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116TH CONGRESS
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[Report No. 116–262]

To authorize programs of the National Aeronautics and Space Administration,
and for other purposes.

IN THE SENATE OF THE UNITED STATES

NOVEMBER 6, 2019

Mr. CRUZ (for himself, Ms. SINEMA, Mr. WICKER, and Ms. CANTWELL) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

SEPTEMBER 8, 2020

Reported by Mr. WICKER, with an amendment

[Strike out all after the enacting clause and insert the part printed in *italic*]

A BILL

To authorize programs of the National Aeronautics and
Space Administration, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

1 **SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

2 (a) **SHORT TITLE.**—This Act may be cited as the
 3 “National Aeronautics and Space Administration Author-
 4 ization Act of 2019”.

5 (b) **TABLE OF CONTENTS.**—The table of contents of
 6 this Act is as follows:

Sec. 1. Short title; table of contents.

Sec. 2. Definitions.

TITLE I—AUTHORIZATION OF APPROPRIATIONS

Sec. 101. Authorization of appropriations.

TITLE II—HUMAN SPACEFLIGHT AND EXPLORATION

Sec. 201. Advanced eislunar and lunar surface capabilities.

Sec. 202. Space launch system configurations.

Sec. 203. Advanced spacesuits.

Sec. 204. Life science and physical science research.

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

Sec. 206. Rocket engine test infrastructure.

Sec. 207. Indian River Bridge.

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

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

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

Sec. 211. Low-Earth orbit commercialization.

Sec. 212. Maintaining a national laboratory in space.

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

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

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

Sec. 216. Steppingstone approach to exploration.

Sec. 217. Technical amendments relating to Artemis missions.

TITLE III—SCIENCE

Sec. 301. Science priorities.

Sec. 302. Lunar discovery program.

Sec. 303. Search for life.

Sec. 304. James Webb Space Telescope.

Sec. 305. Wide-Field Infrared Survey Telescope.

Sec. 306. Satellite servicing for science missions.

Sec. 307. Earth science missions and programs.

Sec. 308. Science missions to Mars.

Sec. 309. Planetary Defense Coordination Office.

Sec. 310. Suborbital science flights.

Sec. 311. Sense of Congress on small satellite science.

TITLE IV—AERONAUTICS

- Sec. 401. Short title.
- Sec. 402. Definitions.
- Sec. 403. Experimental aircraft projects.
- Sec. 404. Unmanned aircraft systems.
- Sec. 405. 21st Century Aeronautics Capabilities Initiative.
- Sec. 406. Sense of Congress on on-demand air transportation.
- Sec. 407. Sense of Congress on hypersonic technology research.

TITLE V—SPACE TECHNOLOGY

- Sec. 501. Space Technology Mission Directorate.
- Sec. 502. Flight opportunities program.
- Sec. 503. Small Spacecraft Technology Program.
- Sec. 504. Nuclear propulsion technology.
- Sec. 505. Mars-forward technologies.

TITLE VI—STEM ENGAGEMENT

- Sec. 601. Sense of Congress.
- Sec. 602. STEM education engagement activities.
- Sec. 603. Skilled technical education outreach program.

TITLE VII—WORKFORCE AND INDUSTRIAL BASE

- Sec. 701. Appointment and compensation pilot program.
- Sec. 702. Establishment of multi-institution consortia and university-affiliated research centers.
- Sec. 703. Expedited access to technical talent and expertise.
- Sec. 704. Report on industrial base for civil space missions and operations.
- Sec. 705. Separations and retirement incentives.
- Sec. 706. Confidentiality of medical quality assurance records.

TITLE VIII—MISCELLANEOUS PROVISIONS

- Sec. 801. Contracting authority.
- Sec. 802. Authority for transaction prototype projects and follow-on production contracts.
- Sec. 803. Protection of data and information from public disclosure.
- Sec. 804. Physical security modernization.
- Sec. 805. Lease of non-excess property.
- Sec. 806. Cybersecurity.
- Sec. 807. Limitation on cooperation with the People's Republic of China.
- Sec. 808. Small satellite launch services program.
- Sec. 809. 21st century space launch infrastructure.
- Sec. 810. Missions of national need.
- Sec. 811. Exemption from the Iran, North Korea, and Syria Nonproliferation Act.
- Sec. 812. Drinking water well replacement for Chincoteague, Virginia.
- Sec. 813. Passenger carrier use.
- Sec. 814. SBIR phase flexibility for the National Aeronautics and Space Administration.

1 **SEC. 2. DEFINITIONS.**

2 In this Act:

1 (1) ADMINISTRATION.—The term “Administra-
2 tion” means the National Aeronautics and Space
3 Administration.

4 (2) ADMINISTRATOR.—The term “Adminis-
5 trator” means the Administrator of the National
6 Aeronautics and Space Administration.

7 (3) APPROPRIATE COMMITTEES OF CON-
8 GRESS.—Except as otherwise expressly provided, the
9 term “appropriate committees of Congress”
10 means—

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

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

15 (4) CISLUNAR SPACE.—The term “cislunar
16 space” means the region of space beyond low-Earth
17 orbit out to and including the region around the sur-
18 face of the Moon.

19 (5) DEEP SPACE.—The term “deep space”
20 means the region of space beyond low-Earth orbit,
21 including cislunar space.

22 (6) DEVELOPMENT COST.—The term “develop-
23 ment cost” has the meaning given the term in sec-
24 tion 30104 of title 51, United States Code.

1 (7) ISS.—The term “ISS” means the Inter-
2 national Space Station.

3 (8) ISS MANAGEMENT ENTITY.—The term
4 “ISS management entity” means the organization
5 with which the Administrator has entered into a co-
6 operative agreement under section 504(a) of the Na-
7 tional Aeronautics and Space Administration Au-
8 thorization Act of 2010 (42 U.S.C. 18354(a)).

9 (9) NASA.—The term “NASA” means the Na-
10 tional Aeronautics and Space Administration.

11 (10) ORION.—The term “Orion” means the
12 multipurpose crew vehicle described in section 303 of
13 the National Aeronautics and Space Administration
14 Authorization Act of 2010 (42 U.S.C. 18323).

15 (11) OSTP.—The term “OSTP” means the Of-
16 fice of Science and Technology Policy.

17 (12) SPACE LAUNCH SYSTEM.—The term
18 “Space Launch System” means the Space Launch
19 System authorized under section 302 of the National
20 Aeronautics and Space Administration Act of 2010
21 (42 U.S.C. 18322).

1 **TITLE I—AUTHORIZATION OF**
 2 **APPROPRIATIONS**

3 **SEC. 101. AUTHORIZATION OF APPROPRIATIONS.**

4 There are authorized to be appropriated to the Ad-
 5 ministration for fiscal year 2020 \$22,750,000,000 as fol-
 6 lows:

7 (1) For Exploration, \$6,222,600,000.

8 (2) For Space Operations, \$4,150,200,000.

9 (3) For Science, \$6,905,700,000.

10 (4) For Aeronautics, \$783,900,000.

11 (5) For Space Technology, \$1,076,400,000.

12 (6) For Science, Technology, Engineering, and
 13 Mathematics Engagement, \$112,000,000.

14 (7) For Safety, Security, and Mission Services,
 15 \$2,934,800,000.

16 (8) For Construction and Environmental Com-
 17 pliance and Restoration, \$524,400,000.

18 (9) For Inspector General, \$40,000,000.

19 **TITLE II—HUMAN SPACEFLIGHT**
 20 **AND EXPLORATION**

21 **SEC. 201. ADVANCED CISLUNAR AND LUNAR SURFACE CA-**
 22 **PABILITIES.**

23 (a) SENSE OF CONGRESS.—It is the sense of Con-
 24 gress that—

1 (1) commercial entities in the United States
2 have made significant investment and progress to-
3 ward the development of human-class lunar landers;

4 (2) NASA developed the Artemis program—

5 (A) to fulfil the goal of landing United
6 States astronauts, include the first woman and
7 the next man, on the Moon; and

8 (B) to collaborate with commercial and
9 international partners to establish sustainable
10 lunar exploration by 2028; and

11 (3) in carrying out the Artemis program, the
12 Administration should ensure that the entire
13 Artemis program is inclusive and representative of
14 all people of the United States, including women and
15 minorities.

