaign. On January 3, 2019, China became the first nation to land a spacecraft on the far side of the Moon. These activities come in advance of a reported plan to land Chinese astronauts on the Moon.³⁶ Additionally, in July 2018, the European Space Agency and the Chinese space agency held a workshop to discuss "common and synergistic areas of lunar science interest and expertise in Europe and China."³⁷

SUMMARY OF PROVISIONS

S. 2800, as enacted, would provide an authorization of appropriations for NASA for fiscal year 2020 at \$22.75 billion, an amount also reflected in S. 2584, the Commerce, Justice, Science, and Related Agencies Appropriations Act, 2020, as reported by the Committee on Appropriations of the Senate. Although the Committee sought to provide multiyear funding authorization for NASA in this bill, uncertainty surrounding development costs for the Artemis program and other programs precluded the Committee from making an informed decision regarding future authorization levels.

HUMAN EXPLORATION

If enacted, the bill would do the following:

- Support NASA's deep space human exploration program and explicitly name the Moon as an interim destination in support of eventual human exploration of Mars.
- Authorize the development of human-class lunar landers for the Artemis program using industry partnerships.
- Require the establishment of an outpost in orbit around the Moon.
- Support full utilization of the SLS through development of the Exploration Upper Stage.
- Direct NASA to invest in maintaining and improving space launch and rocket propulsion test infrastructure and capabilities.
- Support NASA's efforts to develop next-generation space suits for lunar surface operations and on-orbit extravehicular activities.
- Extend authorization for ISS to 2030.
- Foster a U.S.-led market economy in LEO by authorizing NASA's efforts to enable commercial activity and privately-funded platforms.
- Plan for a future robust LEO economy by establishing cost-share requirements for retaining full intellectual property

³⁵Id.

³⁶Sarah Kaplan, Gerry Shih, and Rick Noack, "China Lands Spacecraft on the Far Side of the Moon, a Historic First," *The Washington Post*, Jan. 3, 2019 (<https://www.washingtonpost.com/science/2019/01/03/china-lands-spacecraft-far-side-moon-historic-first/>) (accessed Apr. 30, 2020).

³⁷European Space Agency, "CNSA-ESA Workshop on Chinese-European Cooperation in Lunar Science" (<https://www.cosmos.esa.int/web/cnsa-esa-lunar-science/home>) (accessed Apr. 30, 2020).

rights in inventions, and authorizing a cost recoupment option for ISS-created inventions.

- Support NASA's life science and physical science fundamental research program in order to advance human activities in space.

SCIENCE

If enacted, the bill would do the following:

- Reaffirm that NASA should set science priorities based on the guidance of the decadal surveys of the National Academies of Sciences, Engineering, and Medicine.
- Support scientific research NASA conducts in areas such as planetary science, heliophysics, Earth science, astrobiology and astronomy.
- Direct NASA to continue work on the JWST and maintain the roughly \$8.8 billion cost cap on the program.
- Direct NASA to continue work on WFIRST in order to meet the objectives outlined in the 2010 decadal survey on astronomy and astrophysics.
- Authorize NASA, in accordance with recommendations made by the National Academies of Sciences, Engineering, and Medicine, to conduct lunar science research, including research into the potential of water ice at the polar regions of the Moon.
- Support NASA's efforts in Earth science and ensure that Earth science data remains publicly available.
- Encourage the use of commercially available platforms for sub-orbital science missions.
- Encourage NASA to prioritize missions of national need, including planetary defense and space weather outside of the competitive science mission selection process.
- Require NASA to improve planetary defense capabilities and complete the statutorily required survey of near-Earth objects with a dedicated space-based observatory.

AERONAUTICS RESEARCH

If enacted, the bill would do the following:

- Require development of experimental aircraft projects, or X-planes, to demonstrate and develop advanced aerospace technologies.
- Authorize NASA to continue research into advanced aerospace materials and manufacturing processes, including additive manufacturing and advanced composites.
- Facilitate integration of unmanned aircraft systems into the national airspace system by researching capabilities and concepts, in coordination with FAA.
- Authorize NASA to invest in facilities for aeronautics research and testing.
- Express the Sense of Congress that NASA continue existing hypersonic flight research efforts in coordination with the Department of Defense (DOD).

SPACE TECHNOLOGY

If enacted, the bill would do the following:

- Require NASA to maintain the Space Technology Mission Directorate.
- Support and expand the Commercial Reusable Suborbital Research Program (Flight Opportunities) for suborbital micro-gravity research.
- Direct NASA to continue work on nuclear propulsion technology and require a flight demonstration by the end of 2024.
- Support future Mars exploration efforts by directing NASA to focus on long-lead technologies such as entry, descent, and landing, in-space propulsion, cryogenic fluid management, and in-situ additive manufacturing.
- Encourage the development and deployment of advanced space communications technologies, such as optical communications and quantum encryption.

EDUCATION, WORKFORCE, PROCUREMENT, NASA INDUSTRIAL BASE,
AND MISCELLANEOUS PROVISIONS

If enacted, the bill would do the following:

- Direct NASA to leverage existing programs within the agency to engage students in STEM education.
- Require NASA to conduct K–12 outreach to inform students about careers in STEM fields and provide opportunities for students to observe NASA efforts where and when appropriate.
- Create an appointment and compensation pilot program within NASA to explore innovations in workforce structure flexibility.
- Authorize NASA to establish university-affiliated research centers in order to better support agency missions.
- Reduce the risk of technology or information transfer to the PRC.
- Streamline NASA contracting procedures by authorizing follow-on production contracts stemming from prototype projects.
- Require NASA to produce a report on the industrial base for civil space missions and operations in order to identify crucial supply chain components and capabilities.
- Increase the authorized separation incentive amount from \$20,000 to \$40,000 to achieve parity with other Federal agencies.

LEGISLATIVE HISTORY

S. 2800, the National Aeronautics and Space Administration Authorization Act of 2019, was introduced on November 6, 2019, by Senator Cruz (for himself and Senators Sinema, Wicker, and Cantwell) and was referred to the Committee on Commerce, Science, and Transportation of the Senate. On November 13, 2019, the Committee met in open Executive Session and, by voice vote, ordered S. 2800 reported favorably with an amendment (in the nature of a substitute).

The Committee held the following five hearings examining key issues addressed in the bill:

- Building the Space Workforce of the Future: STEM Engagement for a 21st Century Education (Subcommittee on Aviation and Space, November 5, 2019).
- Moon to Mars: NASA's Plans for Deep Space Exploration (July 17, 2019).

- NASA Exploration Plans: Where We've Been and Where We're Going (Subcommittee on Aviation and Space, July 9, 2019).
- The Emerging Space Environment: Operational, Technical, and Policy Challenges (Subcommittee on Aviation and Space, May 14, 2019).
- The New Space Race: Ensuring U.S. Global Leadership in the Final Frontier (March 13, 2019).

RELATED LEGISLATION

S. 3799—National Aeronautics and Space Administration Authorization Act of 2018

S. 3799, the National Aeronautics and Space Administration Authorization Act of 2018, was introduced on December 19, 2018, by Senator Cruz (for himself and Senators Nelson, Markey, Rubio, and Cornyn). That bill did not receive further action after it was introduced in the final days of the 115th Congress. However, that bill served as the base text for S. 2800.

S. 919—Space Frontier Act of 2019

The Space Frontier Act of 2019 was initially introduced in the 115th Congress as S. 3277, and it was reintroduced in the 116th Congress as S. 919 on March 27, 2019, by Senator Cruz (for himself and Senators Sinema, Markey, and Wicker). Senators Peters and Scott are additional cosponsors. That bill seeks to provide stability and clarity to the commercial space sector in order to promote the industry and maintain U.S. leadership in space. That bill would build upon previous commercial space legislation, including the U.S. Commercial Space Launch Competitiveness Act,³⁸ and would focus on streamlining and reforming the regulatory framework for commercial space launch and reentry and nongovernmental Earth observation activities. In the 115th Congress, S. 3277 passed the Senate by unanimous consent, but it failed a suspension vote in the House of Representatives requiring a two-thirds majority. On April 3, 2019, the Committee reported S. 919 favorably.

S. 2909—NASA Enhanced Use Leasing Extension Act of 2019

S. 2909, the NASA Enhanced Use Leasing Extension Act of 2019, was introduced on November 20, 2019, by Senator Wicker (for himself and Senators Cantwell and Hyde-Smith). Senators Feinstein and Scott are additional cosponsors. That bill would extend through 2020 the authority for NASA to lease its non-excess real property and related personal property.

S. 2831—21st Century Space Grant Modernization Act of 2019

S. 2831, the 21st Century Space Grant Modernization Act of 2019, was introduced on November 12, 2019, by Senator Capito (for herself and Senator Sinema). Senators Rounds, Rosen, Braun, Van Hollen, Murkowski, and Baldwin are additional cosponsors. That bill would update the National Space Grant College and Fellowship Program (Space Grant) and revise outdated provisions. That bill would reconfigure Space Grant funding calculations in order to distribute an equal share of grant funding to consortia from each of the 50 States, the District of Columbia, and Puerto Rico. The re-

³⁸Pub. L. 114–90.

vised funding scheme would require 85 percent of all funding to be provided to State consortia, 10 percent used for program administration at NASA, and 5 percent of funding used for special programs to further science and education-related efforts at NASA.

S. 1713—Aeronautics Innovation Act

S. 1713, the Aeronautics Innovation Act, was introduced on June 4, 2019, by Senator Warner (for himself and Senator Moran) and would direct NASA to continue work on aeronautics research and development. That bill would require NASA to conduct such research on advanced aerostructures, composites and other advanced materials, avionics, unmanned traffic management systems, and experimental aircraft.

S. 2837—Cleaner, Quieter Airplanes Act

S. 2837, the Cleaner, Quieter Airplanes Act, was introduced on November 12, 2019, by Senator Cardin (for himself and Senators Van Hollen, Warren, King, Merkley, and Feinstein) and would require NASA to establish an initiative to develop and demonstrate technologies that reduce aircraft noise and emissions.

ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

At a Glance			
S. 2800, National Aeronautics and Space Administration Authorization Act of 2019			
As ordered reported by the Senate Committee on Commerce, Science, and Transportation on November 13, 2019			
By Fiscal Year, Millions of Dollars	2020	2020-2025	2020-2030
Direct Spending (Outlays)	0	20	85
Revenues	0	0	0
Increase or Decrease (-) in the Deficit	0	20	85
Spending Subject to Appropriation (Outlays)	23	3,098	not estimated
Statutory pay-as-you-go procedures apply?	Yes	Mandate Effects	
Increases on-budget deficits in any of the four consecutive 10-year periods beginning in 2030?	< \$5 billion	Contains intergovernmental mandate?	No
		Contains private-sector mandate?	No

The bill would

- Authorize appropriations totaling \$22.8 billion in 2020 for activities of the National Aeronautics and Space Administration (NASA) and would provide direction on those activities
- Extend operation of the International Space Station (ISS) through 2030
- Extend NASA's authority to enter into enhanced-use lease (EUL) agreements

- Permit NASA to increase voluntary separation incentive payments from \$25,000 to \$40,000
- Estimated budgetary effects would primarily stem from
- Extending operations of the ISS
 - Spending of the authorized appropriations
 - Potential use of third-party financing to construct and renovate facilities for energy production, launch, and other specialized uses under EUL agreements
- Areas of significant uncertainty include
- Estimating the value of investments and amount of government use of facilities constructed by third parties under EUL agreements

Bill summary: S. 2800 would authorize appropriations totaling \$22.8 billion in 2020 for activities of the National Aeronautics and Space Administration (NASA) and would provide direction on those activities. (In 2020, NASA received appropriations totaling \$22.6 billion.) Under S. 2800, operation of the International Space Station (ISS) would continue through 2030.

The bill also would permanently extend NASA’s authority to enter into enhanced-use lease (EUL) agreements. Finally, S. 2800 would permit NASA to increase voluntary separation incentive payments from \$25,000 to \$40,000.

Estimated Federal cost: The estimated budgetary effect of S. 2800 is shown in Table 1. The costs of the legislation fall primarily within budget function 250 (general science, space, and technology).

TABLE 1.—ESTIMATED BUDGETARY EFFECTS OF S. 2800

	By fiscal year, millions of dollars—												2020–2025	2020–2030
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030			
Increases in Spending Subject to Appropriation														
Estimated Authorization	388	2	2	2	2	4,202	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	4,598	n.e.
Estimated Outlays	23	234	105	25	9	2,702	n.e.	n.e.	n.e.	n.e.	n.e.	n.e.	3,098	n.e.
Increases in Direct Spending														
Estimated Budget Authority	0	*	5	11	11	11	14	13	13	13	13	13	37	105
Estimated Outlays	0	*	1	4	7	9	12	12	13	13	13	13	20	85

Components may not sum to totals because of rounding; n.e. = not estimated; * = between zero and \$500,000.

Basis of estimate: For this estimate, CBO assumes that the bill will be enacted in 2020 and that the authorized and necessary amounts will be appropriated. Estimated outlays are based on historical spending patterns for the affected activities.

Spending subject to appropriation: CBO estimates that implementing S. 2800 would cost about \$3.1 billion over the 2020–2025 period (see Table 2).

TABLE 2.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER S. 2800

	By fiscal year, millions of dollars—						
	2020	2021	2022	2023	2024	2025	2020–2025
International Space Station:							
Estimated Authorization	0	0	0	0	0	4,200	4,200
Estimated Outlays	0	0	0	0	0	2,700	2,700
NASA Programs:							
Authorizations ^a	388	0	0	0	0	0	388
Estimated Outlays	23	232	103	23	7	0	388

TABLE 2.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER S. 2800—
Continued

	By fiscal year, millions of dollars—						
	2020	2021	2022	2023	2024	2025	2020– 2025
Voluntary Separation Incentive Payments:							
Estimated Authorization	0	2	2	2	2	2	10
Estimated Outlays	0	2	2	2	2	2	10
Total Changes:							
Estimated Authorization	388	2	2	2	2	4,202	4,598
Estimated Outlays	23	234	105	25	9	2,702	3,098

^aS. 2800 would authorize appropriations for individual programs of the National Aeronautics and Space Administration totaling \$22.8 billion in 2020. Because appropriations for 2020 have already been provided, CBO estimates that implementing S. 2800 would increase authorized spending by \$388 million, the difference between the authorized and appropriated amounts for those individual programs.

International Space Station

Current law requires NASA to operate the ISS through 2024. S. 2800 would extend the authorization through 2030. Using information from NASA on the costs to operate the ISS in recent years, CBO estimates that continuing those operations would require funding of more than \$4 billion annually starting in 2025. Based on historical spending patterns for ISS operations, CBO estimates that implementing the provision would cost \$2.7 billion in 2025 and several billions of dollars after 2025.

NASA programs

S. 2800 would authorize appropriations totaling \$22.8 billion in 2020 for individual NASA programs. In 2020, NASA received appropriations totaling \$22.6 billion for those programs. Of that amount, \$6,018 million was for exploration; \$4,140 million was for space operations; \$2,913 million was for safety, security, and mission services; \$373 million was for construction. The bill would authorize \$6,223 million for exploration; \$4,150 million for space operations; \$2,935 million for safety, security, and mission services; and \$524 million for construction. Thus, CBO estimates that enacting S. 2800 would increase the authorization by \$388 million in 2020—the difference between the authorized and appropriated amounts for those programs. (CBO does not estimate any additional outlays for NASA programs that received appropriations in 2020 that are greater than or equal to the amounts authorized under the bill.) Assuming appropriation of the additional amounts, CBO estimates that implementing the bill would cost \$388 million over the 2020–2025 period.

S. 2800 also would direct NASA to develop a low-Earth orbit commercialization program, conduct a science mission to Mars, and establish a planetary defense coordination office, among other activities. CBO expects that the authorization of appropriations for 2020 would include the costs of meeting those directives.

Voluntary separation incentive payments

Under current law, NASA may restructure or reshape its workforce by offering payments, sometimes called buyouts, generally capped at \$25,000 for employees who agree to separate from the agency. S. 2800 would raise the maximum payment by \$15,000, to \$40,000.

Using information from NASA about its use of such payments over the past six years, CBO estimates that each year 75 people, on average, would receive the \$40,000 payment for voluntary separation. That estimate includes CBO’s expectation that the larger payment would induce another 25 people annually to accept a buyout. That combination of higher payments and the expected increase in the number of people voluntarily separating would cost \$10 million (or \$2 million annually) over the next five years, CBO estimates. (The additional separations would cause some employees to retire sooner than they would have under current law. That cost is discussed under the heading “Direct Spending.”)

Other activities

S. 2800 also would direct the Department of Defense to review ISS projects, the Government Accountability Office to audit certain contracts, and the Office of Science and Technology Policy to study how NASA funds missions of national need. Based on the costs of similar tasks, CBO estimates that any costs to implement those provisions would be insignificant; any spending would be subject to the availability of appropriated funds.