16 (b) LANDER PROGRAM.—The Administrator shall
17 foster the development of not more than 2 human-class
18 lunar lander designs through public-private partnerships.

19 (c) REQUIREMENTS.—In carrying out the program
20 under subsection (b), the Administrator shall—

21 (1) enter into industry-led partnerships using a
22 fixed-price, milestone-based approach;

23 (2) to the maximum extent practicable, encour-
24 age reusability and sustainability of systems devel-
25 oped;

1 (3) ensure availability of 1 or more lunar polar
 2 science payloads for a demonstration mission; and
 3 (4) to the maximum extent practicable, offer ex-
 4 isting capabilities and assets of NASA centers to
 5 support these partnerships.

6 **SEC. 202. SPACE LAUNCH SYSTEM CONFIGURATIONS.**

7 (a) **MOBILE LAUNCH PLATFORM.**—The Adminis-
 8 trator is authorized to maintain 2 operational mobile
 9 launch platforms to enable the launch of multiple configu-
 10 rations of the Space Launch System.

11 (b) **EXPLORATION UPPER STAGE.**—To meet the ca-
 12 pability requirements under section 302(e)(2) of the Na-
 13 tional Aeronautics and Space Administration Authoriza-
 14 tion Act of 2010 (42 U.S.C. 18322(e)(2)), the Adminis-
 15 trator shall continue development of the Exploration
 16 Upper Stage for the Space Launch System with a sched-
 17 uled availability sufficient for use on the third launch of
 18 the Space Launch System.

19 (c) **BRIEFING.**—Not later than 90 days after the date
 20 of the enactment of this Act, the Administrator shall brief
 21 the appropriate committees of Congress on the develop-
 22 ment and scheduled availability of the Exploration Upper
 23 Stage for the third launch of the Space Launch System.

24 (d) **MAIN PROPULSION TEST ARTICLE.**—To meet the
 25 requirements under section 302(e)(3) of the National Aer-

1 onautics and Space Administration Authorization Act of
 2 2010 (42 U.S.C. 18322(c)(3)), the Administrator shall—

3 (1) immediately on completion of the first full-
 4 duration integrated core stage test of the Space
 5 Launch System, initiate development of a main pro-
 6 pulsion test article for the integrated core stage pro-
 7 pulsion elements of the Space Launch System;

8 (2) not later than 180 days after the date of
 9 the enactment of this Act, submit to the appropriate
 10 committees of Congress a detailed plan for the devel-
 11 opment and operation of such main propulsion test
 12 article; and

13 (3) use existing capabilities of NASA centers
 14 for the design, manufacture, and operation of the
 15 main propulsion test article.

16 **SEC. 203. ADVANCED SPACESUITS.**

17 (a) SENSE OF CONGRESS.—It is the sense of Con-
 18 gress that next-generation advanced spacesuits are a crit-
 19 ical technology for human space exploration and use of
 20 low-Earth orbit, cislunar space, the surface of the Moon,
 21 and Mars.

22 (b) DEVELOPMENT PLAN.—The Administrator shall
 23 establish a detailed plan for the development and manu-
 24 facture of advanced spacesuits, consistent with the deep
 25 space exploration goals and timetables of NASA.

1 (e) DIVERSE ASTRONAUT CORPS.—The Adminis-
 2 trator shall ensure that spacesuits developed and manufac-
 3 tured after the date of the enactment of this Act are capa-
 4 ble of accommodating a wide range of sizes of astronauts
 5 so as to meet the needs of the diverse NASA astronaut
 6 corps.

7 (d) ISS USE.—Throughout the operational life of the
 8 ISS, the Administrator should fully use the ISS for testing
 9 advanced spacesuits.

10 (e) PRIOR INVESTMENTS.—

11 (1) IN GENERAL.—In developing an advanced
 12 spacesuit, the Administrator shall, to the maximum
 13 extent practicable, leverage prior and existing invest-
 14 ments in advanced spacesuit technologies to maxi-
 15 mize the benefits of such investments and tech-
 16 nologies.

17 (2) AGREEMENTS WITH PRIVATE ENTITIES.—In
 18 carrying out this subsection, the Administrator may
 19 enter into 1 or more agreements with 1 or more pri-
 20 vate entities for the manufacture of advanced
 21 spacesuits, as the Administrator considers appro-
 22 priate.

23 (f) BRIEFING.—Not later than 180 days after the
 24 date of the enactment of this Act, and semiannually there-
 25 after until NASA procures advanced spacesuits under this

1 section, the Administrator shall brief the appropriate com-
 2 mittees of Congress on the development plan in subsection
 3 (b).

4 **SEC. 204. LIFE SCIENCE AND PHYSICAL SCIENCE RE-**
 5 **SEARCH.**

6 (a) SENSE OF CONGRESS.—It is the sense of Con-
 7 gress that—

8 (1) the 2011 decadal survey on biological and
 9 physical sciences in space identifies—

10 (A) many areas in which fundamental sci-
 11 entific research is needed to efficiently advance
 12 the range of human activities in space, from the
 13 first stages of exploration to eventual economic
 14 development; and

15 (B) many areas of basic and applied sci-
 16 entific research that could use the microgravity,
 17 radiation, and other aspects of the spaceflight
 18 environment to answer fundamental scientific
 19 questions; and

20 (2) given the central role of life science and
 21 physical science research in developing the future of
 22 space exploration, NASA should continue to invest
 23 strategically in such research to maintain United
 24 States leadership in space exploration; and

1 ~~(3)~~ such research remains important to the ob-
 2 jectives of NASA with respect to long-duration deep
 3 space human exploration to the Moon and Mars.

4 ~~(b) PROGRAM CONTINUATION.—~~

5 ~~(1) IN GENERAL.—~~In support of the goals de-
 6 scribed in section 20302 of title 51, United States
 7 Code, the Administrator shall continue to implement
 8 a collaborative, multidisciplinary life science and
 9 physical science fundamental research program—

10 ~~(A)~~ to build a scientific foundation for the
 11 exploration and development of space;

12 ~~(B)~~ to investigate the mechanisms of
 13 changes to biological systems and physical sys-
 14 tems, and the environments of those systems in
 15 space, including the effects of long-duration ex-
 16 posure to deep space-related environmental fac-
 17 tors on those systems;

18 ~~(C)~~ to understand the effects of combined
 19 deep space radiation and altered gravity levels
 20 on biological systems so as to inform the devel-
 21 opment and testing of potential counter-
 22 measures;

23 ~~(D)~~ to understand physical phenomena in
 24 reduced gravity that affect design and perform-

1 ance of enabling technologies necessary for the
2 space exploration program;

3 ~~(E)~~ to provide scientific opportunities to
4 educate, train, and develop the next generation
5 of researchers and engineers; and

6 ~~(F)~~ to provide state-of-the-art data reposi-
7 tories and curation of large multi-data sets to
8 enable comparative research analyses.

9 ~~(2) ELEMENTS.—~~The program under para-
10 graph ~~(1)~~ shall—

11 ~~(A)~~ include fundamental research relating
12 to life science, space bio science, and physical
13 science; and

14 ~~(B)~~ maximize intra-agency and interagency
15 partnerships to advance space exploration, sci-
16 entific knowledge, and benefits to Earth.

17 ~~(3) USE OF FACILITIES.—~~In carrying out the
18 program under paragraph ~~(1)~~, the Administrator
19 may use ground-based, air-based, and space-based
20 facilities in low-Earth orbit and beyond low-Earth
21 orbit.