Direct spending: CBO estimates that enacting S. 2800 would increase direct spending by \$85 million over the 2020–2030 period (see Table 3).

TABLE 3.—INCREASES IN DIRECT SPENDING UNDER S. 2800

	By fiscal year, millions of dollars—													2020– 2025	2020– 2030
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030				
Enhanced-Use Lease Agreements:															
Estimated Budget Authority	0	0	5	10	10	10	13	13	13	13	13	13	35	100	
Estimated Outlays	0	0	1	3	6	8	11	12	13	13	13	13	18	80	
Retirement Effects of Voluntary Separation Incentive Payments:															
Estimated Budget Authority	0	*	*	1	1	1	1	*	*	*	*	*	2	5	
Estimated Outlays	0	*	*	1	1	1	1	*	*	*	*	*	2	5	
Total:															
Estimated Budget Authority	0	*	5	11	11	11	14	13	13	13	13	13	37	105	
Estimated Outlays	0	*	1	4	7	9	12	12	13	13	13	13	20	85	

Components may not sum to totals because of rounding; * = between zero and \$500,000.

Enhanced-use lease agreements

Currently NASA can lease its underused property to nonfederal entities and, without further appropriation, retain and spend any amounts collected in rent for property maintenance and capital improvements. S. 2800 would permanently extend that authority, which under current law expires on December 31, 2021. The bill also would permit NASA to accept any type of in-kind consideration under EUL agreements. (NASA’s current authority to accept in-kind consideration is limited to facilities that produce renewable energy.)

In the past, NASA has used its EUL authority to lease out buildings and land for nonfederal purposes, including education and research. Those leases have ranged from limited reuse to full redevelopment of the properties; they result in no significant net costs to the agency. CBO expects that some of the EUL agreements NASA would enter into during the 2022–2030 period would be similar to

those transactions. In those cases, CBO estimates that there would be no significant effect on the deficit because any rent payments, which would be recorded in the budget as reductions in direct spending, would be offset by expenditures soon thereafter.

In addition, based on recent agreements NASA has executed, CBO expects that some EUL agreements would contain terms for third parties to build or renovate facilities for energy production, launch, and other specialized uses. Although NASA could use other authorities to enter into similar agreements with third parties, CBO expects the extension and expansion of in-kind consideration under S. 2800 would accelerate and increase the likelihood of such agreements. CBO also expects that some of those projects would effectively be governmental because they would be located on federal land and thus subject to NASA's control and because NASA, or other federal agencies such as the Department of Defense, would be major users of the services supported by those facilities. Thus, in CBO's view, developing and constructing facilities in that manner are governmental transactions and their costs should be recorded in the budget.¹

Based on proposed leasing plans and costs for similar facilities, CBO estimates that under EUL agreements made final over the 2022–2030 period, third parties would invest between \$750 million and \$800 million in facilities for energy production, launch, and other specialized uses. The federal budgetary effects of governmental transactions financed by third parties would depend on the extent and nature of federal support. In CBO's view, transactions supported entirely by private entities should not be reflected on the federal budget because the cost of those activities would be fully born by those nonfederal entities.

However, CBO expects that some third parties would recover at least a portion of their investments through contracts with the federal government for specialized facilities used by NASA or other federal agencies—to launch satellites or other federal payloads into space, for example. In addition, based on the experience of NASA and other agencies that accept certain in-kind consideration under EUL agreements, CBO expects that expanding allowable in-kind consideration could result in renovated or new facilities for the federal government's exclusive use. CBO considers such financing on behalf of the federal government primarily for government activities to be similar to an agency's using federal borrowing authority to improve its physical infrastructure. CBO therefore regards the costs of such transactions to be direct spending and believes the full cost of long-term commitments that obligate the government to make payments in future years should be recorded in the budget.²

In recent years, NASA has reported a backlog of at least \$1.6 billion worth of maintenance and improvement projects at five locations where it currently leases out space.³ Based on the federal government's potential share of benefits from any new projects

¹For more information, see Congressional Budget Office, *How CBO Determines Whether to Classify an Activity as Governmental When Estimating Its Budgetary Effects* (June 2017), www.cbo.gov/publication/52803.

²For more information, see Congressional Budget Office, *Third-Party Financing of Federal Projects* (June 2005), www.cbo.gov/publication/16554.

³National Aeronautics and Space Administration, *Deferred Maintenance Assessment Report: FY16 NASA-Wide Standardized Deferred Maintenance Parametric Estimate* (September 30, 2016), <https://go.usa.gov/xwrsv> (PDF, 1.8 MB).

(which CBO estimates would average between 25 percent and 30 percent over the projects' lifetime), CBO expects that NASA would use the EUL authority under S. 2800 to finance the construction of facilities valued at about \$100 million—equivalent to roughly 6 percent of NASA's maintenance backlog at those locations. Based on historical spending patterns for similar activities, CBO estimates that direct spending would increase by \$80 million over the 2022–2030 period.

Retirement effects of voluntary separation incentive payments

As discussed above, the higher payments for voluntary separation would induce some NASA employees to leave the federal government. Those who are retirement-eligible would, in CBO's estimation, end up retiring 18 months sooner, on average, than they would under current law. Based on information from NASA and from the Office of Personnel Management, a handful of employees each year would receive retirement annuities and health benefits sooner than under current law. In total, CBO estimates, those accelerated payments would increase spending on retirement benefits by \$5 million over the 2020–2030 period.

Other provisions

S. 2800 would authorize NASA to spend, without further appropriation, any royalties received for inventions developed on the ISS by commercial entities using federal resources. Under current law, any such royalties, which are classified in the budget as offsetting receipts, or reductions in direct spending, are deposited into the general fund of the Treasury and their spending is subject to appropriation. Using information from NASA on commercial activity on the ISS and a typical timeframe for developing inventions, CBO estimates that enacting the provision would have no significant effect on direct spending over the 2020–2030 period.

Finally, S. 2800 also would permit NASA to collect and spend donations, which are classified as offsetting receipts, for space exploration. CBO expects that any amounts collected would be insignificant and offset by expenditures; the resulting net effect on direct spending would be negligible.

Uncertainty: CBO aims to produce estimates that generally reflect the middle of a range of the most likely budgetary outcomes that would result if legislation was enacted. However, direct spending under S. 2800 could be higher or lower than CBO's estimate because of the following four sources of uncertainty:

- CBO cannot precisely predict the extent to which NASA would use the EUL extension under S. 2800 in place of its other alternative financing and leasing authorities to facilitate construction of specialized facilities. In such cases, CBO has adopted a convention of assuming a 50 percent chance of an agency's using its discretion as provided in the legislation.
- CBO cannot foresee with certainty the value of third parties' investments in such facilities. Generally, investments of higher value would increase the potential for direct spending.
- CBO cannot predict with certainty whether or how the federal government would use facilities constructed by third parties under EUL agreements. If the federal government is the primary user of the services provided by those facilities, and

thus serves as the main source from which third parties would recover their investments, the government’s share of indirect financing for and benefits from those projects would be higher, resulting in greater direct spending. However, if the federal government makes little or no use of the services provided by such facilities, the net effect on direct spending could be insignificant. CBO expects that expanding NASA’s authority to accept in-kind considerations could increase the potential for projects in which the government is a primary or exclusive user.

- Increases in spending on retirement benefits would be affected by the number of separation payments NASA offered, who received the offers, and whether the offers were accepted. CBO cannot predict those decisions or who would be affected. As a result, spending on retirement benefits could be higher or lower if NASA offered more or fewer buyouts, or if a greater or smaller share of the workforce ended up retiring.

Because of those uncertainties, the budgetary effects of enacting S. 2800 could differ significantly from those provided in CBO’s estimate.

Pay-As-You-Go considerations: The Statutory Pay-As-You-Go Act of 2010 establishes budget-reporting and enforcement procedures for legislation affecting direct spending or revenues. The net changes in outlays that are subject to those pay-as-you-go procedures are shown in Table 4.

TABLE 4.—CBO’S ESTIMATE OF THE STATUTORY PAY-AS-YOU-GO EFFECTS OF S. 2800, THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 2019, AS ORDERED REPORTED BY THE SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION ON NOVEMBER 13, 2019

	By fiscal year, millions of dollars—													
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020–2025	2020–2030	
	Net Increase in the Deficit													
Pay-As-You-Go Effect	0	0	1	4	7	9	12	12	13	13	13	20	85	

Increase in long-term deficits: CBO estimates that enacting S. 2800 would not increase on-budget deficits by more than \$5 billion in any of the four consecutive 10-year periods beginning in 2030.

Mandates: None.

Estimate prepared by: Federal costs: Janani Shankaran (National Aeronautics and Space Administration), Dan Ready (voluntary separation incentive payments); Mandates: Brandon Lever.

Estimate reviewed by: Kim P. Cawley, Chief, Natural and Physical Resources Cost Estimates Unit; H. Samuel Papenfuss, Deputy Director of Budget Analysis; Theresa Gullo, Director of Budget Analysis.

REGULATORY IMPACT STATEMENT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported:

NUMBER OF PERSONS COVERED

S. 2800, as enacted, would not expand the number of people affected by Government regulations. Entities participating in NASA programs already participate subject to regulations and the Committee does not anticipate expansion of those covered.

ECONOMIC IMPACT

The bill, as enacted, would stimulate significant economic activity through \$22.75 billion in funds authorized for NASA programs. In particular, large spaceflight programs such as Artemis contribute to sustaining U.S. leadership in aerospace engineering and manufacturing. NASA missions contribute to the inspiration and training of future generations of scientists and engineers and result in the development of world-changing technologies and products. Microgravity research conducted on the ISS has led to advancements in medical and materials science. NASA has also contributed significantly to the growth of the U.S. domestic commercial space industry by enabling the development of new launch vehicles, spacecraft, and earth observation capabilities. This bill seeks to amplify these impacts.

PRIVACY

The bill, as enacted, would enhance personal privacy protections for individuals receiving medical care from NASA, as it ensures that medical quality assurance records remain confidential. Given the importance of medical care being administered by NASA and the small patient pool, protecting medical information in line with common Government and industry best practices will help to ensure high-quality assurance of care.

PAPERWORK

The Committee does not anticipate a major increase in the paperwork burdens for individuals or businesses. The bill would require NASA to produce 19 reports to Congress. These reports are focused around specific critical areas of interest to the Committee and Nation, including various aspects of proposed commercial capability development plans, launch vehicle architecture, long-range exploration goals and missions, space station requirements, and facilities and workforce alignment, among others.

CONGRESSIONALLY DIRECTED SPENDING

In compliance with paragraph 4(b) of rule XLIV of the Standing Rules of the Senate, the Committee provides that no provisions contained in the bill, as reported, meet the definition of congressionally directed spending items under the rule.

SECTION-BY-SECTION ANALYSIS

Sec. 1. Short title; table of contents.

This section would provide that the bill may be cited as the “National Aeronautics and Space Administration Authorization Act of 2019” and would provide a table of contents.

Sec. 2. Definitions.

This section would define the terms “Administration”, “Administrator”, “appropriate committees of Congress”, “cislunar space”, “deep space”, “development cost”, “ISS”, “ISS management entity”, “NASA”, “Orion”, “OSTP”, and “Space Launch System”.

TITLE I—AUTHORIZATION OF APPROPRIATIONS*Sec. 101. Authorization of Appropriations.*

This section would authorize \$22.75 billion for NASA for fiscal year 2020.

TITLE II—HUMAN SPACEFLIGHT AND EXPLORATION*Sec. 201. Advanced cislunar and lunar surface capabilities.*

This section would express the sense of Congress regarding the Artemis program and recognize the significant commercial investments in human-class lunar landers, as well as the inclusive and diverse nature of NASA’s workforce and the Artemis generation compared to the Apollo program of the 1960s. This section would direct NASA to partner with industry for the development of two or more human lander designs in the initial development phase, with a down-selection to no more than two designs for flight demonstration.

Sec. 202. Space Launch System configurations.

This section would authorize NASA to maintain two mobile launch platforms for different variants of the SLS and would direct NASA to continue development of the EUS in order to utilize EUS on the third launch of SLS. This section would also direct NASA to develop a Main Propulsion Test Article for SLS to enable four-engine testing without using a flight article core stage.

Sec. 203. Advanced spacesuits.

This section would express the sense of Congress on the importance of advanced spacesuit technology for the exploration of the Moon and Mars and would direct NASA to develop such spacesuits. It also would enable the agency to contract with the private sector for the manufacture of space suits.

Under this section, NASA is directed to ensure that exploration spacesuits accommodate a diverse astronaut corps. The Committee is concerned that an all-female spacewalk scheduled in 2019 was canceled because there were not enough size-appropriate spacesuits available for use on ISS. Spacesuit availability should not drive NASA’s ability to conduct exploration activities or limit those who can participate in such activities.

Sec. 204. Life science and physical science research.

This section would express the sense of Congress that NASA should continue to support the biological and physical science priorities laid out in the 2011 National Academies’ decadal survey on biological and physical sciences in space and would direct NASA to conduct such research to advance deep space human exploration.

Sec. 205. Acquisition of domestic space transportation and logistics resupply services.

This section would prohibit NASA from contracting with any company for space transportation or logistical resupply services that uses or plans to use a foreign launch provider or service, unless such service or vehicle is not available domestically. It provides an exemption for no-exchange-of-funds agreements with an international partner.

Sec. 206. Rocket engine test infrastructure.

This section would direct NASA to invest in modernizing its rocket engine test infrastructure for future NASA and commercial missions. Under this section, NASA is directed to prioritize investments in projects that enhance capabilities for large thrust-level atmospheric and altitude engines and engine systems, and ensure that this program not interfere with other testing activities or programs.

Sec. 207. Indian River Bridge.

This section would require NASA, in coordination with appropriate Federal agencies, to ensure access to the Eastern Range via a bridge at the Indian River location. The Committee is concerned that the current Indian River Bridge on the NASA Causeway, which provides access to both Kennedy Space Center and Cape Canaveral, may soon be deemed unsafe for the transport of spacecraft and other heavy cargo.

Sec. 208. Value of International Space Station and capabilities in low-Earth orbit.

This section would express the sense of Congress that maintaining a continuous human presence in LEO is in the economic and national security interests of the United States. It would also direct NASA to maintain the capability for a continuous human presence in LEO during and beyond the useful life of the ISS.

Sec. 209. Extension and modification relating to International Space Station.

This section would authorize NASA funding for the ISS through 2030. As NASA works to foster a market economy in LEO, ensuring that NASA maintains the United States' only microgravity laboratory and its attendant international commitments during the transitional period remains a priority for the Committee.

Sec. 210. Department of Defense activities on International Space Station.

This section would direct the Secretary of Defense to identify and review DOD activities being carried out on the ISS and brief Congress on such activities. Although NASA-affiliated research comprises a large percentage of ISS activity, the station can also host research benefiting other agencies, including DOD.

Sec. 211. Low-Earth orbit commercialization.

This section would state that it is the policy of the United States to encourage the development of the LEO commercial sector. It also would direct NASA to utilize U.S. commercial products and serv-

ices to fulfill mission requirements. The section would authorize NASA's LEO development program to stimulate the demand for space-based commercial research, development, and manufacturing and the supply of human spaceflight services in LEO. NASA would be required to prioritize activities that have non-Federal funding. The Committee believes that the emergence of a true commercial space economy will require greater reliance on non-NASA investors and customers to support in-space platforms and services. The section would also stipulate that prior to awarding funding for a commercial space station, NASA should award a contract for the use of a docking port on the ISS, a capability that many commercial companies have expressed interest in for a number of years.

Sec. 212. Maintaining a national laboratory in space.

This section would express the sense of Congress on the importance and benefits of a national laboratory in space and that the United States should maintain a national microgravity laboratory and support fundamental science research on future platforms. This section would also require NASA, in coordination with other appropriate agencies, to issue a report detailing the feasibility of establishing a federally funded microgravity national laboratory.

Sec. 213. International Space Station national laboratory; property rights in inventions.

This section would establish a legal framework for intellectual property developed on the ISS national laboratory. NASA would be required to waive any Government claims to intellectual property rights for inventions made on the ISS national laboratory if NASA is fully reimbursed for its services.

Sec. 214. Data first produced during non-NASA scientific use of the ISS national laboratory.

This section would provide disclosure limitations, including special handling for information classified as trade secrets or confidential information, regarding certain non-NASA scientific data developed in the ISS national laboratory.

Sec. 215. Royalties and other payments received for designated activities.

This section would allow NASA to recoup any costs or collect royalties from inventions supported by NASA or NASA personnel during work hours. This section would also establish the Space Exploration fund within the U.S. Treasury. Funds collected pursuant to this provision would be deposited in the Space Exploration fund, which NASA could use to carry out space exploration activities. This section would express the sense of Congress that NASA should determine a monetary threshold at which recouping costs or royalty payments should be required (i.e., if an invention created based on ISS research meets a certain monetary value).

Sec. 216. Steppingstone approach to exploration.

This section would explicitly authorize NASA to conduct missions to the Moon in preparation for future manned missions to Mars and would set requirements for carrying out such missions. In carrying out such exploration of the Moon, NASA would be required

to utilize both SLS and commercial space transportation services, plan for at least one SLS launch annually after the first successful crewed launch of Orion on SLS, and establish a space station in orbit around the Moon. The Committee believes such an outpost is vital to establishing a sustainable exploration program that feeds forward to Mars.

Sec. 217. Technical amendments relating to Artemis missions.

This section would replace, in existing statutes, instances of the obsolete exploration mission EM designation with Artemis, NASA's current terminology for its deep space exploration program.

TITLE III—SCIENCE

Sec. 301. Science priorities.

This section would express the sense of Congress regarding the importance of adequately funding a balanced set of scientific research grants and that NASA should continue to set research priorities based on guidance from the National Academies' decadal surveys. The section would require NASA to consult with the National Academies on any reevaluation of scientific priorities. For instance, NASA's goal to return humans to the Moon and the advent of new capabilities, such as commercial lunar landers, has provided an opportunity to do science on the lunar surface. While lunar science was not highly rated in the 2013 planetary science decadal survey, these external factors were not known at the time. The Committee appreciates that NASA consulted with the National Academies on lunar science priorities now that these opportunities are available, and expects the agency to continue such consultations in the event of similar scenarios.

Sec. 302. Lunar discovery program.

This section would authorize NASA to develop a lunar research program that includes missions on the lunar surface. The agency would be directed to procure domestic commercial landers for such research payloads, follow research recommendations made by the National Academies, and create a mission to determine the presence of water at the lunar poles.

Sec. 303. Search for life.

This section would express the sense of Congress to authorize NASA to continue its multidisciplinary research program to search for proof of life evolving somewhere in the universe beyond Earth. In carrying out such a research program, NASA would be required to support activities to search and analyze technosignatures. This section would also authorize the agency to invest in new sensor technology.

Sec. 304. James Webb Space Telescope.

This section would express the sense of Congress with respect to the importance of the expansive undertaking in developing the JWST and acknowledges the previous setbacks in the cost and schedule during its early development. NASA would be authorized to spend approximately \$8.8 billion to complete development and safe launch of the telescope by March 31, 2021.

Sec. 305. Wide-Field Infrared Survey Telescope.

This section would express the sense of Congress that the growth of astrophysics flagship missions have impacted the Science Mission Directorate and would direct NASA to continue developing WFIRST in accordance with the 2010 National Academies decadal survey for astronomy and astrophysics.

Sec. 306. Satellite servicing for science missions.

This section would require NASA to study the feasibility and cost of utilizing in-space refueling or repair of NASA's currently operational science missions. NASA would be required to provide the study to the appropriate committees of Congress and the National Academies Space Studies Board 1 year after the date of enactment of this bill.

Sec. 307. Earth science missions and programs.

This section would express the sense of Congress with respect to the importance of Earth science and the data collected and used to understand global change. It would direct NASA to follow the recommendations and guidance of the National Academies, carry out previously planned observation missions (the program of record), and develop new missions of all classes, based on the decadal recommendations. In carrying out activities under this section, the Committee encourages the Administrator to continue to leverage commercially available data products and services in instances where mission goals may be met through data procurement instead of a dedicated spacecraft.

Sec. 308. Science missions to Mars.

This section would direct NASA to conduct 1 or more science missions to Mars to enable the selection of 1 or more sites for human landing. Additionally, the section would authorize a Mars sample return mission.

Sec. 309. Planetary Defense Coordination Office.

This section would express the sense of congressional findings that near-Earth objects remain a threat, and that the statutory requirement to survey and catalog such objects by 2020 will not be met with currently available NASA assets. To address the threat of near-Earth objects, this section would authorize NASA's Planetary Defense Coordination Office. The Planetary Defense Coordination Office would, in accordance with NASA's publicly announced plans, be required to develop and launch a space-based infrared survey telescope capable of completing the Near-Earth Object Survey program. Given the recommendations of the National Academies, this section specifically would direct NASA to fund, develop, and launch a space-based infrared telescope, preferably one which has already been selected by NASA for concept design studies, by September 30, 2025. This section would also authorize DOD support for these activities.

This section would require NASA to annually report to the relevant congressional committees on its progress toward completing the space-based infrared telescope, and other efforts related to planetary defense.

Sec. 310. Suborbital science flights.

This section would express the sense of Congress that commercially available suborbital flight platforms enable low-cost access to a microgravity environment to advance science and train scientists and engineers under the Science Mission Directorate's Suborbital Research Program. With commercial reusable suborbital flight platforms providing increased access to the microgravity environment for NASA's Space Technology Mission Directorate payloads, the Committee is concerned that challenges within the Science Mission Directorate are significantly limiting the use of commercial reusable suborbital flight platforms for science purposes. Therefore, this section would require NASA to submit a report to Congress within 270 days on the manner in which suborbital flight platforms can contribute to meeting the science objectives of NASA for the Science Mission Directorate, including the challenges to greater use of commercial suborbital flight platforms for such purposes.

Sec. 311. Earth science data and observations.

This section would require NASA to make Earth science data and observations available to the public. Current NASA policy requires such data to remain publicly available.

Sec. 312. Sense of Congress on small satellite science.

This section would express the sense of Congress regarding the importance of small satellites in carrying out cost-effective research and supports the continuing development of lightweight, compact instruments for small satellites.

Sec. 313. Sense of Congress on commercial space services.

This section would express the sense of Congress that NASA should explore ways to utilize commercial space products and services for science missions. Specifically, NASA should look to collaborate directly with providers of services for space exploration missions beyond LEO, such as hosting instruments; communications relay; positioning, navigation and timing (PNT); and data services.

Sec. 314. Procedures for identifying and addressing alleged violations of scientific integrity policy.

This section would require NASA to develop procedures to identify and address alleged violations of the agency's scientific integrity policy. NASA's scientific integrity policy serves as a safeguard to ensure high standards of professionalism, ethical conduct, and adherence to proper research and data evaluation practices.

TITLE IV—AERONAUTICS

Sec. 401. Short title.

This section would provide that the title may be cited as the "Aeronautics Innovation Act".

Sec. 402. Definitions.

This section would define the terms "Aeronautics Strategic Implementation Plan", "unmanned aircraft", "unmanned aircraft system", and "X-plane".

Sec. 403. Experimental aircraft projects.

This section would express the sense of Congress that developing high risk technologies where there is not yet a profit rationale is a key role for NASA and that large-scale piloted test flight is important for transitioning new technologies and materials and capturing the maximum benefits for the development of commercial projects. This section would also express the intent to maintain adequate long term funding to ensure piloted test flights are sustained into the future.

This section would establish the policy of the United States to maintain world leadership in military and civilian aeronautical power. This section would also require a series of X-plane technology demonstration projects, including a low-boom supersonic aircraft and a subsonic aircraft that enables significant increases in energy efficiency. The goal of the X-plane program is to eventually enable the deployment of such technologies to the commercial sector.

This section would also authorize NASA to develop an advanced manufacturing technology program to develop composite and high temperature materials and their manufacturing processes. The program would also develop new techniques to reduce the damage when evaluating aviation and aeronautic structures and provide education and training to help address the global cost and human competitiveness in aeronautical industries. In conducting this program, NASA would be authorized to engage in research partnerships with academia or the commercial sector.

Sec. 404. Unmanned aircraft systems.

This section would direct NASA to research and develop capabilities and concepts to enable the integration of unmanned aircraft systems into the national airspace system. To support the integration of unmanned aircraft, NASA would coordinate with the FAA to research and test air traffic management systems that incorporate unmanned aircraft.

Sec. 405. 21st Century Aeronautics Capabilities Initiative.

This section would establish the 21st Century Aeronautics Capabilities Initiative within the construction and environmental compliance and restoration account to ensure NASA has the resources and facilities to conduct flight demonstration projects.

Sec. 406. Sense of Congress on on-demand air transportation.

This section would express the sense of Congress that high-speed air transportation, small airports, helipads, and other vertical flight infrastructure can alleviate surface congestion and that NASA should conduct research focused on new technologies and tools to develop future vehicles and on-demand air transportation systems that can be leveraged by the FAA to support vehicle safety and operational certification.

Sec. 407. Sense of Congress on hypersonic technology research.

This section would express the sense of Congress that hypersonic technology is critical for both civilian and national security purposes and that NASA should utilize the DOD, commercial partner-

ships, and academic institutions to maximize development of hypersonic flight development.

TITLE V—SPACE TECHNOLOGY

Sec. 501. Space Technology Mission Directorate.

This section would express the sense of Congress that an independent Space Technology Mission Directorate is critical to ensuring continued development in technologies critical to NASA's various mission directorates. The section would direct NASA to maintain the Space Technology Mission Directorate.

Sec. 502. Flight opportunities program.

This section would express the sense of Congress that NASA should provide suborbital flight opportunities for payloads. The section would amend the Commercial Reusable Suborbital Research Program to allow NASA to fund engineering and integration demonstrations, proofs of concept, and educational experiments, but would prohibit NASA from funding the development of commercial suborbital launch vehicles as the number of such vehicles offered by commercial entities has proliferated rapidly since the program's creation.

Sec. 503. Small Spacecraft Technology Program.

This section would express the sense of Congress that the Small Spacecraft Technology Program is important for conducting science and technology validation for low-earth orbit and deep space missions and would direct NASA to accommodate science payloads that further the goal of human exploration of the Moon and Mars.

Sec. 504. Nuclear propulsion technology.

This section would express the sense of Congress that nuclear propulsion is critical to development of advanced civilian and national defense spacecraft and would require NASA to coordinate with the DOD to continue development of nuclear propulsion technology and conduct an in-space demonstration of such technology no later than 2024. In carrying out the requirements of this section, the Committee encourages the Administrator, to the greatest extent practicable, to partner with commercial industry.

Sec. 505. Mars-forward technologies.

This section would express the sense of Congress to direct NASA and its Space Technology Mission Directorate to prioritize technologies needed for human exploration of Mars, including entry, descent, and landing, and in-space propulsion.

Sec. 506. Prioritization of low-enriched uranium technology.

This section would express the sense of Congress that highly enriched uranium presents security and nuclear nonproliferation concerns. This section would direct NASA to prioritize the use of low-enriched uranium in developing a surface power nuclear reactor, and provide a report to Congress on such prioritization not later than 120 days after the date of enactment.

Sec. 507. Sense of Congress on next-generation communications technology.

This section would express the sense of Congress that optical communications and quantum encryption technologies remain vital to U.S. leadership in space and that such technologies would enable more reliable and secure space-based communications. As NASA examines future space communications needs, the Committee encourages the Administrator to press forward with development and deployment of these technologies.

TITLE VI—STEM ENGAGEMENT

Sec. 601. Sense of Congress.

The section would express the sense of Congress that NASA is uniquely positioned as a source of inspiration to help increase student interest in STEM fields. Therefore, NASA should engage with students in K–12, higher education, and underrepresented populations to support STEM opportunities and development.

Sec. 602. STEM education engagement activities.

This section would direct NASA to provide formal and informal STEM education engagement through various existing and new programs to encourage students at all education levels to pursue learning and career opportunities in STEM fields by leveraging NASA’s flagship projects among other means. This section also would direct NASA to report back to the appropriate committees within 1 year regarding these activities.

This section would reaffirm that one of NASA’s core missions is to engage students of all ages to pursue learning and career opportunities in STEM fields. While this section states that the Office of NASA STEM Engagement shall lead these efforts, this section would also make it clear that all NASA mission directorates must play a role in providing funding and opportunities to carry out NASA’s STEM Engagement mission. By requiring that NASA leverage national programs to promote STEM education, this section would clarify that all human spaceflight and science missions should contribute funding and resources, including in-person and virtual access to facilities and personnel, to ensure NASA meets its STEM education mission.

Sec. 603. Skilled technical education outreach program.

This section would direct NASA to conduct outreach at secondary schools to expose students to careers that require technical education and to encourage students to pursue such careers and enable students to observe NASA systems and processes whenever appropriate. The section also would direct the agency to submit an outreach plan with implementation steps, resources required, and other recommendations for establishing such a program.

Sec. 604. National space grant college and fellowship program.

This section, modeled on S. 2831, a bill introduced by Senators Capito and Sinema, would change and clarify provisions in the National Space Grant College and Fellowship Program (Space Grant). While there would be updates, this section would continue the main goals of the program—namely that Space Grant is a joint

Federal-State partnership aimed at advancing STEM learning and workforce development equally at the national and State levels. Core funding for lead Space Grant institutions in each State would remain the heart of the program. This funding supports State-wide STEM efforts through research projects, fellowships, and community partnerships.

Specifically, this section would modernize and reform Space Grant for the first time since its creation in 1988 to more accurately reflect how the program currently operates. This section would specify that NASA designate a Space Grant consortium in each State to administer each State's Space Grant funding allocation. A Space Grant consortium may consist of colleges, industries, science learning centers, museums, and government entities.

This section would broaden the objective of the Space Grant program to include providing hands-on research, training, and education programs with measurable outcomes in each State. This section would clarify that the goal of the Space Grant program is to support the research needs of NASA, develop a national STEM workforce, and meet each State's STEM workforce needs.

This section would establish a new procedure for NASA to suspend, terminate, or re-designate a Space Grant consortium, if needed.

This section would clarify how funding for the Space Grant program would be distributed. This section would direct NASA to provide an equal share of grant funding to consortia from each of the 50 States, the District of Columbia, and Puerto Rico. Space grant consortia from Guam and the U.S. Virgin Islands will receive one-fifth the amount of funding a State receives. This section would require States to provide a one-to-one match for every Federal dollar received.

This section would require that, of all funding appropriated to the Space Grant program each year, 85 percent of all funding be provided to State consortia in the form of grants. Ten percent of appropriated funding may be used for NASA to administer the program, and 5 percent of funding can be used for special programs to further science and education-related NASA missions.

Additionally, this section would establish limits for the use of Space Grant funds, and makes several conforming repeals of provisions in the current statute.

TITLE VII—WORKFORCE AND INDUSTRIAL BASE

Sec. 701. Appointment and compensation pilot program.

This section would create a 3-year pilot program within NASA to explore innovations in workforce structure. This section also would modify the agency's excepted service hiring authority for enhanced workforce flexibility.

Sec. 702. Establishment of multi-institution consortia and university-affiliated research centers.

This section would reaffirm NASA's authority to establish university-affiliated research centers (UARCs) to support NASA missions, similar to the DOD, which has 15 active UARC agreements. NASA has previously utilized UARCs to support work out of Ames Research Center. This section would reiterate that authority and

require NASA to develop and implement policies and procedures that govern the selection of UARC participants and the award of cooperative agreements or other contracts. By establishing these procedures, this section would allow universities to better understand the research needs of NASA and the procedure for being awarded a UARC contract.

Sec. 703. Expedited access to technical talent and expertise.

This section would allow NASA to establish one or more multi-institution task order contracts, consortia, cooperative agreements, or other arrangements to facilitate expedited access to technical expertise in support of NASA missions. This section is modeled on similar authority granted to the DOD in the National Defense Authorization Act for Fiscal Year 2018³⁹ and would enable NASA to benefit from the expertise of researchers at universities, federally funded research and development corporations, nonprofit research institutions, or other research consortia.

Sec. 704. Report on industrial base for civil space missions and operations.

This section would require NASA to submit to the appropriate committees of Congress, not later than 1 year after enactment, a report that describes the current status of the NASA space industrial base and a description of weaknesses in supply chain, skills, manufacturing, and other key aspects of an industrial base. NASA would then be directed to assess mechanisms to mitigate or address such weaknesses, as well as any other matters in connection with the NASA industrial base.

Sec. 705. Separations and retirement incentives.

This section would increase the maximum separation or retirement incentive from the current \$25,000 to \$40,000 to bring NASA in line with other Federal agencies, including the DOD.

Sec. 706. Confidentiality of medical quality assurance records.

This section would ensure that records pertaining to medical quality assurance investigations at NASA remain protected. Such records may include personally identifiable information and sensitive medical information on patients. Protecting such information is standard practice in most governmental and nongovernmental healthcare environments.

TITLE VIII—MISCELLANEOUS PROVISIONS

Sec. 801. Contracting authority.

This section would authorize NASA to consider commercial users' needs when contracting for supplies or services (e.g., for commercial launch companies operating on NASA property). Commercial users would reimburse the Government for the cost of their share of such goods or services. This action will enable NASA to take advantage of better economy-of-scale pricing for these services and enable its providers to make better informed business decisions about the infrastructure investments that may be necessary to sat-

³⁹Pub. L. 115–91.

isfy both Government and commercial needs. This authority is similar to the authority DOD has under 10 U.S.C. 2276(b)(2).

Sec. 802. Authority for transaction prototype projects and follow-on production contracts.