1 **SEC. 205. ACQUISITION OF DOMESTIC SPACE TRANSPOR-**
 2 **TATION AND LOGISTICS RESUPPLY SERV-**
 3 **ICES.**

4 (a) IN GENERAL.—Except as provided in subsection
 5 (b), the Administrator shall not enter into any contract
 6 with a person or entity that proposes to use, or will use,
 7 a foreign launch provider for a commercial service to pro-
 8 vide space transportation or logistics resupply for—

9 (1) the ISS; or

10 (2) any Government-owned or Government-
 11 funded platform in Earth orbit or eislunar space; on
 12 the lunar surface; or elsewhere in space.

13 (b) EXCEPTION.—The Administrator may enter into
 14 a contract with a person or entity that proposes to use,
 15 or will use, a foreign launch provider for a commercial
 16 service to carry out an activity described in subsection (a)
 17 if a domestic vehicle or service is unavailable.

18 (c) RULE OF CONSTRUCTION.—Nothing in this sec-
 19 tion shall be construed to prohibit the Administrator from
 20 entering into 1 or more no-exchange-of-funds collaborative
 21 agreements with an international partner in support of the
 22 deep space exploration plan of NASA.

23 **SEC. 206. ROCKET ENGINE TEST INFRASTRUCTURE.**

24 (a) IN GENERAL.—The Administrator shall carry out
 25 a program to modernize rocket propulsion test infrastruc-
 26 ture at NASA facilities—

- 1 (1) to increase capabilities;
- 2 (2) to enhance safety;
- 3 (3) to support propulsion development and test-
- 4 ing; and
- 5 (4) to foster the improvement of Government
- 6 and commercial space transportation and explo-
- 7 ration.

8 (b) **PROJECTS.**—Projects funded under the program
9 under subsection (a) may include—

- 10 (1) infrastructure and other facilities and sys-
- 11 tems relating to rocket propulsion test stands and
- 12 rocket propulsion testing;
- 13 (2) enhancements to test facility capacity and
- 14 flexibility; and
- 15 (3) such other projects as the Administrator
- 16 considers appropriate to meet the goals described in
- 17 subsection (a).

18 (c) **REQUIREMENTS.**—In carrying out the program
19 under subsection (a), the Administrator shall—

- 20 (1) prioritize investments in projects that en-
- 21 hance test and flight certification capabilities for
- 22 large thrust-level atmospheric and altitude engines
- 23 and engine systems; and multi-engine integrated test
- 24 capabilities; and

1 (2) ensure that no project carried out under
 2 this program shall adversely impact, delay, or defer
 3 testing or other activities associated with facilities
 4 used for Government programs, including—

5 (A) the Space Launch System and the Ex-
 6 ploration Upper Stage of the Space Launch
 7 System;

8 (B) in-space propulsion to support explo-
 9 ration missions; or

10 (C) nuclear propulsion testing.

11 (d) SAVINGS CLAUSE.—Nothing in this section shall
 12 preclude a NASA program, including the Space Launch
 13 System and the Exploration Upper Stage of the Space
 14 Launch System, from using the modernized test infra-
 15 structure developed under this section.

16 **SEC. 207. INDIAN RIVER BRIDGE.**

17 The Administrator, in coordination with the heads of
 18 other Federal agencies that use the Indian River Bridge
 19 on the NASA Causeway, shall develop a plan to ensure
 20 that a bridge over the Indian River at such location pro-
 21 vides access to the Eastern Range for national security,
 22 civil, and commercial space operations.

1 **SEC. 208. VALUE OF INTERNATIONAL SPACE STATION AND**
 2 **CAPABILITIES IN LOW-EARTH ORBIT.**

3 (a) **SENSE OF CONGRESS.**—It is the sense of Con-
 4 gress that—

5 (1) it is in the national and economic security
 6 interests of the United States to maintain a contin-
 7 uous human presence in low-Earth orbit;

8 (2) low-Earth orbit should be used as a test bed
 9 to advance human space exploration and scientific
 10 discoveries; and

11 (3) the ISS is a critical component of economic,
 12 commercial, and industrial development in low-Earth
 13 orbit.

14 (b) **HUMAN PRESENCE REQUIREMENT.**—The United
 15 States shall continuously maintain the capability for a
 16 continuous human presence in low-Earth orbit through
 17 and beyond the useful life of the ISS.

18 **SEC. 209. EXTENSION AND MODIFICATION RELATING TO**
 19 **INTERNATIONAL SPACE STATION.**

20 (a) **POLICY.**—Section 501(a) of the National Aero-
 21 nautics and Space Administration Authorization Act of
 22 2010 (42 U.S.C. 18351(a)) is amended by striking
 23 “2024” and inserting “2030”.

24 (b) **MAINTENANCE OF UNITED STATES SEGMENT**
 25 **AND ASSURANCE OF CONTINUED OPERATIONS.**—Section
 26 503(a) of the National Aeronautics and Space Administra-

tion Authorization Act of 2010 (42 U.S.C. 18353(a)) is amended by striking “September 30, 2024” and inserting “September 30, 2030”.

(c) RESEARCH CAPACITY ALLOCATION AND INTEGRATION OF RESEARCH PAYLOADS.—Section 504(d) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18354(d)) is amended—

(1) in paragraph (1), in the first sentence—

(A) by striking “As soon as practicable” and all that follows through “2011,” and inserting “The”; and

(B) by striking “September 30, 2024” and inserting “September 30, 2030”; and

(2) in paragraph (2), in the third sentence, by striking “September 30, 2024” and inserting “September 30, 2030”.

(d) MAINTENANCE OF USE.—

(1) IN GENERAL.—Section 70907 of title 51, United States Code, is amended—

(A) in the section heading, by striking “**2024**” and inserting “**2030**”; and

(B) in subsection (a), by striking “September 30, 2024” and inserting “September 30, 2030”; and

1 (C) in subsection (b)(3), by striking “Sep-
 2 tember 30, 2024” and inserting “September 30,
 3 2030”.

4 (e) **TRANSITION PLAN REPORTS.**—Section
 5 50111(e)(2) of title 51, United States Code is amended—
 6 (1) in the matter preceding subparagraph (A),
 7 by striking “2023” and inserting “2028”; and
 8 (2) in subparagraph (J), by striking “2028”
 9 and inserting “2030”.

10 (f) **ELIMINATION OF INTERNATIONAL SPACE STA-**
 11 **TION NATIONAL LABORATORY ADVISORY COMMITTEE.**—
 12 Section 70906 of title 51, United States Code, is repealed.

13 (g) **CONFORMING AMENDMENTS.**—Chapter 709 of
 14 title 51, United States Code, is amended—

15 (1) by redesignating section 70907 as section
 16 70906; and

17 (2) in the table of sections for the chapter, by
 18 striking the items relating to sections 70906 and
 19 70907 and inserting the following:

“Sec. 70906. Maintaining use through at least 2030.”.

20 **SEC. 210. DEPARTMENT OF DEFENSE ACTIVITIES ON**
 21 **INTERNATIONAL SPACE STATION.**

22 (a) **IN GENERAL.**—Not later than March 1, 2020, the
 23 Secretary of Defense shall—

24 (1) identify and review each activity, program,
 25 and project of the Department of Defense com-

1 pleted, being carried out, or planned to be carried
2 out on the ISS as of the date of the review; and

3 ~~(2) provide to the appropriate committees of~~
4 Congress a briefing that describes the results of the
5 review.

6 ~~(b) APPROPRIATE COMMITTEES OF CONGRESS DE-~~
7 FINED.—In this section, the term “appropriate commit-
8 tees of Congress” means—

9 ~~(1) the Committee on Armed Services and the~~
10 Committee on Commerce, Science, and Transpor-
11 tation of the Senate; and

12 ~~(2) the Committee on Armed Services and the~~
13 Committee on Science, Space, and Technology of the
14 House of Representatives.

15 **SEC. 211. LOW-EARTH ORBIT COMMERCIALIZATION.**

16 ~~(a) STATEMENT OF POLICY.—It is the policy of the~~
17 United States to encourage the development of a thriving
18 and robust United States commercial sector in low-Earth
19 orbit.

20 ~~(b) PREFERENCE FOR UNITED STATES COMMERCIAL~~
21 PRODUCTS AND SERVICES.—The Administrator shall con-
22 tinue to increase the use of assets, products, and services
23 of private entities in the United States to fulfill the low-
24 Earth orbit requirements of the Administration.

25 ~~(c) NONCOMPETITION.—~~

1 (1) IN GENERAL.—Except as provided in para-
2 graph (2), the Administrator may not offer to a for-
3 eign person or a foreign government a spaceflight
4 product or service relating to the ISS, if a com-
5 parable spaceflight product or service, as applicable,
6 is offered by a private entity in the United States.

7 (2) EXCEPTION.—The Administrator may offer
8 a space-flight product or service relating to the ISS
9 to the government of a country that is a signatory
10 to the Agreement Among the Government of Can-
11 ada, Governments of Member States of the Euro-
12 pean Space Agency, the Government of Japan, the
13 Government of the Russian Federation, and the
14 Government of the United States of America Con-
15 cerning Cooperation on the Civil International Space
16 Station, signed at Washington January 29, 1998,
17 and entered into force on March 27, 2001 (TIAS
18 12927).

19 (d) SHORT-DURATION COMMERCIAL MISSIONS.—To
20 provide opportunities for additional transport of astro-
21 nauts to the ISS and help establish a commercial market
22 in low-Earth orbit, the Administrator may permit short-
23 duration missions to the ISS for commercial passengers.

24 (e) PROGRAM AUTHORIZATION.—

1 (1) ESTABLISHMENT.—The Administrator shall
 2 establish a low-Earth orbit commercialization pro-
 3 gram to encourage the fullest commercial use and
 4 development of space by private entities in the
 5 United States.

6 (2) ELEMENTS.—The program established
 7 under paragraph (1) shall, to the maximum extent
 8 practicable, include activities—

9 (A) to stimulate demand for—

10 (i) space-based commercial research;
 11 development, and manufacturing;

12 (ii) spaceflight products and services;

13 and

14 (iii) human spaceflight products and
 15 services in low-Earth orbit;

16 (B) to improve the capability of the ISS to
 17 accommodate commercial users; and

18 (C) subject to paragraph (3), to foster the
 19 development of commercial space stations and
 20 habitats.

21 (3) COMMERCIAL SPACE STATIONS AND HABI-
 22 TATS.—

23 (A) PRIORITY.—With respect to an activity
 24 to develop a commercial space station or habi-
 25 tat, the Administrator shall give priority to an

1 activity for which a private entity provides a
2 share of the cost to develop and operate the ac-
3 tivity.

4 (B) LIMITATION.—The Administrator may
5 not provide funding for the development of a
6 commercial space station or habitat until after
7 the date on which the Administrator awards a
8 contract for the use of a docking port on the
9 ISS.

10 (C) REPORT.—Not later than 30 days
11 after the date that an award or agreement is
12 made to carry out an activity to develop a com-
13 mercial space station or habitat, the Adminis-
14 trator shall submit to the appropriate commit-
15 tees of Congress a report on the development of
16 the commercial space station or habitat, as ap-
17 plicable, that includes—

18 (i) a business plan that describes the
19 manner in which the project will—

20 (I) meet the future requirements
21 of NASA for low-Earth orbit human
22 space-flight services; and

23 (II) fulfill the cost-share funding
24 prioritization under subparagraph (A);
25 and

(ii) a review of the viability of the operational business case, including—

(I) the level of expected Government participation;

(II) a list of anticipated nongovernmental and international customers and associated contributions; and

(III) an assessment of long-term sustainability for the nongovernmental customers, including an independent assessment of the viability of the market for such commercial services or products.

SEC. 212. MAINTAINING A NATIONAL LABORATORY IN SPACE.

(a) SENSE OF CONGRESS.—It is the sense of Congress that—

(1) the United States segment of the International Space Station (as defined in section 70905 of title 51, United States Code), which is designated as a national laboratory under section 70905(b) of title 51, United States Code—

(A) benefits the scientific community and promotes commerce in space;

1 (B) fosters stronger relationships among
2 NASA and other Federal agencies, the private
3 sector, and research groups and universities;

4 (C) advances science, technology, engineer-
5 ing, and mathematics education through use of
6 the unique microgravity environment; and

7 (D) advances human knowledge and inter-
8 national cooperation;

9 (2) after the ISS is decommissioned, the United
10 States should maintain a national microgravity lab-
11 oratory in space;

12 (3) in maintaining a national microgravity lab-
13 oratory in space, the United States should make ap-
14 propriate accommodations for different types of own-
15 ership and operation arrangements for the ISS and
16 future space stations;

17 (4) to the maximum extent practicable, a na-
18 tional microgravity laboratory in space should be
19 maintained in cooperation with international space
20 partners; and

21 (5) NASA should continue to support funda-
22 mental science research on future platforms in low-
23 Earth orbit and cislunar space, orbital and sub-
24 orbital flights, drop towers, and other microgravity
25 testing environments.

1 (b) ~~REPORT.~~—The Administrator, in coordination
 2 with the National Space Council and other Federal agen-
 3 cies as the Administrator considers appropriate, shall
 4 issue a report detailing the feasibility of establishing a
 5 microgravity national laboratory federally funded research
 6 and development center to carry out activities relating to
 7 the study and use of in-space conditions.

8 **~~SEC. 213. INTERNATIONAL SPACE STATION NATIONAL LAB-~~**
 9 **~~ORATORY; PROPERTY RIGHTS IN INVEN-~~**
 10 **~~TIONS.~~**

11 (a) ~~IN GENERAL.~~—Subchapter III of chapter 201 of
 12 title 51, United States Code, is amended by adding at the
 13 end the following:

14 **“§ 20150. Property rights in designated inventions**

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

20 “(1) the Administration is reimbursed under
 21 the terms of the contract for the full cost of a con-
 22 tribution by the Federal Government of the use of
 23 Federal facilities, equipment, materials, proprietary
 24 information of the Federal Government, or services
 25 of a Federal employee during working hours, includ-

ing 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).

1 “(2) DESIGNATED ACTIVITY.—The term ‘des-
2 ignated activity’ means any non-NASA scientific use
3 of the ISS national laboratory as described in sec-
4 tion 504 of the National Aeronautics and Space Ad-
5 ministration Authorization Act of 2010 (42 U.S.C.
6 18354).

7 “(3) DESIGNATED INVENTION.—The term ‘des-
8 ignated invention’ means any invention conceived or
9 first reduced to practice by any person in the per-
10 formance of a designated activity under a written
11 contract with the Administration or the ISS man-
12 agement entity.

13 “(4) GOVERNMENT-PURPOSE LICENSE.—The
14 term ‘Government-purpose license’ means the res-
15 ervation by the Federal Government of an irrev-
16 ocable, nonexclusive, nontransferable, royalty-free li-
17 cense for the use of an invention throughout the
18 world by or on behalf of the United States or any
19 foreign government pursuant to a treaty or agree-
20 ment with the United States.

21 “(5) ISS MANAGEMENT ENTITY.—The term
22 ‘ISS management entity’ means the organization
23 with which the Administrator enters into a coopera-
24 tive agreement under section 504(a) of the National

1 Aeronautics and Space Administration Authorization
2 Act of 2010 (42 U.S.C. 18354(a)).

3 “(6) USER.—The term ‘user’ means a person,
4 including a nonprofit organization or small business
5 firm (as such terms are defined in section 201 of
6 title 35), or class of persons that enters into a writ-
7 ten contract with the Administration or the ISS
8 management entity for the performance of des-
9 ignated activities.”.

10 (b) CONFORMING.—The table of sections for chapter
11 201 of title 51, United States Code, is amended by insert-
12 ing after the item relating to section 20149 the following:
 “20150: Property rights in designated inventions.”.