This section would authorize NASA to carry out prototype projects as other transactions and award follow-on production contracts without the use of competitive procedures, provided that competitive procedures were used for the underlying prototype transaction. This authority is intended to give the agency additional flexibility and speed in transitioning from prototypes to production items. Although the Committee understands that contracting requirements currently result in significant delay between prototype stage and production, NASA leadership should take great care in ensuring that this authority is employed responsibly and only in cases where time is of the essence.

Sec. 803. Protection of data and information from public disclosure.

This section would direct NASA to provide protections for certain data relating to proprietary technology or a mishap investigation and ensures data from such an investigation will not be disclosed by other Federal agencies. Such protections will ensure that proprietary or otherwise controlled data is not disclosed. With regard to data related to accident investigations, the Committee believes such protections will promote a better understanding of space systems in the event of a mishap.

Sec. 804. Physical security modernization.

This section would allow NASA security contractors to provide physical security to NASA property and personnel outside of NASA centers.

Sec. 805. Lease of non-excess property.

This section would give NASA permanent enhanced leasing authority. Enhanced use leasing (EUL) allows NASA to enter into agreements with private sector entities, State and local governments, academic institutions, and other Federal agencies, to lease non-excess but underutilized NASA property. Unlike traditional lease arrangements, EUL permits NASA to retain revenues and use them for capital improvements and to improve mission effectiveness. NASA has 70 EULs primarily at five NASA centers: Stennis Space Center (Mississippi), Ames Research Center (California), Marshall Space Flight Center (Alabama), Kennedy Space Center (Florida), and Goddard Space Flight Center (Maryland). Each year, the overall EUL program generates positive revenue for NASA to help maintain deteriorating facilities. The net revenue income from EUL was \$6.8 million in FY 2018 and \$5.4 million in FY 2017. NASA's FY 2020 appropriations bill extended EUL authority until December 31, 2021.

Sec. 806. Cybersecurity.

This section would direct NASA to update and improve the cybersecurity of space assets and other systems and maintain a security operations center to respond to cyber threats. The agency would establish operational level agreements across NASA centers

and directorates and implement a cyber-threat hunt capability to isolate and neutralize cyber threats.

Sec. 807. Limitation on cooperation with the People's Republic of China.

This section would prohibit NASA, the Office of Science and Technology Policy, and the National Space Council from developing or coordinating any bilateral policy or program with, or hosting visitors from, the PRC or any company owned by or incorporated in the PRC, unless NASA certifies that the coordination or visitation poses no risk to technology or information transfer and does not involve individuals involved in human rights violations. Certification of such waiver must be submitted to Congress within 30 days after the waiver is issued. This section also requires the Comptroller General to conduct a review of all contracts that may pose a risk of intellectual property or technology transfer to an entity owned, controlled, or organized under the laws of the PRC.

Sec. 808. Consideration of issues related to contracting with entities receiving assistance from or affiliated with the People's Republic of China.

This section would require NASA to consider implications of contracting with entities connected through ownership, control, or other affiliation to the PRC. The Committee remains concerned about the PRC's massive campaign of infiltration of critical supply chains and theft of sensitive technical information from U.S. aerospace firms, as well as from other entities that are vital to our Nation's economy and security. Findings of the U.S. International Trade Commission, the United States-China Economic and Security Review Commission, the U.S. Trade Representative, and the U.S. Justice Department China Initiative cite not only Chinese theft of U.S. trade secrets, but also leveraging of investments, subsidies, market access privileges, and other Government-controlled financial benefits, both directly and through commonly owned and controlled companies and non-commercial entities, to gain access to sensitive technical information. The Justice Department reports that the FBI has approximately 1,000 open cases involving Chinese activities in the United States aimed at stealing and otherwise illicitly acquiring technical information. As reflected in their own, official documents, the Chinese attach a high priority to targeting U.S. aerospace, in particular.

An August 14, 2017, Presidential Memorandum for the United States Trade Representative states:

China has implemented laws, policies, and practices and has taken actions related to intellectual property, innovation, and technology that may encourage or require the transfer of American technology and intellectual property to enterprises in China or that may otherwise negatively affect American economic interests. These laws, policies, practices, and actions may inhibit U.S. exports, deprive U.S. citizens of fair remuneration for their innovations, divert American jobs to workers in China, contribute to our trade deficit with China, and otherwise undermine American manufacturing, services, and innovation.⁴⁰

The Committee agrees and will continue to respond strongly to the harm done to the United States by China's campaign of preda-

⁴⁰ Donald J. Trump, *Presidential Memorandum for the United States Trade Representative*, Aug. 14, 2017 (<https://www.whitehouse.gov/presidential-actions/presidential-memorandum-united-states-trade-representative/>) (accessed May 1, 2020).

tory behavior toward the U.S. aerospace base and other vitally important sectors of our national economy. The Committee will closely watch for effective implementation of the IP-related provisions of the Phase 1 trade deal with China and the further actions expected to address this serious matter.

Sec. 809. Small satellite launch services program.

This section would direct NASA to procure dedicated launch services for small satellites, including CubeSats, engage with the academic community, and whenever possible utilize secondary payloads for launching such satellites. This section would not prohibit NASA from utilizing ridesharing and co-manifested payloads on larger launch vehicles where appropriate.

Sec. 810. 21st century space launch infrastructure.

This section would require NASA to invest in space launch infrastructure at its facilities to enhance Government and commercial space launch capabilities.

Sec. 811. Missions of national need.

This section would direct OSTP to study how NASA could fund missions of national need (e.g., space debris removal, asteroid detection for planetary defense, and space weather research) that do not necessarily provide the highest value science and, therefore, are often not selected for development through NASA's current funding process. This section also directs OSTP to provide a report no later than 1 year after the date of enactment on recommendations for funding missions of national need.

Sec. 812. Exemption from the Iran, North Korea, and Syria Nonproliferation Act.

This section would extend NASA's exemption from the Iran, North Korea, and Syria Nonproliferation Act through 2030 in order to allow NASA to continue cooperation with Russia on the ISS.

Sec. 813. Drinking water well replacement for Chincoteague, Virginia.

This section would allow NASA to replace water wells contaminated by agency activities at the Wallops Flight Facility in Virginia.

Sec. 814. Passenger carrier use.

This section would allow NASA to provide transportation to U.S. Government astronauts after space missions before they receive medical clearance to drive. The provision would also allow non-U.S. Government astronauts to receive transportation services on a reimbursable basis.

Sec. 815. Use of commercial near-space balloons.

This section would express the sense of Congress that use of commercially available near-space balloons is in the best interest of the United States. The section would also direct NASA to use, where appropriate, commercially available near-space balloons to support the agency's goals.

Sec. 816. President's Space Advisory Board.

This section would rename the National Space Council User's Advisory Group (UAG) as the President's Space Advisory Board to better reflect the group's purpose and composition. The UAG is comprised of various stakeholders in the space economy and provides advice and guidance on space industry issues.

Sec. 817. Initiative on technologies for noise and emissions reductions.

This section would direct NASA to build upon and accelerate work on technologies to reduce noise and emissions from aircraft. This section would also direct the agency to continue work on electric propulsion, provide guidance to the FAA on these technologies, and report to Congress annually on the initiative.

Sec. 818. Remediation of sites contaminated with trichloroethylene.

This section would require NASA to continue efforts to remediate contamination at sites where the agency used trichloroethylene (TCE). This section also requires the Administrator to provide a report to Congress no later than 1 year after enactment with recommendations on remediating affected sites and estimated costs.

Sec. 819. Report on merits and options for establishing an institute relating to space resources.

This section would require NASA to report to Congress within 180 days after enactment, a set of options for, and the merits of, establishing an institute related to the identification, development and distribution of space resources. The term "space resource" would be defined as an abiotic resource found in outer space, such as mineral deposits on another planet.

Sec. 820. Report on establishing center of excellence for space weather technology.

This section would require a report from NASA within 180 days after enactment, describing the potential benefits of establishing a NASA center of excellence for space weather technology. This section would also require NASA to consider geographical constraints on the establishment of such a center based on previously Government-funded space weather research activities, access to universities, and areas where NASA may not previously have established such activities.

Sec. 821. Review on preference for domestic suppliers.

This section would express the sense of Congress that, to the maximum extent practicable, NASA should use domestic suppliers of goods and services and comply with Federal acquisition regulations, including subcontract provisions. This section would require NASA to review its domestic supplier preferences and its compliance with Federal acquisition regulations provisions relating to foreign-based sub-contractors, within 180 days after the enactment of this bill. This section would also require NASA to provide a report to Congress on the results of that review.

Sec. 822. Report on utilization of commercial space ports licensed by Federal Aviation Administration.

This section would require NASA to report to Congress on the utilization of FAA-licensed commercial spaceports for civil space missions.

Sec. 823. Active orbital debris mitigation.

This section would express the sense of Congress that orbital debris poses a hazard to NASA missions and encourage the agency to ensure that policies and practices for safety and debris mitigation meet or exceed international guidelines. This section would require NASA to report to Congress within 90 days after the date of enactment on the status of implementation.

Sec. 824. Study on commercial communications services.

This section would express the sense of Congress that current NASA space communications capabilities do not allow for real-time data collection, observation, or transmission of information. The section would require that NASA study the use of commercial communications services for suborbital flight programs and LEO research. This section also requires that a report on the results of such study be provided to Congress and made available to the public no later than 18 months after the date of enactment.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new material is printed in italic, existing law in which no change is proposed is shown in roman):

UNITED STATES CODE

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TITLE 31—MONEY AND FINANCE

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Subtitle II—The Budget Process

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CHAPTER 13—APPROPRIATIONS

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Subchapter III—Limitations, Exceptions, and Penalties

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§ 1344. Passenger carrier use

(a)(1) Funds available to a Federal agency, by appropriation or otherwise, may be expended by the Federal agency for the maintenance, operation, or repair of any passenger carrier only to the extent that such carrier is used to provide transportation for official purposes. Notwithstanding any other provision of law, transporting any individual other than the individuals listed in subsections (b) and (c) of this section between such individual's residence and such individual's place of employment is not transportation for an official purpose.

(2) For purposes of paragraph (1), transportation between the residence of an officer or employee and various locations that is—

(A) required for the performance of field work, in accordance with regulations prescribed pursuant to subsection (e) of this section, **[or]**

(B) essential for the safe and efficient performance of intelligence, counterintelligence, protective services, or criminal law enforcement duties, *or*

(C) *necessary for post-flight transportation of United States Government astronauts, and other astronauts subject to reimbursable arrangements, returning from space for the performance of medical research, monitoring, diagnosis, or treatment, or other official duties, prior to receiving post-flight medical clearance to operate a motor vehicle,*

is transportation for an official purpose, when approved in writing by the head of the Federal agency.

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TITLE 51—NATIONAL AND COMMERCIAL SPACE PROGRAMS

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Subtitle I—General

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CHAPTER 101—DEFINITIONS

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§ 10101. Definitions

In this title:

(1) ADMINISTRATION.—The term “Administration” means the National Aeronautics and Space Administration.

(2) ADMINISTRATOR.—The term “Administrator” means the Administrator of the National Aeronautics and Space Administration.

(3) *CISLUNAR SPACE*.—The term “cislunar space” means the region of space beyond low-Earth orbit out to and including the region around the surface of the Moon.

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Subtitle II—General Program and Policy Provisions

CHAPTER 201—NATIONAL AERONAUTICS AND SPACE PROGRAM

SUBCHAPTER I—SHORT TITLE, DECLARATION OF POLICY, AND DEFINITIONS

Sec.

- 20101. Short title.
- 20102. Congressional declaration of policy and purpose.
- 20103. Definitions.

SUBCHAPTER II—COORDINATION OF AERONAUTICAL AND SPACE ACTIVITIES

- 20111. National Aeronautics and Space Administration.
- 20112. Functions of the Administration.
- 20113. Powers of the Administration in performance of functions.
- 20114. Administration and Department of Defense coordination.
- 20115. International cooperation.
- 20116. Reports to Congress.
- 20117. Disposal of excess land.

SUBCHAPTER III—GENERAL ADMINISTRATIVE PROVISIONS

- 20131. Public access to information.
- 20132. Security requirements.
- 20133. Permission to carry firearms.
- 20134. Arrest authority.
- 20135. Property rights in inventions.
- 20136. Contributions awards.
- 20137. Malpractice and negligence suits against United States.
- 20138. Insurance and indemnification.
- 20139. Insurance for experimental aerospace vehicles.
- 20140. Appropriations.
- 20141. Misuse of agency name and initials.
- 20142. Contracts regarding expendable launch vehicles.
- 20143. Full cost appropriations account structure.
- 20144. Prize authority.
- 20145. Lease of non-excess property.
- 20146. Retrocession of jurisdiction.
- 20147. Recovery and disposition authority.
- 20148. Indemnification; NASA launch services and reentry services.
- 20149. Medical monitoring and research relating to human space flight.
- 20150. *Property rights in designated inventions.*
- 20151. *Data rights.*
- 20152. *Royalties and other payments received for designated activities.*

SUBCHAPTER IV—UPPER ATMOSPHERE RESEARCH

- 20161. Congressional declaration of purpose and policy.
- 20162. Definition of upper atmosphere.
- 20163. Program authorized.
- 20164. International cooperation.

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Subchapter II—Coordination of Aeronautical and Space Activities

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§ 20113. Powers of the Administration in performance of functions

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(o) PROVISIONS RELATED TO SEPARATION AND RETIREMENT INCENTIVES.—

(1) *DEFINITION.*—*In this subsection, the term “employee”—*

(A) *means an employee of the Administration serving under an appointment without time limitation; and*

(B) *does not include—*

(i) *a reemployed annuitant under subchapter III of chapter 83 or chapter 84 of title 5 or any other retirement system for employees of the Federal Government;*

(ii) *an employee having a disability on the basis of which such employee is or would be eligible for disability retirement under any of the retirement systems referred to in clause (i); or*

(iii) *for purposes of eligibility for separation incentives under this subsection, an employee who is in receipt of a decision notice of involuntary separation for misconduct or unacceptable performance.*

(2) *AUTHORITY.*—*The Administrator may establish a program under which employees may be eligible for early retirement, offered separation incentive pay to separate from service voluntarily, or both. This authority may be used to reduce the number of personnel employed or to restructure the workforce to meet mission objectives without reducing the overall number of personnel. This authority is in addition to, and notwithstanding, any other authorities established by law or regulation for such programs.*

(3) *EARLY RETIREMENT.*—*An employee who is at least 50 years of age and has completed 20 years of service, or has at least 25 years of service, may, pursuant to regulations promulgated under this subsection, apply and be retired from the Administration and receive benefits in accordance with subchapter III of chapter 83 or 84 of title 5 if the employee has been employed continuously within the Administration for more than 30 days before the date on which the determination to conduct a reduction or restructuring within 1 or more Administration centers is approved.*

(4) *SEPARATION PAY.*—

(A) *IN GENERAL.*—*Separation pay shall be paid in a lump sum or in installments and shall be equal to the lesser of—*

(i) *an amount equal to the amount the employee would be entitled to receive under section 5595(c) of title 5, if the employee were entitled to payment under such section; or*

(ii) \$40,000.

(B) *LIMITATIONS.*—Separation pay shall not be a basis for payment, and shall not be included in the computation, of any other type of Government benefit. Separation pay shall not be taken into account for the purpose of determining the amount of any severance pay to which an individual may be entitled under section 5595 of title 5, based on any other separation.

(C) *INSTALLMENTS.*—Separation pay, if paid in installments, shall cease to be paid upon the recipient's acceptance of employment by the Federal Government, or commencement of work under a personal services contract as described in paragraph (5).

(5) *LIMITATIONS ON REEMPLOYMENT.*—

(A) An employee who receives separation pay under such program may not be reemployed by the Administration for a 12-month period beginning on the effective date of the employee's separation, unless this prohibition is waived by the Administrator on a case-by-case basis.

(B) An employee who receives separation pay under this section on the basis of a separation and accepts employment with the Government of the United States, or who commences work through a personal services contract with the United States within 5 years after the date of the separation on which payment of the separation pay is based, shall be required to repay the entire amount of the separation pay to the Administration. If the employment is with an Executive agency (as defined by section 105 of title 5) other than the Administration, the Administrator may, at the request of the head of that agency, waive the repayment if the individual involved possesses unique abilities and is the only qualified applicant available for the position. If the employment is within the Administration, the Administrator may waive the repayment if the individual involved is the only qualified applicant available for the position. If the employment is with an entity in the legislative branch, the head of the entity or the appointing official may waive the repayment if the individual involved possesses unique abilities and is the only qualified applicant available for the position. If the employment is with the judicial branch, the Director of the Administrative Office of the United States Courts may waive the repayment if the individual involved possesses unique abilities and is the only qualified applicant available for the position.

(6) *REGULATIONS.*—Under the program established under paragraph (2), early retirement and separation pay may be offered only pursuant to regulations established by the Administrator, subject to such limitations or conditions as the Administrator may require.