13 **SEC. 214. DATA FIRST PRODUCED DURING NON-NASA SCI-**
14 **ENTIFIC USE OF THE ISS NATIONAL LABORA-**
15 **TORY.**

16 (a) DATA RIGHTS.—Subchapter III of chapter 201
17 of title 51, United States Code, as amended by section
18 213, is further amended by adding at the end the fol-
19 lowing:

20 **“§ 20151. Data rights**

21 “(a) NON-NASA SCIENTIFIC USE OF THE ISS NA-
22 TIONAL LABORATORY.—The Federal Government may not
23 use or reproduce, or disclose outside of the Government,
24 any data first produced in the performance of a designated

1 activity under a written contract with the Administration
 2 or the ISS management entity, unless—

3 “(1) otherwise agreed under the terms of the
 4 contract with the Administration or the ISS man-
 5 agement entity, as applicable;

6 “(2) the designated activity is carried out with
 7 Federal funds;

8 “(3) disclosure is required by law;

9 “(4) the Federal Government has rights in the
 10 data under another Federal contract, grant, coopera-
 11 tive agreement, or other transaction; or

12 “(5) the data is—

13 “(A) otherwise lawfully acquired or inde-
 14 pendently developed by the Federal Govern-
 15 ment;

16 “(B) related to the health and safety of
 17 personnel on the ISS; or

18 “(C) essential to the performance of work
 19 by the ISS management entity or NASA per-
 20 sonnel.

21 “(b) DEFINITIONS.—In this section:

22 “(1) CONTRACT.—The term ‘contract’ has the
 23 meaning given the term under section 20135(a).

24 “(2) DATA.—

1 “(A) IN GENERAL.—The term ‘data’
2 means recorded information, regardless of form
3 or the media on which it may be recorded.

4 “(B) INCLUSIONS.—The term ‘data’ in-
5 cludes technical data and computer software.

6 “(C) EXCLUSIONS.—The term ‘data’ does
7 not include information incidental to contract
8 administration, such as financial, administra-
9 tive, cost or pricing, or management informa-
10 tion.

11 “(3) DESIGNATED ACTIVITY.—The term ‘des-
12 ignated activity’ has the meaning given the term in
13 section 20150.

14 “(4) ISS MANAGEMENT ENTITY.—The term
15 ‘ISS management entity’ has the meaning given the
16 term in section 20150.”.

17 (b) SPECIAL HANDLING OF TRADE SECRETS OR
18 CONFIDENTIAL INFORMATION.—Section 20131(b)(2) of
19 title 51, United States Code, is amended to read as fol-
20 lows:

21 “(2) INFORMATION DESCRIBED.—

22 “(A) ACTIVITIES UNDER AGREEMENT.—
23 Information referred to in paragraph (1) is in-
24 formation that—

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

5 “(ii) would be a trade secret or com-
 6 mercial or financial information that is
 7 privileged or confidential within the mean-
 8 ing of section 552(b)(4) of title 5 if the in-
 9 formation had been obtained from a non-
 10 Federal party participating in such an
 11 agreement.

12 “(B) CERTAIN DATA.—Information re-
 13 ferred to in paragraph (1) includes data (as de-
 14 fined in section 20151) that—

15 “(i) was first produced by the Admin-
 16 istration in the performance of any des-
 17 ignated activity (as defined in section
 18 20150); and

19 “(ii) would be a trade secret or com-
 20 mercial or financial information that is
 21 privileged or confidential within the mean-
 22 ing of section 552(b)(4) of title 5 if the
 23 data had been obtained from a non-Fed-
 24 eral party.”.

1 (c) CONFORMING AMENDMENT.—The table of sec-
 2 tions for chapter 201 of title 51, United States Code, as
 3 amended by section 213, is further amended by inserting
 4 after the item relating to section 20150 the following:

“20151. Data rights.”.

5 **SEC. 215. ROYALTIES AND OTHER PAYMENTS RECEIVED**
 6 **FOR DESIGNATED ACTIVITIES.**

7 (a) SENSE OF CONGRESS.—It is the sense of Con-
 8 gress that the Administrator should determine a threshold
 9 for which it may be appropriate for NASA to recoup the
 10 costs of supporting the creation of invention aboard the
 11 ISS, through the negotiation of royalties, similar to agree-
 12 ments made by other Federal agencies that support pri-
 13 vate sector innovation.

14 (b) IN GENERAL.—Subchapter III of chapter 201 of
 15 title 51, United States Code, as amended by sections 213
 16 and 214, is further amended by adding at the end the
 17 following:

18 **“§ 20152. Royalties and other payments received for**
 19 **designated activities**

20 “(a) DESIGNATED INVENTIONS MADE WITH FED-
 21 ERAL ASSISTANCE.—Notwithstanding any other provision
 22 of law, if the Administration, under the terms of a written
 23 contract for the performance of a designated activity,
 24 agrees to provide, unreimbursed, the total cost of a con-
 25 tribution by the Federal Government of the use of Federal

1 facilities, equipment, materials, proprietary information of
2 the Federal Government, or services of a Federal employee
3 during working hours, including the cost for the Adminis-
4 tration to carry out its responsibilities under paragraphs
5 (1) and (4) of section 504(d) of the National Aeronautics
6 and Space Administration Authorization Act of 2010 (42
7 U.S.C. 18354(d)); the Administrator shall negotiate an
8 agreement on the terms and rates of royalty payments
9 with respect to an invention or class of inventions con-
10 ceived or first reduced to practice by any person or class
11 of persons in the performance of such designated activi-
12 ties.

13 “(b) LICENSING AND ASSIGNMENT OF INVEN-
14 TIONS.—Notwithstanding sections 3710a and 3710e of
15 title 15 and any other provision of law, after payment in
16 accordance with subsection (A)(i) of such section
17 3710e(a)(1)(A)(i) to the inventors who have directly as-
18 signed to the Federal Government their interests in an in-
19 vention under a written contract with the Administration
20 or the ISS management entity for the performance of a
21 designated activity, the balance of any royalty or other
22 payment received by the Administrator or the ISS man-
23 agement entity from licensing and assignment of such in-
24 vention shall be paid by the Administrator or the ISS

1 management entity, as applicable, to the Space Explo-
 2 ration Fund.

3 ~~“(c) SPACE EXPLORATION FUND.—~~

4 ~~“(1) ESTABLISHMENT.—There is established in~~
 5 ~~the Treasury of the United States a fund, to be~~
 6 ~~known as the ‘Space Exploration Fund’ (referred to~~
 7 ~~in this subsection as the ‘Fund’), to be administered~~
 8 ~~by the Administrator.~~

9 ~~“(2) USE OF FUND.—The Fund shall be avail-~~
 10 ~~able without fiscal year limitation and without fur-~~
 11 ~~ther appropriation to carry out space exploration ac-~~
 12 ~~tivities under section 20302.~~

13 ~~“(3) DEPOSITS.—There shall be deposited in~~
 14 ~~the Fund—~~

15 ~~“(A) amounts appropriated to the Fund;~~

16 ~~“(B) fees and royalties collected by the Ad-~~
 17 ~~ministrator or the ISS management entity~~
 18 ~~under subsections (a) and (b); and~~

19 ~~“(C) donations or contributions designated~~
 20 ~~to support authorized activities.~~

21 ~~“(4) RULE OF CONSTRUCTION.—Amounts avail-~~
 22 ~~able to the Administrator under this subsection shall~~
 23 ~~be in addition to amounts otherwise made available~~
 24 ~~for the purpose described in paragraph (2).~~

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

3 (e) **CONFORMING AMENDMENT.**—The table of sec-
4 tions for chapter 201 of title 51, United States Code, as
5 amended by sections 213 and 214, is further amended by
6 inserting after the item relating to section 20151 the fol-
7 lowing:

“20152. Royalties and other payments received for designated activities.”.

8 **SEC. 216. STEPPINGSTONE APPROACH TO EXPLORATION.**

9 (a) **IN GENERAL.**—Section 70504 of title 51, United
10 States Code, is amended to read as follows:

11 **“§ 70504. Steppingstone approach to exploration**

12 “(a) **IN GENERAL.**—The Administrator, in sustain-
13 able steps, may conduct missions to intermediate destina-
14 tions, such as the Moon, in accordance with section
15 20302(b), and on a timetable determined by the avail-
16 ability of funding, in order to achieve the objective of
17 human exploration of Mars specified in section 202(b)(5)
18 of the National Aeronautics and Space Administration Au-
19 thorization Act of 2010 (42 U.S.C. 18312(b)(5)), if the
20 Administrator—

21 “(1) determines that each such mission dem-
22 onstrates or advances a technology or operational
23 concept that will enable human missions to Mars;
24 and

1 ~~“(2) incorporates each such mission into the~~
 2 ~~human exploration roadmap under section 432 of~~
 3 ~~the National Aeronautics and Space Administration~~
 4 ~~Transition Authorization Act of 2017 (Public Law~~
 5 ~~115–10; 51 U.S.C. 20302 note).~~

6 ~~“(b) CISELUNAR SPACE EXPLORATION ACTIVITIES.—~~
 7 ~~In conducting a mission under subsection (a), the Admin-~~
 8 ~~istrator shall—~~

9 ~~“(1) use a combination of launches of the Space~~
 10 ~~Launch System and space transportation services~~
 11 ~~from United States commercial providers, as appro-~~
 12 ~~priate, for the mission;~~

13 ~~“(2) plan for not fewer than 1 Space Launch~~
 14 ~~System launch annually beginning after the first~~
 15 ~~successful crewed launch of Orion on the Space~~
 16 ~~Launch System; and~~

17 ~~“(3) establish an outpost in orbit around the~~
 18 ~~Moon that—~~

19 ~~“(A) demonstrates technologies, systems,~~
 20 ~~and operational concepts directly applicable to~~
 21 ~~the space vehicle that will be used to transport~~
 22 ~~humans to Mars;~~

23 ~~“(B) has the capability for periodic human~~
 24 ~~habitation; and~~

1 “(C) can function as a point of departure;
2 return, or staging for Administration or non-
3 governmental or international partner missions
4 to multiple locations on the lunar surface or
5 other destinations.

6 “(e) ~~COST-EFFECTIVENESS.~~—To maximize the cost-
7 effectiveness of the long-term space exploration and utili-
8 zation activities of the United States, the Administrator
9 shall take all necessary steps, including engaging non-
10 governmental and international partners, to ensure that
11 activities in the Administration’s human space exploration
12 program are balanced in order to help meet the require-
13 ments of future exploration and utilization activities lead-
14 ing to human habitation on the surface of Mars.

15 “(d) ~~COMPLETION.~~—Within budgetary consider-
16 ations, once an exploration-related project enters its devel-
17 opment phase, the Administrator shall seek, to the max-
18 imum extent practicable, to complete that project without
19 undue delay.

20 “(e) ~~INTERNATIONAL PARTICIPATION.~~—To achieve
21 the goal of successfully conducting a crewed mission to
22 the surface of Mars, the Administrator shall invite the
23 partners in the ISS program and other nations, as appro-
24 priate, to participate in an international initiative under
25 the leadership of the United States.”.

1 (b) DEFINITION OF CISLUNAR SPACE.—Section
 2 10101 of title 51, United States Code, is amended by add-
 3 ing at the end the following:

4 “(3) CISLUNAR SPACE.—The term ‘cislunar
 5 space’ means the region of space beyond low-Earth
 6 orbit out to and including the region around the sur-
 7 face of the Moon.”.

8 (c) TECHNICAL AND CONFORMING AMENDMENTS.—
 9 Section 3 of the National Aeronautics and Space Adminis-
 10 tration Authorization Act of 2010 (42 U.S.C. 18302) is
 11 amended by striking paragraphs (2) and (3) and inserting
 12 the following:

13 “(2) APPROPRIATE COMMITTEES OF CON-
 14 GRESS.—The term ‘appropriate committees of Con-
 15 gress’ means—

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

18 “(B) the Committee on Science, Space,
 19 and Technology of the House of Representa-
 20 tives.

21 “(3) CISLUNAR SPACE.—The term ‘cislunar
 22 space’ means the region of space beyond low-Earth
 23 orbit out to and including the region around the sur-
 24 face of the Moon.”.

1 **SEC. 217. TECHNICAL AMENDMENTS RELATING TO**
 2 **ARTEMIS MISSIONS.**

3 (1) Section 421 of the National Aeronautics
 4 and Space Administration Authorization Act of 2017
 5 (Public Law 115–10; 51 U.S.C. 20301 note) is
 6 amended—

7 (A) in subsection (c)(3)—

8 (i) by striking “EM–1” and inserting
 9 “Artemis 1”;

10 (ii) by striking “EM–2” and inserting
 11 “Artemis 2”; and

12 (iii) by striking “EM–3” and inserting
 13 “Artemis 3”; and

14 (B) in subsection (f)(3), by striking “EM–
 15 3” and inserting “Artemis 3”.

16 (2) Section 432(b) of the National Aeronautics
 17 and Space Administration Authorization Act of 2017
 18 (Public Law 115–10; 51 U.S.C. 20302 note) is
 19 amended—

20 (A) in paragraph (3)(D)—

21 (i) by striking “EM–1” and inserting
 22 “Artemis 1”; and

23 (ii) by striking “EM–2” and inserting
 24 “Artemis 2”; and

25 (B) in paragraph (4)(C), by striking “EM–
 26 3” and inserting “Artemis 3”.

TITLE III—SCIENCE

SEC. 301. SCIENCE PRIORITIES.

(a) SENSE OF CONGRESS ON SCIENCE PORTFOLIO.—

Congress reaffirms the sense of Congress that—

(1) a balanced and adequately funded set of activities, consisting of research and analysis grant programs, technology development, suborbital research activities, and small, medium, and large space missions, contributes to a robust and productive science program and serves as a catalyst for innovation and discovery; and

(2) the Administrator should set science priorities by following the guidance provided by the scientific community through the decadal surveys of the National Academies of Sciences, Engineering, and Medicine.

(b) NATIONAL ACADEMIES DECADAL SURVEYS.—

Section 20305(e) of title 51, United States Code, is amended—

(1) by striking “The Administrator shall” and inserting the following:

“(1) REEXAMINATION OF PRIORITIES BY NATIONAL ACADEMIES.—The Administrator shall”, and

(2) by adding at the end the following:

1 “(2) REEXAMINATION OF PRIORITIES BY AD-
 2 MINISTRATOR.—If the Administrator decides to reex-
 3 amine the applicability of the priorities of the
 4 decadal surveys to the missions and activities of the
 5 Administration due to scientific discoveries or exter-
 6 nal factors, the Administrator shall, to the maximum
 7 extent practicable, consult with the relevant commit-
 8 tees of the National Academies.”.

9 **SEC. 302. LUNAR DISCOVERY PROGRAM.**

10 (a) IN GENERAL.—The Administrator may carry out
 11 a program to conduct lunar science research, including
 12 missions to the surface of the Moon, that materially con-
 13 tributes to the objective described in section 20102(d)(1)
 14 of title 51, United States Code.

15 (b) COMMERCIAL LANDERS.—In carrying out a pro-
 16 gram under subsection (a), the Administrator shall pro-
 17 cure the services of commercial landers developed pri-
 18 marily by United States industry to land science payloads
 19 of all classes on the lunar surface.

20 (c) LUNAR SCIENCE RESEARCH.—The Administrator
 21 shall ensure that lunar science research carried out under
 22 subsection (a) is consistent with recommendations made
 23 by the National Academies of Sciences, Engineering, and
 24 Medicine.

1 (d) LUNAR POLAR VOLATILES.—In carrying out a
 2 program under subsection (a), the Administrator shall, at
 3 the earliest opportunity, consider mission proposals to
 4 evaluate the potential of lunar polar volatiles to contribute
 5 to sustainable lunar exploration.

6 **SEC. 303. SEARCH FOR LIFE.**

7 (a) SENSE OF CONGRESS.—It is the sense of Con-
 8 gress that—

9 (1) the report entitled “An Astrobiology Strat-
 10 egy for the Search for Life in the Universe” pub-
 11 lished by the National Academies of Sciences, Engi-
 12 neering, and Medicine outlines the key scientific
 13 questions and methods for fulfilling the objective of
 14 NASA to search for the origin, evolution, distribu-
 15 tion, and future of life in the universe; and

16 (2) the interaction of lifeforms with their envi-
 17 ronment, a central focus of astrobiology research, is
 18 a topic of broad significance to life sciences research
 19 in space and on Earth.