(7) *USE OF EXISTING FUNDS.*—The Administrator shall carry out this subsection using amounts otherwise made available to the Administrator and no additional funds are authorized to be appropriated to carry out this subsection.

(p) *CONTRACTING AUTHORITY.*—The Administration—

(1) may enter into an agreement with a private, commercial, or State government entity to provide the entity with supplies, support, and services related to private, commercial, or State government space activities carried out at a property owned or operated by the Administration; and

(2) upon the request of such an entity, may include such supplies, support, and services in the requirements of the Administration if—

(A) the Administrator determines that the inclusion of such supplies, support, or services in such requirements—

(i) is in the best interest of the Federal Government;

(ii) does not interfere with the requirements of the Administration; and

(iii) does not compete with the commercial space activities of other such entities; and

(B) the Administration has full reimbursable funding from the entity that requested supplies, support, and services prior to making any obligation for the delivery of such supplies, support, or services under an Administration procurement contract or any other agreement.

(q) TRANSACTION PROTOTYPE PROJECTS AND FOLLOW-ON PRODUCTION CONTRACTS.—

(1) *IN GENERAL.*—The Administration may enter into a transaction (other than a contract, cooperative agreement, or grant) to carry out a prototype project that is directly relevant to enhancing the mission effectiveness of the Administration.

(2) *SUBSEQUENT AWARD OF FOLLOW-ON PRODUCTION CONTRACT.*—A transaction entered into under this subsection for a prototype project may provide for the subsequent award of a follow-on production contract to participants in the transaction.

(3) *INCLUSION.*—A transaction under this subsection includes a project awarded to an individual participant and to all individual projects awarded to a consortium of United States industry and academic institutions.

(4) *DETERMINATION.*—The authority of this section may be exercised for a transaction for a prototype project and any follow-on production contract, upon a determination by the head of the contracting activity, in accordance with Administration policies, that—

(A) circumstances justify use of a transaction to provide an innovative business arrangement that would not be feasible or appropriate under a contract; and

(B) the use of the authority of this section is essential to promoting the success of the prototype project.

(5) *COMPETITIVE PROCEDURE.*—

(A) *IN GENERAL.*—To the maximum extent practicable, the Administrator shall use competitive procedures with respect to entering into a transaction to carry out a prototype project.

(B) *EXCEPTION.*—Notwithstanding section 2304 of title 10, United States Code, a follow-on production contract may be awarded to the participants in the prototype transaction without the use of competitive procedures, if—

(i) *competitive procedures were used for the selection of parties for participation in the prototype transaction; and*

(ii) *the participants in the transaction successfully completed the prototype project provided for in the transaction.*

(6) *COST SHARE.—A transaction to carry out a prototype project and a follow-on production contract may require that part of the total cost of the transaction or contract be paid by the participant or contractor from a source other than the Federal Government.*

(7) *PROCUREMENT ETHICS.—A transaction under this authority shall be considered an agency procurement for purposes of chapter 21 of title 41, United States Code, with regard to procurement ethics.*

* * * * *

Subchapter III—General Administrative Provisions

§ 20131. Public access to information

(a) **PUBLIC INSPECTION.**—Information obtained or developed by the Administrator in the performance of the Administrator's functions under this chapter shall be made available for public inspection, except information—

- (1) authorized or required by Federal statute to be withheld;
- (2) classified to protect the national security; or
- (3) described in [subsection (b)] *subsection (b) or (c).*

(b) **SPECIAL HANDLING OF TRADE SECRET OR CONFIDENTIAL INFORMATION.**—

(1) **IN GENERAL.**—The Administrator, for a period of up to 5 years after the development of information described in paragraph (2), may provide appropriate protections against the dissemination of such information, including exemption from subchapter II of chapter 5 of title 5.

[(2) **INFORMATION DESCRIBED.**—Information referred to in paragraph (1) is information that results from activities conducted under an agreement entered into under subsections (e) and (f) of section 20113 of this title, and that would be a trade secret or commercial or financial information that is privileged or confidential under the meaning of section 552(b)(4) of title 5 if the information had been obtained from a non-Federal party participating in such an agreement.]

(2) **INFORMATION DESCRIBED.**—

(A) **ACTIVITIES UNDER AGREEMENT.**—*Information referred to in paragraph (1) is information that—*

(i) results from activities conducted under an agreement entered into under subsections (e) and (f) of section 20113; and

(ii) would be a trade secret or commercial or financial information that is privileged or confidential within the meaning of section 552(b)(4) of title 5 if the information had been obtained from a non-Federal party participating in such an agreement.

- (B) *CERTAIN DATA.*—Information referred to in paragraph (1) includes data (as defined in section 20151) that—
- (i) was first produced by the Administration in the performance of any designated activity (as defined in section 20150); and
 - (ii) would be a trade secret or commercial or financial information that is privileged or confidential within the meaning of section 552(b)(4) of title 5 if the data had been obtained from a non-Federal party.
- (c) *SPECIAL HANDLING OF CERTAIN TECHNICAL DATA.*—
- (1) *IN GENERAL.*—The Administrator may provide appropriate protections against the public dissemination of certain technical data, including exemption from subchapter II of chapter 5 of title 5.
 - (2) *DEFINITIONS.*—In this subsection:
 - (A) *CERTAIN TECHNICAL DATA.*—The term “certain technical data” means technical data that may not be exported lawfully outside the United States without approval, authorization, or license under—
 - (i) the Export Control Reform Act of 2018 (Public Law 115–232; 132 Stat. 2208); or
 - (ii) the International Security Assistance and Arms Export Control Act of 1976 (Public Law 94–329; 90 Stat. 729).
 - (B) *TECHNICAL DATA.*—The term “technical data” means any blueprint, drawing, photograph, plan, instruction, computer software, or documentation, or any other technical information.
- [(c)](d) *COMMITTEES OF CONGRESS.*—Nothing in this chapter authorizes the withholding of information, including any data, by the Administrator from the duly authorized committees of Congress.
- (e) *EXCLUSION FROM FOIA.*—This section shall be considered a statute described in subsection (b)(3)(B) of section 552 of title 5 (commonly referred to as the “Freedom of Information Act”).

§ 20132. * * *

§ 20133. Permission to carry firearms

As the Administrator deems necessary in the public interest, the Administrator may—

- (1) direct officers and employees of the Administration to carry firearms while in the conduct of their official duties; and
- (2) authorize employees of contractors and subcontractors of the Administration who are engaged in the protection of [property owned by the United States, and located at facilities owned by or contracted to the United States,] *Administration personnel or of property owned or leased by, or under the control of, the United States* to carry firearms while in the conduct of their official duties.

§ 20134. Arrest authority

Under regulations prescribed by the Administrator and approved by the Attorney General, employees of the Administration and of its contractors and subcontractors authorized to carry firearms under section 20133 of this title may arrest without warrant for

any offense against the United States committed in their presence, or for any felony cognizable under the laws of the United States if they have reasonable grounds to believe that the person to be arrested has committed or is committing such felony. Persons granted authority to make arrests by this section may exercise that authority only while guarding and protecting *Administration personnel or any* property owned or leased by, or under the control of, the United States under the administration and control of the Administration or one of its contractors or subcontractors, at facilities owned by or contracted to the Administration.

* * * * *

§ 20145. Lease of non-excess property

(a) * * *

(b) CASH CONSIDERATION.—

(1) FAIR MARKET VALUE.—(A) A person or entity entering into a lease under this section shall provide cash consideration for the lease at fair market value as determined by the Administrator.

(B) Notwithstanding subparagraph (A), the Administrator may accept in-kind consideration for leases entered into for the purpose of developing renewable energy production facilities.

(2) * * *

(c) * * *

(d) * * *

(e) * * *

(f) * * *

(g) SUNSET.—The authority to enter into leases under this section shall expire December 31, 2021. The expiration under this subsection of authority to enter into leases under this section shall not affect the validity or term of leases or the Administration’s retention of proceeds from leases entered into under this section before the expiration of the authority.

* * * * *

§ 20150. Property rights in designated inventions

(a) EXCLUSIVE PROPERTY RIGHTS.—Notwithstanding section 3710a of title 15, chapter 18 of title 35, section 20135, or any other provision of law, a designated invention shall be the exclusive property of a user, and shall not be subject to a Government-purpose license, if—

(1) the Administration is reimbursed under the terms of the contract for the full cost of a contribution by the Federal Government of the use of Federal facilities, equipment, materials, proprietary information of the Federal Government, or services of a Federal employee during working hours, including the cost for the Administration to carry out its responsibilities under paragraphs (1) and (4) of section 504(d) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18354(d));

(2) Federal funds are not transferred to the user under the contract; and

(3) the invention was made (as defined in section 20135(a))—

- (A) solely by the user; or
 (B)(i) by the user with the services of a Federal employee under the terms of the contract; and
 (ii) the Administration is reimbursed for such services under paragraph (1).
- (b) *RULE OF CONSTRUCTION.*—Nothing in this section may be construed to affect the rights of the Federal Government, including property rights in inventions, under any contract, except in the case of a written contract with the Administration or the ISS management entity for the performance of a designated activity.
- (c) *DEFINITIONS.*—In this section—
- (1) *CONTRACT.*—The term “contract” has the meaning giving the term in section 20135(a).
- (2) *DESIGNATED ACTIVITY.*—The term “designated activity” means any non-NASA scientific use of the ISS national laboratory as described in section 504 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18354).
- (3) *DESIGNATED INVENTION.*—The term “designated invention” means any invention conceived or first reduced to practice by any person in the performance of a designated activity under a written contract with the Administration or the ISS management entity.
- (4) *GOVERNMENT-PURPOSE LICENSE.*—The term “Government-purpose license” means the reservation by the Federal Government of an irrevocable, nonexclusive, nontransferable, royalty-free license for the use of an invention throughout the world by or on behalf of the United States or any foreign government pursuant to a treaty or agreement with the United States.
- (5) *ISS MANAGEMENT ENTITY.*—The term “ISS management entity” means the organization with which the Administrator enters into a cooperative agreement under section 504(a) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18354(a)).
- (6) *USER.*—The term “user” means a person, including a non-profit organization or small business firm (as such terms are defined in section 201 of title 35), or class of persons that enters into a written contract with the Administration or the ISS management entity for the performance of designated activities.

§20151. Data rights

- (a) *NON-NASA SCIENTIFIC USE OF THE ISS NATIONAL LABORATORY.*—The Federal Government may not use or reproduce, or disclose outside of the Government, any data first produced in the performance of a designated activity under a written contract with the Administration or the ISS management entity, unless—
- (1) otherwise agreed under the terms of the contract with the Administration or the ISS management entity, as applicable;
 - (2) the designated activity is carried out with Federal funds;
 - (3) disclosure is required by law;
 - (4) the Federal Government has rights in the data under another Federal contract, grant, cooperative agreement, or other transaction; or
 - (5) the data is—

- (A) otherwise lawfully acquired or independently developed by the Federal Government;
- (B) related to the health and safety of personnel on the ISS; or
- (C) essential to the performance of work by the ISS management entity or NASA personnel.
- (b) **DEFINITIONS.**—*In this section:*
- (1) **CONTRACT.**—*The term “contract” has the meaning given the term under section 20135(a).*
- (2) **DATA.**—
- (A) **IN GENERAL.**—*The term “data” means recorded information, regardless of form or the media on which it may be recorded.*
- (B) **INCLUSIONS.**—*The term “data” includes technical data and computer software.*
- (C) **EXCLUSIONS.**—*The term “data” does not include information incidental to contract administration, such as financial, administrative, cost or pricing, or management information.*
- (3) **DESIGNATED ACTIVITY.**—*The term “designated activity” has the meaning given the term in section 20150.*
- (4) **ISS MANAGEMENT ENTITY.**—*The term “ISS management entity” has the meaning given the term in section 20150.*

§ 20152. Royalties and other payments received for designated activities

(a) **DESIGNATED INVENTIONS MADE WITH FEDERAL ASSISTANCE.**—*Notwithstanding any other provision of law, if the Administration, under the terms of a written contract for the performance of a designated activity, agrees to provide, unreimbursed, the total cost of a contribution by the Federal Government of the use of Federal facilities, equipment, materials, proprietary information of the Federal Government, or services of a Federal employee during working hours, including the cost for the Administration to carry out its responsibilities under paragraphs (1) and (4) of section 504(d) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18354(d)), the Administrator shall negotiate an agreement on the terms and rates of royalty payments with respect to an invention or class of inventions conceived or first reduced to practice by any person or class of persons in the performance of such designated activities.*

(b) **LICENSING AND ASSIGNMENT OF INVENTIONS.**—*Notwithstanding sections 3710a and 3710c of title 15 and any other provision of law, after payment in accordance with subsection (A)(i) of such section 3710c(a)(1)(A)(i) to the inventors who have directly assigned to the Federal Government their interests in an invention under a written contract with the Administration or the ISS management entity for the performance of a designated activity, the balance of any royalty or other payment received by the Administrator or the ISS management entity from licensing and assignment of such invention shall be paid by the Administrator or the ISS management entity, as applicable, to the Space Exploration Fund.*

(c) **SPACE EXPLORATION FUND.**—

(1) **ESTABLISHMENT.**—*There is established in the Treasury of the United States a fund, to be known as the ‘Space Exploration*

Fund (referred to in this subsection as the ‘Fund’), to be administered by the Administrator.

(2) *USE OF FUND.*—The Fund shall be available without fiscal year limitation and without further appropriation to carry out space exploration activities under section 20302.

(3) *DEPOSITS.*—There shall be deposited in the Fund—

(A) amounts appropriated to the Fund;

(B) fees and royalties collected by the Administrator or the ISS management entity under subsections (a) and (b); and

(C) donations or contributions designated to support authorized activities.

(4) *RULE OF CONSTRUCTION.*—Amounts available to the Administrator under this subsection shall be in addition to amounts otherwise made available for the purpose described in paragraph (2).

(d) *DEFINITIONS.*—The terms used in this section have the meanings given the terms in section 20150.

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CHAPTER 203—RESPONSIBILITIES AND VISION

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§ 20301. General responsibilities

(a) * * *

(b) * * *

(c) *CYBERSECURITY.*—The Administrator shall update and improve the cybersecurity of NASA space assets and supporting infrastructure.

* * * * *

§ 20305. National Academies decadal surveys

(a) *IN GENERAL.*—The Administrator shall enter into agreements on a periodic basis with the National Academies for independent assessments, also known as decadal surveys, to take stock of the status and opportunities for Earth and space science discipline fields and Aeronautics research and to recommend priorities for research and programmatic areas over the next decade.

(b) *INDEPENDENT COST ESTIMATES.*—The agreements described in subsection (a) shall include independent estimates of the life cycle costs and technical readiness of missions assessed in the decadal surveys whenever possible.

(c) *REEXAMINATION.*—**[The Administrator shall]**

(1) *REEXAMINATION OF PRIORITIES BY NATIONAL ACADEMIES.*—The Administrator shall request that each National Academies decadal survey committee identify any conditions or events, such as significant cost growth or scientific or technological advances, that would warrant the Administration asking the National Academies to reexamine the priorities that the decadal survey had established.

(2) *REEXAMINATION OF PRIORITIES BY ADMINISTRATOR.*—If the Administrator decides to reexamine the applicability of the priorities of the decadal surveys to the missions and activities of

the Administration due to scientific discoveries or external factors, the Administrator shall consult with the relevant committees of the National Academies.

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Subtitle III—Administrative Provisions

* * * * *

CHAPTER 313—HEALTHCARE

Sec.

31301. Healthcare program.

31302. Astronaut healthcare survey.

31303. Confidentiality of medical quality assurance records.

§ 31301. Healthcare program

The Administrator shall develop a plan to better understand the longitudinal health effects of space flight on humans. In the development of the plan, the Administrator shall consider the need for the establishment of a lifetime healthcare program for Administration astronauts and their families or other methods to obtain needed health data from astronauts and retired astronauts.

§ 31302. Astronaut healthcare survey

(a) **SURVEY.**—The Administrator shall administer an anonymous survey of astronauts and flight surgeons to evaluate communication, relationships, and the effectiveness of policies. The survey questions and the analysis of results shall be evaluated by experts independent of the Administration. The survey shall be administered on at least a biennial basis.

(b) **REPORT.**—The Administrator shall transmit a report of the results of the survey to Congress not later than 90 days following completion of the survey.

§ 31303. Confidentiality of medical quality assurance records

(a) **IN GENERAL.**—*Except as provided in subsection (b)(1)—*

(1) a medical quality assurance record, or any part of a medical quality assurance record, may not be subject to discovery or admitted into evidence in a judicial or administrative proceeding; and

(2) an individual who reviews or creates a medical quality assurance record for the Administration, or participates in any proceeding that reviews or creates a medical quality assurance record, may not testify in a judicial or administrative proceeding with respect to—

(A) the medical quality assurance record; or

(B) any finding, recommendation, evaluation, opinion, or action taken by such individual or in accordance with such proceeding with respect to the medical quality assurance record.

(b) **DISCLOSURE OF RECORDS.**—

(1) IN GENERAL.—*Notwithstanding subsection (a), a medical quality assurance record may be disclosed to—*

(A) a Federal agency or private entity, if the medical quality assurance record is necessary for the Federal agency or private entity to carry out—

(i) licensing or accreditation functions relating to Administration healthcare facilities; or

(ii) monitoring of Administration healthcare facilities required by law;

(B) a Federal agency or healthcare provider, if the medical quality assurance record is required by the Federal agency or healthcare provider to enable Administration participation in a healthcare program of the Federal agency or healthcare provider;

(C) a criminal or civil law enforcement agency, or an instrumentality authorized by law to protect the public health or safety, on written request by a qualified representative of such agency or instrumentality submitted to the Administrator that includes a description of the lawful purpose for which the medical quality assurance record is requested;

(D) an officer, an employee, or a contractor of the Administration who requires the medical quality assurance record to carry out an official duty associated with healthcare;

(E) healthcare personnel, to the extent necessary to address a medical emergency affecting the health or safety of an individual; and

(F) any committee, panel, or board convened by the Administration to review the healthcare-related policies and practices of the Administration.

(2) **SUBSEQUENT DISCLOSURE PROHIBITED.**—An individual or entity to whom a medical quality assurance record has been disclosed under paragraph (1) may not make a subsequent disclosure of the medical quality assurance record.

(c) **PERSONALLY IDENTIFIABLE INFORMATION.**—

(1) **IN GENERAL.**—Except as provided in paragraph (2), the personally identifiable information contained in a medical quality assurance record of a patient or an employee of the Administration, or any other individual associated with the Administration for purposes of a medical quality assurance program, shall be removed before the disclosure of the medical quality assurance record to an entity other than the Administration.

(2) **EXCEPTION.**—Personally identifiable information described in paragraph (1) may be released to an entity other than the Administration if the Administrator makes a determination that the release of such personally identifiable information—

(A) is in the best interests of the Administration; and

(B) does not constitute an unwarranted invasion of personal privacy.

(d) **EXCLUSION FROM FOIA.**—A medical quality assurance record may not be made available to any person under section 552 of title 5, United States Code (commonly referred to as the “Freedom of Information Act”), and this section shall be considered a statute described in subsection (b)(3)(B) of such section 522.

(e) *REGULATIONS.*—Not later than one year after the date of the enactment of this section, the Administrator shall promulgate regulations to implement this section.

(f) *RULES OF CONSTRUCTION.*—Nothing in this section shall be construed—

(1) to withhold a medical quality assurance record from a committee of the Senate or House of Representatives or a joint committee of Congress if the medical quality assurance record relates to a matter within the jurisdiction of such committee or joint committee; or

(2) to limit the use of a medical quality assurance record within the Administration, including the use by a contractor or consultant of the Administration.

(g) *DEFINITIONS.*—In this section:

(1) *MEDICAL QUALITY ASSURANCE RECORD.*—The term “medical quality assurance record” means any proceeding, discussion, record, finding, recommendation, evaluation, opinion, minutes, report, or other document or action that results from a quality assurance committee, quality assurance program, or quality assurance program activity.

(2) *QUALITY ASSURANCE PROGRAM.*—

(A) *IN GENERAL.*—The term “quality assurance program” means a comprehensive program of the Administration—

(i) to systematically review and improve the quality of medical and behavioral health services provided by the Administration to ensure the safety and security of individuals receiving such health services; and

(ii) to evaluate and improve the efficiency, effectiveness, and use of staff and resources in the delivery of such health services.

(B) *INCLUSION.*—The term “quality assurance program” includes any activity carried out by or for the Administration to assess the quality of medical care provided by the Administration.

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**Subtitle IV—Aeronautics and Space
Research and Education**

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CHAPTER 401—AERONAUTICS

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**Subchapter II—High Priority Aeronautics
Research and Development Programs**

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§ 40112. Research and technology programs

(a) *SUPERSONIC TRANSPORT RESEARCH AND DEVELOPMENT.*—The Administrator may establish an initiative with the objective of de-

veloping and demonstrating, in a relevant environment, airframe and propulsion technologies to enable efficient, economical overland flight of supersonic civil transport aircraft with no significant impact on the environment.

(b) TECHNOLOGIES FOR NOISE AND EMISSIONS REDUCTION.—

(1) INITIATIVE REQUIRED.—The Administrator shall establish an initiative to build upon and accelerate previous or ongoing work to develop and demonstrate new technologies, including systems architecture, components, or integration of systems and airframe structures, in electric aircraft propulsion concepts that are capable of substantially reducing both emissions and noise from aircraft.

(2) APPROACH.—In carrying out the initiative, the Administrator shall do the following:

(A) Continue and expand work of the Administration on research, development, and demonstration of electric aircraft concepts, and the integration of such concepts.

(B) To the extent practicable, work with multiple partners, including small businesses and new entrants, on research and development activities related to transport category aircraft.

(C) Provide guidance to the Federal Aviation Administration on technologies developed and tested pursuant to the initiative.

[(b)](c) ROTORCRAFT AND OTHER RUNWAY-INDEPENDENT AIR VEHICLES.—The Administrator may establish a rotorcraft and other runway-independent air vehicles initiative with the objective of developing and demonstrating improved safety, noise, and environmental impact in a relevant environment.

[(c)](d) HYPERSONICS RESEARCH.—The Administrator may establish a hypersonics research program with the objective of exploring the science and technology of hypersonic flight using air-breathing propulsion concepts, through a mix of theoretical work, basic and applied research, and development of flight research demonstration vehicles. The program may also include the transition to the hypersonic range of Mach 3 to Mach 5.

[(d)](e) REVOLUTIONARY AERONAUTICAL CONCEPTS.—The Administrator may establish a research program which covers a unique range of subsonic, fixed wing vehicles and propulsion concepts. This research is intended to push technology barriers beyond current subsonic technology. Propulsion concepts include advanced materials, morphing engines, hybrid engines, and fuel cells.

[(e)](f) FUEL CELL-POWERED AIRCRAFT RESEARCH.—

(1) OBJECTIVE.—The Administrator may establish a fuel cell-powered aircraft research program whose objective shall be to develop and test concepts to enable a hydrogen fuel cell-powered aircraft that would have no hydrocarbon or nitrogen oxide emissions into the environment.

(2) APPROACH.—The Administrator may establish a program of competitively awarded grants available to teams of researchers that may include the participation of individuals from universities, industry, and government for the conduct of this research.

[(f)](g) MARS AIRCRAFT RESEARCH.—

(1) OBJECTIVE.—The Administrator may establish a Mars Aircraft project whose objective shall be to develop and test concepts for an uncrewed aircraft that could operate for sustained periods in the atmosphere of Mars.

(2) APPROACH.—The Administrator may establish a program of competitively awarded grants available to teams of researchers that may include the participation of individuals from universities, industry, and government for the conduct of this research.

* * * * *

CHAPTER 403—NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM

Sec.

40301. Purposes.

40302. Definitions.

40303. National space grant college and fellowship program.

40304. Grants or contracts.

40305. Specific national needs.

40304. *Grants.*

40305. *Availability of other Federal personnel and data.*

40306. Space grant college and space grant regional consortium.

40307. Space grant fellowship program.

40308. Space grant review panel.

40309. Availability of other Federal personnel and data.

40310. Designation or award to be on competitive basis.

40311. Continuing emphasis.

§ 40301. Purposes

The purposes of this chapter are to—

(1) * * *

(2) * * *

(3) encourage and support, within the university community of the Nation, the existence of interdisciplinary and multidisciplinary programs of space research that—

(A) engage in integrated activities of training, research, and public service;

(B) have cooperative programs with industry; **and**

(C) are coordinated with the overall program of the Administration; *and*

(D) *promote equally the State and regional STEM interests of each space grant consortium;*

(4) encourage and support the existence of consortia, **made up of university and industry members, in order to advance** *comprised of members of universities in each State and other entities, such as 2-year colleges, industries, science learning centers, museums, and government entities, to advance the exploration and development of space resources in cases in which national objectives can be better fulfilled through such consortia than through the programs of single universities;*

(5) encourage and support Federal funding for graduate fellowships in fields related to space; and

(6) support activities in colleges and universities generally for the purpose of creating and operating a network of institutional programs that will enhance achievements resulting from efforts under this chapter.

§ 40302. Definitions

In this chapter:

(1) * * *

(2) * * *

[(3) PANEL.—The term “panel” means the space grant review panel established pursuant to section 40308 of this title.]

(3) LEAD INSTITUTION.—*The term “lead institution” means an entity in a State that—*

(A) was designated by the Administrator under section 40306, as in effect on the day before the date of the enactment of the National Aeronautics and Space Administration Authorization Act of 2019; or

(B) is designated by the Administrator under section 40303(d)(3).

(4) PERSON.—The term “person” means any individual, any public or private corporation, partnership, or other association or entity (including any [space grant college, space grant regional consortium, institution of higher education,] *lead institution, space grant consortium, institute, or laboratory*), or any State, political subdivision of a State, or agency or officer of a State or political subdivision of a State.

(5) * * *

(6) SPACE GRANT CONSORTIUM.—*The term “space grant consortium” means a State-wide group, led by a lead institution, that has established partnerships with other academic institutions, industries, science learning centers, museums, and government entities to promote a strong educational base in the space and aeronautical sciences.*

[(6) SPACE GRANT COLLEGE.—The term “space grant college” means any public or private institution of higher education which is designated as such by the Administrator pursuant to section 40306 of this title.]

[(7) SPACE GRANT PROGRAM.—The term “space grant program” means any program that—

[(A) is administered by any space grant college, space grant regional consortium, institution of higher education, institute, laboratory, or State or local agency; and

[(B) includes 2 or more projects involving education and one or more of the following activities in the fields related to space:

[(i) Research.

[(ii) Training.

[(iii) Advisory services.

[(8) SPACE GRANT REGIONAL CONSORTIUM.—The term “space grant regional consortium” means any association or other alliance that is designated as a space grant regional consortium by the Administrator pursuant to section 40306 of this title.]

[(9)](7) SPACE RESOURCE.—The term “space resource” means any tangible or intangible benefit which can be realized only from—

(A) aeronautical and space activities; or

(B) advancements in any field related to space *and aeronautics*.

[(10) STATE.—The term “State” means any State of the United States, the District of Columbia, the Commonwealth of

Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, or any other territory or possession of the United States.】

(8) *STEM*.—The term “*STEM*” means science, technology, engineering, and mathematics.

§ 40303. National space grant college and fellowship program

(a) **ESTABLISHMENT**.—The Administrator shall establish and maintain, within the Administration, a program to be known as the national space grant college and fellowship program. The national space grant college and fellowship program shall consist of the financial assistance and other activities provided for in this chapter. The Administrator shall establish long-range planning guidelines and priorities, and adequately evaluate the program.

【(b) **FUNCTIONS**.—Within the Administration, the program shall—

【(1) apply the long-range planning guidelines and the priorities established by the Administrator under subsection (a);

【(2) advise the Administrator with respect to the expertise and capabilities which are available through the national space grant college and fellowship program, and make such expertise available to the Administration as directed by the Administrator;

【(3) evaluate activities conducted under grants and contracts awarded pursuant to sections 40304 and 40305 of this title to ensure that the purposes set forth in section 40301 of this title are implemented;

【(4) encourage other Federal departments, agencies, and instrumentalities to use and take advantage of the expertise and capabilities which are available through the national space grant college and fellowship program, on a cooperative or other basis;

【(5) encourage cooperation and coordination with other Federal programs concerned with the development of space resources and fields related to space;

【(6) advise the Administrator on the designation of recipients supported by the national space grant college and fellowship program and, in appropriate cases, on the termination or suspension of any such designation; and

【(7) encourage the formation and growth of space grant and fellowship programs.】

(b) **PROGRAM OBJECTIVE**.—

(1) *IN GENERAL*.—The Administrator shall carry out the national space grant college and fellowship program with the objective of providing hands-on research, training, and education programs with measurable outcomes in each State, including programs to provide—

(A) internships, fellowships, and scholarships;

(B) interdisciplinary hands-on mission programs and design projects;

(C) student internships with industry or university researchers or at centers of the Administration;

(D) faculty and curriculum development initiatives;

(E) university-based research initiatives relating to the Administration and the STEM workforce needs of each State; or

(F) STEM engagement programs for kindergarten through grade 12 teachers and students.

(2) PROGRAM PRIORITIES.—In carrying out the objective described in paragraph (1), the Administrator shall ensure that each program carried out by a space grant consortium under the national space grant college and fellowship program balances the following priorities:

(A) The space and aeronautics research needs of the Administration, including the mission directorates.

(B) The need to develop a national STEM workforce.

(C) The STEM workforce needs of the State.

(c) PROGRAM ADMINISTERED THROUGH SPACE GRANT CONSORTIA.—The Administrator shall carry out the national space grant college and fellowship program through the space grant consortia.

(d) SUSPENSION; TERMINATION; NEW COMPETITION.—

(1) SUSPENSION.—The Administrator may, for cause and after an opportunity for hearing, suspend a lead institution that was designated by the Administrator under section 40306, as in effect on the day before the date of the enactment of the National Aeronautics and Space Administration Authorization Act of 2019.

(2) TERMINATION.—If the issue resulting in a suspension under paragraph (1) is not resolved within a period determined by the Administrator, the Administrator may terminate the designation of the entity as a lead institution.

(3) NEW COMPETITION.—If the Administrator terminates the designation of an entity as a lead institution, the Administrator may initiate a new competition in the applicable State for the designation of a lead institution.

[(c)](e) GENERAL AUTHORITIES.—To carry out the provisions of this chapter, the Administrator may—

(1) accept conditional or unconditional gifts or donations of services, money, or property, real, personal or mixed, tangible or intangible;

(2) accept and use funds from other Federal departments, agencies, and instrumentalities to pay for fellowships, grants, contracts, and other transactions; and

(3) issue such rules and regulations as may be necessary and appropriate.

[(d)] PROGRAM ADMINISTRATION COSTS.—In carrying out the provisions of this chapter, the Administrator—

[(1)] shall maximize appropriated funds for grants and contracts made under section 40304 in each fiscal year; and

[(2)] in each fiscal year, the Administrator shall limit its program administration costs to no more than 5 percent of funds appropriated for this program for that fiscal year.

[(e)] REPORTS.—For any fiscal year in which the Administrator cannot meet the administration cost target under subsection (d)(2), if the Administration is unable to limit program costs under subsection (b), the Administrator shall submit to the appropriate committees of Congress a report, including—

[(1) a description of why the Administrator did not meet the cost target under subsection (d); and

[(2) the measures the Administrator will take in the next fiscal year to meet the cost target under subsection (d) without drawing upon other Federal funding.]

§ [40304. Grants or contracts

[(a) **AUTHORITY OF ADMINISTRATOR.**—The Administrator may make grants and enter into contracts or other transactions under this subsection to assist any space grant and fellowship program or project if the Administrator finds that the program or project will carry out the purposes set forth in section 40301 of this title. The total amount paid pursuant to a grant or contract may equal not more than 66 percent of the total cost of the space grant and fellowship program or project involved, except in the case of grants or contracts paid for with funds accepted by the Administrator pursuant to section 40303(c)(2) of this title.

[(b) **SPECIAL GRANTS.**—The Administrator may make special grants under this subsection to carry out the purposes set forth in section 40301 of this title. The amount of a special grant may equal up to 100 percent of the total cost of the project involved. A special grant may be made under this subsection only if the Administrator finds that—

[(1) no reasonable means is available through which the applicant can meet the matching requirement for a grant under subsection (a);

[(2) the probable benefit of the project outweighs the public interest in the matching requirement; and

[(3) the same or equivalent benefit cannot be obtained through the award of a contract or grant under subsection (a) or section 40305 of this title.

[(c) **APPLICATION.**—Any person may apply to the Administrator for a grant or contract under this section. Application shall be made in such form and manner, and with such content and other submissions, as the Administrator shall by regulation prescribe.

[(d) **TERMS AND CONDITIONS.**—

[(1) **IN GENERAL.**—Any grant made, or contract entered into, under this section shall be subject to the limitations and provisions set forth in paragraphs (2) and (3) and to such other terms, conditions, and requirements as the Administrator considers necessary or appropriate.

[(2) **LIMITATIONS.**—No payment under any grant or contract under this section may be applied to—

[(A) the purchase of any land;

[(B) the purchase, construction, preservation, or repair of any building; or

[(C) the purchase or construction of any launch facility or launch vehicle.

[(3) **LEASES.**—Notwithstanding paragraph (2), the items in subparagraphs (A), (B), and (C) of such paragraph may be leased upon written approval of the Administrator.