20 (b) PROGRAM CONTINUATION.—

21 (1) IN GENERAL.—The Administrator shall con-
 22 tinue to implement a collaborative, multidisciplinary
 23 science and technology development program to
 24 search for proof of the existence or historical exist-
 25 ence of life beyond Earth in support of the objective

1 described in section 20102(d)(10) of title 51, United
2 States Code.

3 ~~(2) ELEMENT.—The program under paragraph~~
4 ~~(1) shall include activities relating to astronomy, bi-~~
5 ~~ology, geology, and planetary science.~~

6 ~~(3) COORDINATION WITH LIFE SCIENCES PRO-~~
7 ~~GRAM.—In carrying out the program under para-~~
8 ~~graph (1), the Administrator shall coordinate efforts~~
9 ~~with the life sciences program of the Administration.~~

10 ~~(4) TECHNOSIGNATURES.—In carrying out the~~
11 ~~program under paragraph (1), the Administrator~~
12 ~~shall support activities to search for and analyze~~
13 ~~technosignatures.~~

14 ~~(5) INSTRUMENTATION AND SENSOR TECH-~~
15 ~~NOLOGY.—In carrying out the program under para-~~
16 ~~graph (1), the Administrator may strategically invest~~
17 ~~in the development of new instrumentation and sen-~~
18 ~~sor technology.~~

19 **SEC. 304. JAMES WEBB SPACE TELESCOPE.**

20 ~~(a) SENSE OF CONGRESS.—It is the sense of Con-~~
21 ~~gress that—~~

22 ~~(1) the James Webb Space Telescope will be~~
23 ~~the next premier observatory in space and has great~~
24 ~~potential to further scientific study and assist sci-~~

1 entists in making new discoveries in the field of as-
2 tronomy;

3 (2) the James Webb Space Telescope was devel-
4 oped as an ambitious project with a scope that was
5 not fully defined at inception and with risk that was
6 not fully known or understood;

7 (3) despite the major technology development
8 and innovation that was needed to construct the
9 James Webb Space Telescope, major negative im-
10 pacts to the cost and schedule of the James Webb
11 Space Telescope resulted from poor program man-
12 agement and poor contractor performance;

13 (4) the Administrator should take into account
14 the lessons learned from the cost and schedule issues
15 relating to the development of the James Webb
16 Space Telescope in making decisions regarding the
17 scope of and the technologies needed for future sci-
18 entific missions;

19 (5) in selecting future scientific missions, the
20 Administrator should take into account the impact
21 that large programs that overrun cost and schedule
22 estimates may have on other NASA programs in
23 earlier phases of development; and

24 (6) the Administrator should continue to de-
25 velop the James Webb Space Telescope with a devel-

opment cost of not more than \$9,000,000,000, as estimated by the James Webb Space Telescope Independent Review Board Report released in May 2018.

(b) PROJECT CONTINUATION.—

(1) IN GENERAL.—The Administrator shall continue—

(A) to closely track the cost and schedule performance of the James Webb Space Telescope project; and

(B) to improve the reliability of cost estimates and contractor performance data throughout the remaining development of the James Webb Space Telescope.

(2) KEY PROGRAM OBJECTIVE.—The Administrator shall continue to develop the James Webb Space Telescope on a schedule to meet the objective of safely launching the James Webb Space Telescope not later than March 31, 2021.

SEC. 305. WIDE-FIELD INFRARED SURVEY TELESCOPE.

(a) SENSE OF CONGRESS.—It is the sense of Congress that—

(1) major growth in the cost of astrophysics flagship-class missions has impacted the overall portfolio balance of the Science Mission Directorate; and

1 (2) the Administrator should continue to de-
 2 velop the Wide-Field Infrared Survey Telescope with
 3 a development cost of not more than
 4 \$3,200,000,000.

5 (b) PROJECT CONTINUATION.—The Administrator
 6 shall continue to develop the Wide-Field Infrared Survey
 7 Telescope to meet the objectives outlined in the 2010
 8 decadal survey on astronomy and astrophysics of the Na-
 9 tional Academies of Sciences, Engineering, and Medicine
 10 in a manner that maximizes scientific productivity based
 11 on the resources invested.

12 **SEC. 306. SATELLITE SERVICING FOR SCIENCE MISSIONS.**

13 (a) STUDY.—

14 (1) IN GENERAL.—The Administrator shall con-
 15 duct a study on the feasibility of using in-space
 16 robotic refueling, repair, or refurbishment capabili-
 17 ties to extend the useful life of telescopes and other
 18 science missions that are operational or in develop-
 19 ment as of the date of the enactment of this Act.

20 (2) ELEMENTS.—The study conducted under
 21 paragraph (1) shall include the following:

22 (A) An identification of the technologies
 23 and in-space testing required to demonstrate
 24 the in-space robotic refueling, repair, or refur-

1 bishment capabilities described in paragraph
2 (1).

3 ~~(B)~~ The projected cost of using such capa-
4 bilities, including the cost of extended oper-
5 ations for science missions described in that
6 paragraph.

7 ~~(b) BRIEFING.—~~Not later than 1 year after the date
8 of the enactment of this Act, the Administrator shall pro-
9 vide to the appropriate committees of Congress and the
10 Space Studies Board of the National Academies of
11 Sciences, Engineering, and Medicine a briefing on the re-
12 sults of the study conducted under subsection ~~(a)(1)~~.

13 **~~SEC. 307. EARTH SCIENCE MISSIONS AND PROGRAMS.~~**

14 ~~(a) SENSE OF CONGRESS.—~~It is the sense of Con-
15 gress that the Earth Science Division of NASA plays an
16 important role in national efforts—

17 ~~(1)~~ to collect and use Earth observations in
18 service to society; and

19 ~~(2)~~ to understand global change.

20 ~~(b) EARTH SCIENCE MISSIONS AND PROGRAMS.—~~

21 With respect to the missions and programs of the Earth
22 Science Division, the Administrator shall, to the maximum
23 extent practicable, follow the recommendations and guid-
24 ance provided by the scientific community through the
25 decadal survey for Earth science and applications from

1 space of the National Academies of Sciences, Engineering,
2 and Medicine, including—

3 (1) the science priorities described in such sur-
4 vey;

5 (2) the execution of the series of existing or
6 previously planned observations (commonly known as
7 the “program of record”); and

8 (3) the development of a range of missions of
9 all classes, including opportunities for principal in-
10 vestigator-led, competitively selected missions.

11 **SEC. 308. SCIENCE MISSIONS TO MARS.**

12 (a) ~~IN GENERAL.~~—The Administrator shall conduct
13 ~~1~~ or more science missions to Mars to enable the selection
14 of ~~1~~ or more sites for human landing.

15 (b) ~~SAMPLE PROGRAM.~~—The Administrator may
16 carry out a program—

17 (1) to collect samples from the surface of Mars;
18 and

19 (2) to return such samples to Earth for sci-
20 entific analysis.

21 (c) ~~USE OF EXISTING CAPABILITIES AND ASSETS.~~—

22 In carrying out this section, the Administrator shall, to
23 the maximum extent practicable, use existing capabilities
24 and assets of NASA centers.

1 **SEC. 309. PLANETARY DEFENSE COORDINATION OFFICE.**

2 (a) FINDINGS.—Congress makes the following find-
3 ings:

4 (1) Near-Earth objects remain a threat to the
5 United States.

6 (2) Section 321(d)(1) of the National Aero-
7 nautics and Space Administration Authorization Act
8 of 2005 (Public Law 109–155; 119 Stat. 2922; 51
9 U.S.C. 71101 note prec.) established a requirement
10 that the Administrator plan, develop, and implement
11 a Near-Earth Object Survey program to detect,
12 track, catalogue, and characterize the physical char-
13 acteristics of near-Earth objects equal to or greater
14 than 140 meters in diameter in order to assess the
15 threat of such near-Earth objects to the Earth, with
16 the goal of 90-percent completion of the catalogue of
17 such near-Earth objects by December 30, 2020.