[(4) **RECORDS.**—Any person that receives or utilizes any proceeds of any grant or contract under this section shall keep such records as the Administrator shall by regulation prescribe as being necessary and appropriate to facilitate effective audit

and evaluation, including records which fully disclose the amount and disposition by such recipient of such proceeds, the total cost of the program or project in connection with which such proceeds were used, and the amount, if any, of such cost which was provided through other sources. Such records shall be maintained for 3 years after the completion of such a program or project. The Administrator and the Comptroller General of the United States, or any of their duly authorized representatives, shall have access, for the purpose of audit and evaluation, to any books, documents, papers, and records of receipts which, in the opinion of the Administrator or the Comptroller General, may be related or pertinent to such grants and contracts.】

§40304. Grants

(a) *ELIGIBLE SPACE GRANT CONSORTIUM DEFINED.*—*In this section, the term “eligible space grant consortium” means a space grant consortium that the Administrator has determined—*

(1) *has the capability and objective to carry out not fewer than 3 of the 6 programs under section 40303(b)(1);*

(2) *will carry out programs that balance the priorities described in section 40303(b)(2); and*

(3) *is engaged in research, training, and education relating to space and aeronautics.*

(b) *GRANTS.*—

(1) *IN GENERAL.*—*The Administrator shall award grants to the lead institutions of eligible space grant consortia to carry out the programs under section 40303(b)(1).*

(2) *REQUEST FOR PROPOSALS.*—

(A) *IN GENERAL.*—*Not later than 180 days after the date of the enactment of the National Aeronautics and Space Administration Authorization Act of 2019, the Administrator shall issue a request for proposals from space grant consortia for the award of grants under this section.*

(B) *APPLICATIONS.*—*A lead institution of a space grant consortium that seeks a grant under this section shall submit, on behalf of such space grant consortium, an application to the Administrator at such time, in such manner, and accompanied by such information as the Administrator may require.*

(3) *GRANT AWARDS.*—*The Administrator shall award 1 or more 5-year grants, disbursed in annual installments, to the lead institution of the eligible space grant consortium of—*

(A) *each State;*

(B) *the District of Columbia; and*

(C) *the Commonwealth of Puerto Rico.*

(4) *USE OF FUNDS.*—*A grant awarded under this section shall be used by an eligible space grant consortium to carry out not fewer than 3 of the 6 programs under section 40303(b)(1).*

(c) *ALLOCATION OF FUNDING.*—

(1) *PROGRAM IMPLEMENTATION.*—

(A) *IN GENERAL.*—*To carry out the objective described in section 40303(b)(1), of the funds made available each fiscal year for the national space grant college and fellowship*

program, the Administrator shall allocate not less than 85 percent as follows:

(i) The 52 eligible space grant consortia shall each receive an equal share.

(ii) The territories of Guam and the United States Virgin Islands shall each receive funds equal to approximately $\frac{1}{5}$ of the share for each eligible space grant consortia.

(B) **MATCHING REQUIREMENT.**—Each eligible space grant consortium shall match the funds allocated under subparagraph (A)(i) on a basis of not less than 1 non-Federal dollar for every 1 Federal dollar, except that any program funded under paragraph (3) or any program to carry out 1 or more internships or fellowships shall not be subject to that matching requirement.

(2) **PROGRAM ADMINISTRATION.**—

(A) **IN GENERAL.**—Of the funds made available each fiscal year for the national space grant college and fellowship program, the Administrator shall allocate not more than 10 percent for the administration of the program.

(B) **COSTS COVERED.**—The funds allocated under subparagraph (A) shall cover all costs of the Administration associated with the administration of the national space grant college and fellowship program, including—

(i) direct costs of the program, including costs relating to support services and civil service salaries and benefits;

(ii) indirect general and administrative costs of centers and facilities of the Administration; and

(iii) indirect general and administrative costs of the Administration headquarters.

(3) **SPECIAL PROGRAMS.**—Of the funds made available each fiscal year for the national space grant college and fellowship program, the Administrator shall allocate not more than 5 percent to the lead institutions of space grant consortia established as of the date of the enactment of the National Aeronautics and Space Administration Authorization Act of 2019 for grants to carry out innovative approaches and programs to further science and education relating to the missions of the Administration and STEM disciplines.

(d) **TERMS AND CONDITIONS.**—

(1) **LIMITATIONS.**—Amounts made available through a grant under this section may not be applied to—

(A) the purchase of land;

(B) the purchase, construction, preservation, or repair of a building; or

(C) the purchase or construction of a launch facility or launch vehicle.

(2) **LEASES.**—Notwithstanding paragraph (1), land, buildings, launch facilities, and launch vehicles may be leased under a grant on written approval by the Administrator.

(3) **RECORDS.**—

(A) **IN GENERAL.**—Any person that receives or uses the proceeds of a grant under this section shall keep such records as the Administrator shall by regulation prescribe

as being necessary and appropriate to facilitate effective audit and evaluation, including records that fully disclose the amount and disposition by a recipient of such proceeds, the total cost of the program or project in connection with which such proceeds were used, and the amount, if any, of such cost that was provided through other sources.

(B) MAINTENANCE OF RECORDS.—Records under subparagraph (A) shall be maintained for not less than 3 years after the date of completion of such a program or project.

(C) ACCESS.—For the purpose of audit and evaluation, the Administrator and the Comptroller General of the United States shall have access to any books, documents, papers, and records of receipts relating to a grant under this section, as determined by the Administrator or Comptroller General.

【§ 40305. Specific national needs

【(a) IDENTIFICATION OF SPECIFIC NEEDS AND GRANT-MAKING AND CONTRACTING AUTHORITY.—The Administrator shall identify specific national needs and problems relating to space. The Administrator may make grants or enter into contracts under this section with respect to such needs or problems. The amount of any such grant or contract may equal up to 100 percent of the total cost of the project involved.

【(b) APPLICATIONS FOR GRANTS OR CONTRACTS.—Any person may apply to the Administrator for a grant or contract under this section. In addition, the Administrator may invite applications with respect to specific national needs or problems identified under subsection (a). Application shall be made in such form and manner, and with such content and other submissions, as the Administrator shall by regulation prescribe. Any grant made, or contract entered into, under this section shall be subject to the limitations and provisions set forth in paragraphs (2) and (4) of section 40304(d) of this title and to such other terms, conditions, and requirements as the Administrator considers necessary or appropriate.

【§ 40306. Space grant college and space grant regional consortium

【(a) DESIGNATION AND QUALIFICATIONS.—

【(1) AUTHORITY TO DESIGNATE.—The Administrator may designate—

【(A) any institution of higher education as a space grant college; and

【(B) any association or other alliance of 2 or more persons, other than individuals, as a space grant regional consortium.

【(2) SPACE GRANT COLLEGE REQUIREMENTS.—No institution of higher education may be designated as a space grant college unless the Administrator finds that such institution—

【(A) is maintaining a balanced program of research, education, training, and advisory services in fields related to space;

【(B) will act in accordance with such guidelines as are prescribed under subsection (b)(2); and

[(C) meets such other qualifications as the Administrator considers necessary or appropriate.

[(3) SPACE GRANT REGIONAL CONSORTIUM REQUIREMENTS.—No association or other alliance of 2 or more persons may be designated as a space grant regional consortium unless the Administrator finds that such association or alliance—

[(A) is established for the purpose of sharing expertise, research, educational facilities or training facilities, and other capabilities in order to facilitate research, education, training, and advisory services in any field related to space;

[(B) will encourage and follow a regional approach to solving problems or meeting needs relating to space, in cooperation with appropriate space grant colleges, space grant programs, and other persons in the region;

[(C) will act in accordance with such guidelines as are prescribed under subsection (b)(2); and

[(D) meets such other qualifications as the Administrator considers necessary or appropriate.

[(b) QUALIFICATIONS AND GUIDELINES.—The Administrator shall by regulation prescribe—

[(1) the qualifications required to be met under paragraphs (2)(C) and (3)(D) of subsection (a); and

[(2) guidelines relating to the activities and responsibilities of space grant colleges and space grant regional consortia.

[(c) SUSPENSION OR TERMINATION OF DESIGNATION.—The Administrator may, for cause and after an opportunity for hearing, suspend or terminate any designation under subsection (a).

[(§ 40307. Space grant fellowship program

[(a) AWARD OF FELLOWSHIPS.—The Administrator shall support a space grant fellowship program to provide educational and training assistance to qualified individuals at the graduate level of education in fields related to space. Such fellowships shall be awarded pursuant to guidelines established by the Administrator. Space grant fellowships shall be awarded to individuals at space grant colleges, space grant regional consortia, other colleges and institutions of higher education, professional associations, and institutes in such a manner as to ensure wide geographic and institutional diversity in the pursuit of research under the fellowship program.

[(b) LIMITATION ON AMOUNT PROVIDED.—The total amount which may be provided for grants under the space grant fellowship program during any fiscal year shall not exceed an amount equal to 50 percent of the total funds appropriated for such year pursuant to this chapter.

[(c) AUTHORITY TO SPONSOR OTHER RESEARCH FELLOWSHIP PROGRAMS UNAFFECTED.—Nothing in this section shall be construed to prohibit the Administrator from sponsoring any research fellowship program, including any special emphasis program, which is established under an authority other than this chapter.

[(§ 40308. Space grant review panel

[(a) ESTABLISHMENT.—The Administrator shall establish an independent committee known as the space grant review panel,

which shall not be subject to the provisions of the Federal Advisory Committee Act (5 App. U.S.C.).

[(b) DUTIES.—The panel shall take such steps as may be necessary to review, and shall advise the Administrator with respect to—

[(1) applications or proposals for, and performance under, grants and contracts awarded pursuant to sections 40304 and 40305 of this title;

[(2) the space grant fellowship program;

[(3) the designation and operation of space grant colleges and space grant regional consortia, and the operation of space grant and fellowship programs;

[(4) the formulation and application of the planning guidelines and priorities pursuant to subsections (a) and (b)(1) of section 40303 of this title; and

[(5) such other matters as the Administrator refers to the panel for review and advice.

[(c) PERSONNEL AND ADMINISTRATIVE SERVICES.—The Administrator shall make available to the panel any information, personnel, and administrative services and assistance which is reasonable to carry out the duties of the panel.

[(d) MEMBERS.—

[(1) APPOINTMENT.—The Administrator shall appoint the voting members of the panel. A majority of the voting members shall be individuals who, by reason of knowledge, experience, or training, are especially qualified in one or more of the disciplines and fields related to space. The other voting members shall be individuals who, by reason of knowledge, experience, or training, are especially qualified in, or representative of, education, extension services, State government, industry, economics, planning, or any other activity related to efforts to enhance the understanding, assessment, development, or utilization of space resources. The Administrator shall consider the potential conflict of interest of any individual in making appointments to the panel.

[(2) CHAIRMAN AND VICE CHAIRMAN.—The Administrator shall select one voting member to serve as the Chairman and another voting member to serve as the Vice Chairman. The Vice Chairman shall act as Chairman in the absence or incapacity of the Chairman.

[(3) REIMBURSEMENT FOR EXPENSES.—Voting members of the panel who are not Federal employees shall be reimbursed for actual and reasonable expenses incurred in the performance of such duties.

[(4) MEETINGS.—The panel shall meet on a biannual basis and, at any other time, at the call of the Chairman or upon the request of a majority of the voting members or of the Administrator.

[(5) POWERS.—The panel may exercise such powers as are reasonably necessary in order to carry out the duties enumerated in subsection (b).]

【§ 40309.】 § 40305. Availability of other Federal personnel and data

Each department, agency, or other instrumentality of the Federal Government that is engaged in or concerned with, or that has authority over, matters relating to space—

- (1) may, upon a written request from the Administrator, make available, on a reimbursable basis or otherwise, any personnel (with their consent and without prejudice to their position and rating), service, or facility which the Administrator considers necessary to carry out any provision of this chapter;
- (2) may, upon a written request from the Administrator, furnish any available data or other information which the Administrator considers necessary to carry out any provision of this chapter; and
- (3) may cooperate with the Administration.

§ [40310. Designation or award to be on competitive basis

【The Administrator shall not under this chapter designate any space grant college or space grant regional consortium or award any fellowship, grant, or contract unless such designation or award is made in accordance with the competitive, merit-based review process employed by the Administration on October 30, 1987.

【§ 40311. Continuing emphasis

【The Administration shall continue its emphasis on the importance of education to expand opportunities for Americans to understand and participate in the Administration’s aeronautics and space projects by supporting and enhancing science and engineering education, research, and public outreach efforts.】

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Subtitle V—Programs Targeting Commercial Opportunities

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CHAPTER 501—SPACE COMMERCE

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Subchapter II—Promotion of Commercial Space Opportunities

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§ 50111. Commercialization of Space Station

- (a) * * *
- (b) * * *
- (c) ISS TRANSITION PLAN.—

(1) IN GENERAL.—The Administrator, in coordination with the ISS management entity (as defined in section 2 of the National Aeronautics and Space Administration Transition Authorization Act of 2017), ISS partners, the scientific user com-

munity, and the commercial space sector, shall develop a plan to transition in a step-wise approach from the current regime that relies heavily on NASA sponsorship to a regime where NASA could be one of many customers of a low-Earth orbit non-governmental human space flight enterprise.

(2) REPORTS.—Not later than December 1, 2017, and biennially thereafter until **[2023]** 2028, the Administrator shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report that includes—

(A) * * *

* * * * *

(J) an evaluation of the feasible and preferred service life of the ISS beyond the period described in section 503 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18353), through at least **[2028]** 2030, as a unique scientific, commercial, and space exploration-related facility, including—

(i) a general discussion of international partner capabilities and prospects for extending the partnership;

(ii) the cost associated with extending the service life;

(iii) an assessment on the technical limiting factors of the service life of the ISS, including a list of critical components and their expected service life and availability; and

(iv) such other information as may be necessary to fully describe the justification for and feasibility of extending the service life of the ISS, including the potential scientific or technological benefits to the Federal Government, public, or to academic or commercial entities;

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Subtitle VII—Access to Space

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CHAPTER 705—EXPLORATION INITIATIVES

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[§ 70504. Stepping stone approach to exploration

[(a) IN GENERAL.—The Administration—

[(1) may conduct missions to intermediate destinations in sustainable steps in accordance with section 20302(b) of this title, and on a timetable determined by the availability of funding, in order to achieve the objective of human exploration of Mars specified in section 202(b)(5) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18312(b)(5)); and

[(2) shall incorporate any such missions into the human exploration roadmap under section 432 of the National Aeronautics and Space Administration Transition Authorization Act of 2017.

[(b) COST-EFFECTIVENESS.—In order to maximize the cost-effectiveness of the long-term space exploration and utilization activities of the United States, the Administrator shall take all necessary steps, including engaging international, academic, and industry partners, to ensure that activities in the Administration’s human space exploration program balance how those activities might also help meet the requirements of future exploration and utilization activities leading to human habitation on the surface of Mars.

[(c) COMPLETION.—Within budgetary considerations, once an exploration-related project enters its development phase, the Administrator shall seek, to the maximum extent practicable, to complete that project without undue delays.

[(d) INTERNATIONAL PARTICIPATION.—In order to achieve the goal of successfully conducting a crewed mission to the surface of Mars, the President may invite the United States partners in the ISS program and other nations, as appropriate, to participate in an international initiative under the leadership of the United States.】

§ 70504. Steppingstone approach to exploration

(a) *IN GENERAL.*—*The Administrator, in sustainable steps, may conduct missions to intermediate destinations, such as the Moon, in accordance with section 20302(b), and on a timetable determined by the availability of funding, in order to achieve the objective of human exploration of Mars specified in section 202(b)(5) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18312(b)(5)), if the Administrator—*

(1) *determines that each such mission demonstrates or advances a technology or operational concept that will enable human missions to Mars; and*

(2) *incorporates each such mission into the human exploration roadmap under section 432 of the National Aeronautics and Space Administration Transition Authorization Act of 2017 (Public Law 115–10; 51 U.S.C. 20302 note).*

(b) *CISLUNAR SPACE EXPLORATION ACTIVITIES.*—*In conducting a mission under subsection (a), the Administrator shall—*

(1) *use a combination of launches of the Space Launch System and space transportation services from United States commercial providers, as appropriate, for the mission;*

(2) *plan for not fewer than 1 Space Launch System launch annually beginning after the first successful crewed launch of Orion on the Space Launch System; and*

(3) *establish an outpost in orbit around the Moon that—*

(A) *demonstrates technologies, systems, and operational concepts directly applicable to the space vehicle that will be used to transport humans to Mars;*

(B) *has the capability for periodic human habitation; and*

(C) *can function as a point of departure, return, or staging for Administration or nongovernmental or international partner missions to multiple locations on the lunar surface or other destinations.*

(c) *COST-EFFECTIVENESS.*—To maximize the cost-effectiveness of the long-term space exploration and utilization activities of the United States, the Administrator shall take all necessary steps, including engaging nongovernmental and international partners, to ensure that activities in the Administration’s human space exploration program are balanced in order to help meet the requirements of future exploration and utilization activities leading to human habitation on the surface of Mars.

(d) *COMPLETION.*—Within budgetary considerations, once an exploration-related project enters its development phase, the Administrator shall seek, to the maximum extent practicable, to complete that project without undue delay.

(e) *INTERNATIONAL PARTICIPATION.*—To achieve the goal of successfully conducting a crewed mission to the surface of Mars, the Administrator shall invite the partners in the ISS program and other nations, as appropriate, to participate in an international initiative under the leadership of the United States.

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Subtitle VII—Access to Space

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CHAPTER 709—INTERNATIONAL SPACE STATION

Sec.

70901. Peaceful uses of space station.

70902. Allocation of International Space Station research budget.

70903. International Space Station research.

70904. International Space Station completion.

70905. National laboratory designation.

[70906. International Space Station National Laboratory Advisory Committee.]

[repealed]

70906. *Maintaining use through at least 2030.*

70907. *Maintaining use through at least 2024.*

* * * * *

[§ 70906. International Space Station National Laboratory Advisory Committee

(a) *ESTABLISHMENT.*—Not later than one year after October 15, 2008, the Administrator shall establish under the Federal Advisory Committee Act a committee to be known as the “International Space Station National Laboratory Advisory Committee” (hereafter in this section referred to as the “Committee”).

[(b) MEMBERSHIP.—

[(1) COMPOSITION.—The Committee shall be composed of individuals representing organizations that have formal agreements with the Administration to utilize the United States portion of the International Space Station, including allocations within partner elements.

[(2) CHAIR.—The Administrator shall appoint a chair from among the members of the Committee, who shall serve for a 2-year term.

[(c) DUTIES OF THE COMMITTEE.—

[(1) IN GENERAL.—The Committee shall monitor, assess, and make recommendations regarding effective utilization of the International Space Station as a national laboratory and platform for research.

[(2) ANNUAL REPORT.—The Committee shall submit to the Administrator, on an annual basis or more frequently as considered necessary by a majority of the members of the Committee, a report containing the assessments and recommendations required by paragraph (1).

[(d) DURATION.—The Committee shall exist for the life of the International Space Station.]

[[§ 70907.] § 70906. Maintaining use through at least [2024] 2030

(a) POLICY.—The Administrator shall take all necessary steps to ensure that the International Space Station remains a viable and productive facility capable of potential United States utilization through at least [September 30, 2024] *September 30, 2030*.

(b) NASA ACTIONS.—In furtherance of the policy under subsection (a), the Administrator shall ensure, to the extent practicable, that the International Space Station, as a designated national laboratory—

(1) remains viable as an element of overall exploration and partnership strategies and approaches;

(2) is considered for use by all NASA mission directorates, as appropriate, for technically appropriate scientific data gathering or technology risk reduction demonstrations; and

(3) remains an effective, functional vehicle providing research and test bed capabilities for the United States through at least [September 30, 2024] *September 30, 2030*.

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**IRAN, NORTH KOREA, AND SYRIA
NONPROLIFERATION ACT**

* * * * *

[Public Law 106–178; 50 U.S.C. 1701 note]

SEC. 7. DEFINITIONS.

For purposes of this Act, the following terms have the following meanings:

(1) EXTRAORDINARY PAYMENTS IN CONNECTION WITH THE INTERNATIONAL SPACE STATION.—The term “extraordinary payments in connection with the International Space Station” means payments in cash or in kind made or to be made by the United States Government—

(A) for work on the International Space Station which the Russian Government pledged at any time to provide at its expense; or

(B) for work on the International Space Station not required to be made under the terms of a contract or other agreement that was in effect on January 1, 1999, as those terms were in effect on such date,

except that such term does not mean payments in cash or in kind made or to be made by the United States Government prior to [December 31, 2025] *December 31, 2030*, for work to be performed or services to be rendered prior to that date necessary to meet United States obligations under the Agreement Concerning Cooperation on the Civil International Space Station, with annex, signed at Washington January 29, 1998, and entered into force March 27, 2001, or any protocol, agreement, memorandum of understanding, or contract related thereto.

(2) * * *

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, FISCAL YEAR 1991

* * * * *

[Public Law 101-611; 51 U.S.C. 20111 note]

SEC. 121. [USERS' ADVISORY GROUP] *PRESIDENT'S SPACE ADVISORY BOARD.*

(a) ESTABLISHMENT.—(1) The National Space Council shall establish a [Users' Advisory Group] *President's Space Advisory Board* composed of non-Federal representatives of industries and other persons involved in aeronautical and space activities.

(2) The Vice President shall name a chairman of the [Users' Advisory Group] *President's Space Advisory Board*.

(3) The National Space Council shall from time to time, but not less than once a year, meet with the [Users' Advisory Group] *President's Space Advisory Board*.

(4) The function of the [Users' Advisory Group] *President's Space Advisory Board* shall be to ensure that the interests of industries and other non-Federal entities involved in space activities, including in particular commercial entities, are adequately represented in the National Space Council.

(5) The [Users' Advisory Group] *President's Space Advisory Board* may be assisted by personnel detailed to the National Space Council.

(b) EXEMPTION.—The [Users' Advisory Group] *President's Space Advisory Board* shall not be subject to section 14(a)(2) of the Federal Advisory Committee Act [5 U.S.C. App.].

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 2005

* * * * *

[Public Law 109-155; 119 Stat. 2922; 51 U.S.C. 71101 note prec.]

SEC. 321. GEORGE E. BROWN, JR. NEAR-EARTH OBJECT SURVEY.

(a) * * *

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[(f) ANNUAL REPORTS.—After the initial report under subsection (e), the Administrator shall annually transmit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report that includes—

[(1) a summary of all activities carried out under subsection (d) since the date of enactment of the National Aeronautics and Space Administration Transition Authorization Act of 2017, including the progress toward achieving 90 percent completion of the survey described in subsection (d); and

[(2) a summary of expenditures for all activities carried out under subsection (d) since the date of enactment of the National Aeronautics and Space Administration Transition Authorization Act of 2017.]

(f) ANNUAL REPORT.—Not later than September 30, 2020, and annually thereafter through 90-percent completion of the catalogue required by subsection (d)(1), the Administrator shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report that includes the following:

(1) A summary of all activities carried out by the Planetary Defense Coordination Office established under section 309(b)(1) of the National Aeronautics and Space Administration Authorization Act of 2019 since the date of enactment of that Act.

(2) A description of the progress with respect to the design, development, and launch of the space-based infrared survey telescope required by section 309(b)(2)(A) of the National Aeronautics and Space Administration Authorization Act of 2019.

(3) An assessment of the progress toward meeting the requirements of subsection (d)(1).

(4) A description of the status of efforts to coordinate planetary defense activities in response to a threat posed by a near-Earth object with other Federal agencies since the date of enactment of the National Aeronautics and Space Administration Authorization Act of 2019.

(5) A description of the status of efforts to coordinate and cooperate with other countries to discover hazardous asteroids and comets, plan a mitigation strategy, and implement that strategy in the event of the discovery of an object on a likely collision course with Earth.

(6) A summary of expenditures for all activities carried out by the Planetary Defense Coordination Office since the date of enactment of the National Aeronautics and Space Administration Authorization Act of 2019.

(g) * * *

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 2010

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[42 U.S.C. 18302]

SEC. 3. DEFINITIONS.

In this Act:

(1) ADMINISTRATOR.—The term “Administrator” means the Administrator of the National Aeronautics and Space Administration.

[(2) APPROPRIATE COMMITTEES OF CONGRESS.—The term “appropriate committees of Congress” means—

[(A) the Committee on Commerce, Science, and Transportation of the Senate; and

[(B) the Committee on Science of the House of Representatives.

[(3) CIS-LUNAR SPACE.—The term “cis-lunar space” means the region of space from the Earth out to and including the region around the surface of the Moon.]

(2) APPROPRIATE COMMITTEES OF CONGRESS.—The term “appropriate committees of Congress” means—

(A) the Committee on Commerce, Science, and Transportation of the Senate; and

(B) the Committee on Science, Space, and Technology of the House of Representatives.

(3) CISLUNAR SPACE.—The term “cislunar space” means the region of space beyond low-Earth orbit out to and including the region around the surface of the Moon.

(4) * * *

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[42 U.S.C. 18351(a)]

SEC. 501. CONTINUATION OF THE INTERNATIONAL SPACE STATION.

(a) POLICY OF THE UNITED STATES.—It shall be the policy of the United States, in consultation with its international partners in the ISS program, to support full and complete utilization of the ISS through at least [2024] 2030.

(b) * * *

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[42 U.S.C. 18353(a)]

SEC. 503. MAINTENANCE OF THE UNITED STATES SEGMENT AND ASSURANCE OF CONTINUED OPERATIONS OF THE INTERNATIONAL SPACE STATION.

(a) IN GENERAL.—The Administrator shall take all actions necessary to ensure the safe and effective operation, maintenance, and maximum utilization of the United States segment of the ISS through at least [September 30, 2024] September 30, 2030.

(b) * * *

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[42 U.S.C. 18354(d)]

SEC. 504. MANAGEMENT OF THE ISS NATIONAL LABORATORY.

(a) * * *

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(d) RESEARCH CAPACITY ALLOCATION AND INTEGRATION OF RESEARCH PAYLOADS.—

(1) ALLOCATION OF ISS RESEARCH CAPACITY.—[As soon as practicable after the date of the enactment of this Act, but not later than October 1, 2011,] *The* ISS national laboratory managed experiments shall be guaranteed access to, and utilization of, not less than 50 percent of the United States research capacity allocation, including power, cold stowage, and requisite crew time onboard the ISS through at least [September 30, 2024] *September 30, 2030*. Access to the ISS research capacity includes provision for the adequate upmass and downmass capabilities to utilize the ISS research capacity, as available. The Administrator may allocate additional capacity to the ISS national laboratory should such capacity be in excess of NASA research requirements.

(2) ADDITIONAL RESEARCH CAPABILITIES.—If any NASA research plan is determined to require research capacity onboard the ISS beyond the percentage allocated under paragraph (1), such research plan shall be prepared in the form of a requested research opportunity to be submitted to the process established under this section for the consideration of proposed research within the capacity allocated to the ISS national laboratory. A proposal for such a research plan may include the establishment of partnerships with non-NASA institutions eligible to propose research to be conducted within the ISS national laboratory capacity. Until at least [September 30, 2024] *September 30, 2030*, the official or employee designated under subsection (b) may grant an exception to this requirement in the case of a proposed experiment considered essential for purposes of preparing for exploration beyond low-Earth orbit, as determined by joint agreement between the organization with which the Administrator enters into a cooperative agreement under subsection (a) and the official or employee designated under subsection (b).

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[42 U.S.C. 18405(b)–(c)]

SEC. 907. COMMERCIAL REUSABLE SUBORBITAL RESEARCH PROGRAM.

(a) * * *

(b) MANAGEMENT.—The Administrator shall designate an officer or employee of the Space Technology Program to act as the responsible official for the [Commercial Reusable Suborbital Research Program in] *Commercial Reusable Suborbital Research Program established under subsection (c)(1) within* the Space Technology Program. The designee shall be responsible for the development of short- and long term strategic plans for maintaining, renewing and extending suborbital facilities and capabilities.

[(c) ESTABLISHMENT.—The Administrator shall establish a Commercial Reusable Suborbital Research Program within the Space Technology Program that shall fund the development of payloads

for scientific research, technology development, and education, and shall provide flight opportunities for those payloads to microgravity environments and suborbital altitudes. The Commercial Reusable Suborbital Research Program may fund engineering and integration demonstrations, proofs of concept, or educational experiments for commercial reusable vehicle flights. The program shall endeavor to work with NASA’s Mission Directorates to help achieve NASA’s research, technology, and education goals.】

(c) *ESTABLISHMENT.*—

(1) *IN GENERAL.*—*The Administrator shall establish a Commercial Reusable Suborbital Research Program within the Space Technology Mission Directorate to fund—*

(A) the development of payloads for scientific research, technology development, and education;

(B) flight opportunities for those payloads to microgravity environments and suborbital altitudes; and

(C) transition of those payloads to orbital opportunities.

(2) *COMMERCIAL REUSABLE VEHICLE FLIGHTS.*—*In carrying out the Commercial Reusable Suborbital Research Program, the Administrator may fund engineering and integration demonstrations, proofs of concept, and educational experiments for flights of commercial reusable vehicles.*

(3) *COMMERCIAL SUBORBITAL LAUNCH VEHICLES.*—*In carrying out the Commercial Reusable Suborbital Research Program, the Administrator may not fund the development of commercial suborbital launch vehicles.*

(4) *WORKING WITH MISSION DIRECTORATES.*—*In carrying out the Commercial Reusable Suborbital Research Program, the Administrator shall work with the mission directorates of NASA to achieve the research, technology, and education goals of NASA.*

(d) * * *

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 2017

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[Public Law 115–10; 51 U.S.C. 20301 note]

SEC. 421. SPACE LAUNCH SYSTEM, ORION, AND EXPLORATION GROUND SYSTEMS.

(a) * * *

(b) * * *

(c) *SENSE OF CONGRESS ON SPACE LAUNCH SYSTEM, ORION, AND EXPLORATION GROUND SYSTEMS.*—*It is the sense of Congress that—*

(1) as the United States works to send humans on a series of missions to Mars in the 2030s, the United States national space program should continue to make progress on its commitment by fully developing the Space Launch System, Orion, and related Exploration Ground Systems;

(2) using the Space Launch System and Orion for a wide range of contemplated missions will facilitate the national defense, science, and exploration objectives of the United States;

(3) the United States should have continuity of purpose for the Space Launch System and Orion in deep space exploration missions, using them beginning with the uncrewed mission, [EM-1] *Artemis 1*, planned for 2018, followed by the crewed mission, [EM-2] *Artemis 2*, in cis-lunar space planned for 2021, and for subsequent missions beginning with [EM-3] *Artemis 3* extending into cis-lunar space and eventually to Mars;

(4) the President’s annual budget requests for the Space Launch System and Orion development, test, and operational phases should strive to accurately reflect the resource requirements of each of those phases;

(5) the fully integrated Space Launch System, including an upper stage needed to go beyond low-Earth orbit, will safely enable human space exploration of the Moon, Mars, and beyond; and

(6) the Administrator should budget for and undertake a robust ground test and uncrewed and crewed flight test and demonstration program for the Space Launch System and Orion in order to promote safety and reduce programmatic risk.

(d) * * *

(e) * * *

(f) EXPLORATION MISSIONS.—The Administrator shall continue development of—

(1) an uncrewed exploration mission to demonstrate the capability of both the Space Launch System and Orion as an integrated system by 2018;

(2) subject to applicable human rating processes and requirements, a crewed exploration mission to demonstrate the Space Launch System, including the Core Stage and Exploration Upper Stages, by 2021;

(3) subsequent missions beginning with [EM-3] *Artemis 3* at operational flight rate sufficient to maintain safety and operational readiness using the Space Launch System and Orion to extend into cis-lunar space and eventually to Mars; and

(4) a deep space habitat as a key element in a deep space exploration architecture along with the Space Launch System and Orion.

(g) * * *

(h) * * *

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[Public Law 115–10; 51 U.S.C. 20302 note]

SEC. 432. HUMAN EXPLORATION ROADMAP.

(a) * * *

(b) HUMAN EXPLORATION ROADMAP.—

(1) * * *

(2) * * *

(3) CONSIDERATIONS.—In developing the human exploration roadmap, the Administrator shall consider—

(A) using key exploration capabilities, namely the Space Launch System and Orion;

(B) using existing commercially available technologies and capabilities or those technologies and capabilities being developed by industry for commercial purposes;

(C) establishing an organizational approach to ensure collaboration and coordination among NASA's Mission Directorates under section 821, when appropriate, including to collect and return to Earth a sample from the Martian surface;

(D) building upon the initial uncrewed mission, [EM-1] *Artemis 1*, and first crewed mission, [EM-2] *Artemis 2*, of the Space Launch System and Orion to establish a sustainable cadence of missions extending human exploration missions into cislunar space, including anticipated timelines and milestones;

* * * * *

(K) * * *

(4) CRITICAL DECISION PLAN ON HUMAN SPACE EXPLORATION.—As part of the human exploration roadmap, the Administrator shall include a critical decision plan—

(A) identifying and defining key decisions guiding human space exploration priorities and plans that need to be made before June 30, 2020, including decisions that may guide human space exploration capability development, precursor missions, long-term missions, and activities;

(B) defining decisions needed to maximize efficiencies and resources for reaching the near, intermediate, and long-term goals and objectives of human space exploration; and

(C) identifying and defining timelines and milestones for a sustainable cadence of missions beginning with [EM-3] *Artemis 3* for the Space Launch System and Orion to extend human exploration from cis-lunar space to the surface of Mars.

(5) * * *

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