18 (3) The current planetary defense strategy of
19 NASA acknowledges that such goal will not be met.

20 (4) The report of the National Academies of
21 Sciences, Engineering, and Medicine entitled “Find-
22 ing Hazardous Asteroids Using Infrared and Visible
23 Wavelength Telescopes” issued in 2019 states
24 that—

25 (A) NASA cannot accomplish such goal
26 with currently available assets;

(B) NASA should develop and launch a dedicated space-based infrared survey telescope to meet the requirements of section 321(d)(1) of the National Aeronautics and Space Administration Authorization Act of 2005 (Public Law 109–155; 119 Stat. 2922; 51 U.S.C. 71101 note prec.); and

(C) the early detection of potentially hazardous near-Earth objects enabled by a space-based infrared survey telescope is important to enable deflection of a dangerous asteroid.

(b) ESTABLISHMENT OF PLANETARY DEFENSE COORDINATION OFFICE.—

(1) IN GENERAL.—Not later than 90 days after the date of the enactment of this Act, the Administrator shall establish an office within the Planetary Science Division of the Science Mission Directorate, to be known as the “Planetary Defense Coordination Office”, to plan, develop, and implement a program to survey threats posed by near-Earth objects equal to or greater than 140 meters in diameter, as required by section 321(d)(1) of the National Aeronautics and Space Administration Authorization Act of 2005 (Public Law 109–155; 119 Stat. 2922; 51 U.S.C. 71101 note prec.).

1 (2) ACTIVITIES.—The Administrator shall—

2 (A) develop and, not later than September
3 30, 2025, launch a space-based infrared survey
4 telescope that is capable of detecting near-
5 Earth objects equal to or greater than 140 me-
6 ters in diameter, with preference given to plan-
7 etary missions selected by the Administrator as
8 of the date of the enactment of this Act to pur-
9 sue concept design studies relating to the devel-
10 opment of a space-based infrared survey tele-
11 scope;

12 (B) identify, track, and characterize poten-
13 tially hazardous near-Earth objects and issue
14 warnings of the effects of potential impacts of
15 such objects; and

16 (C) assist in coordinating Government
17 planning for response to a potential impact of
18 a near-Earth object.

19 (e) ANNUAL REPORT.—Section 321(f) of the Na-
20 tional Aeronautics and Space Administration Authoriza-
21 tion Act of 2005 (Public Law 109–155; 119 Stat. 2922;
22 51 U.S.C. 71101 note prec.) is amended to read as fol-
23 lows:

24 “(f) ANNUAL REPORT.—Not later than September
25 30, 2020, and annually thereafter through 90-percent

1 completion of the catalogue required by subsection (d)(1);
2 the Administrator shall submit to the Committee on Com-
3 merce, Science, and Transportation of the Senate and the
4 Committee on Science, Space, and Technology of the
5 House of Representatives a report that includes the fol-
6 lowing:

7 “(1) A summary of all activities carried out by
8 the Planetary Defense Coordination Office estab-
9 lished under section 309(b)(1) of the National Aero-
10 nautics and Space Administration Authorization Act
11 of 2019 since the date of enactment of that Act.

12 “(2) A description of the progress with respect
13 to the design, development, and launch of the space-
14 based infrared survey telescope required by section
15 309(b)(2)(A) of the National Aeronautics and Space
16 Administration Authorization Act of 2019.

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

19 “(4) A description of the status of efforts to co-
20 ordinate planetary defense activities in response to a
21 threat posed by a near-Earth object with other Fed-
22 eral agencies since the date of enactment of the Na-
23 tional Aeronautics and Space Administration Au-
24 thorization Act of 2019.

1 “(5) A description of the status of efforts to co-
 2 ordinate and cooperate with other countries to dis-
 3 cover hazardous asteroids and comets, plan a mitiga-
 4 tion strategy, and implement that strategy in the
 5 event of the discovery of an object on a likely colli-
 6 sion course with Earth.

7 “(6) A summary of expenditures for all activi-
 8 ties carried out by the Planetary Defense Coordina-
 9 tion Office since the date of enactment of the Na-
 10 tional Aeronautics and Space Administration Au-
 11 thorization Act of 2019.”.

12 (d) LIMITATION ON USE OF FUNDS.—Of the
 13 amounts authorized to be appropriated by this Act, not
 14 more than 80 percent of amounts authorized to be appro-
 15 priated for the Office of the Administrator for a fiscal year
 16 may be obligated or expended until the date on which the
 17 Administrator submits the report for such fiscal year re-
 18 quired by section 321(f) of the National Aeronautics and
 19 Space Administration Authorization Act of 2005 (Public
 20 Law 109–155; 119 Stat. 2922; 51 U.S.C. 71101 note
 21 pre.).

22 (e) NEAR-EARTH OBJECT DEFINED.—In this sec-
 23 tion, the term “near-Earth object” means an asteroid or
 24 comet with a perihelion distance of less than 1.3 Astro-
 25 nomical Units from the Sun.

1 **SEC. 310. SUBORBITAL SCIENCE FLIGHTS.**

2 (a) SENSE OF CONGRESS.—It is the sense of Con-
3 gress that commercially available suborbital flight plat-
4 forms enable low-cost access to a microgravity environ-
5 ment to advance science and train scientists and engineers
6 under the Suborbital Research Program established under
7 section 802(e) of the National Aeronautics and Space Ad-
8 ministration Authorization Act of 2010 (42 U.S.C.
9 18382(c)).

10 (b) REPORT.—

11 (1) IN GENERAL.—Not later than 270 days
12 after the date of the enactment of this Act, the Ad-
13 ministrator shall submit to the appropriate commit-
14 tees of Congress a report evaluating the manner in
15 which suborbital flight platforms can contribute to
16 meeting the science objectives of NASA for the
17 Science Mission Directorate and the Human Explo-
18 ration and Operations Mission Directorate.

19 (2) CONTENTS.—The report required by para-
20 graph (1) shall include the following:

21 (A) An assessment of the advantages of
22 suborbital flight platforms to meet science ob-
23 jectives.

24 (B) An evaluation of the challenges to
25 greater use of commercial suborbital flight plat-
26 forms for science purposes.

1 (C) An analysis of whether commercial
2 suborbital flight platforms can provide low-cost
3 flight opportunities to test lunar and Mars
4 science payloads.

5 **SEC. 311. SENSE OF CONGRESS ON SMALL SATELLITE**
6 **SCIENCE.**

7 It is the sense of Congress that—

8 (1) small satellites—

9 (A) are increasingly robust, effective, and
10 affordable platforms for carrying out space
11 science missions;

12 (B) can work in tandem with or augment
13 larger NASA spacecraft to support high-priority
14 science missions of NASA; and

15 (C) are cost effective solutions that may
16 allow NASA to continue collecting legacy obser-
17 vations while developing next generation science
18 missions; and

19 (2) NASA should continue to support small sat-
20 ellite research, development, technologies, and pro-
21 grams, including technologies for compact and light-
22 weight instrumentation for small satellites.

1 **TITLE IV—AERONAUTICS**

2 **SEC. 401. SHORT TITLE.**

3 This title may be cited as the “Aeronautics Innova-
4 tion Act”.

5 **SEC. 402. DEFINITIONS.**

6 In this title:

7 (1) **AERONAUTICS STRATEGIC IMPLEMENTA-**
8 **TION PLAN.**—The term “Aeronautics Strategie Im-
9 **plementation Plan”** means the Aeronautics Strategie
10 Implementation Plan issued by the Aeronautics Re-
11 search Mission Directorate.

12 (2) **UNMANNED AIRCRAFT; UNMANNED AIR-**
13 **CRAFT SYSTEM.**—The terms “unmanned aircraft”
14 and “unmanned aircraft system” have the meanings
15 given those terms in section 44801 of title 49,
16 United States Code.

17 (3) **X-PLANE.**—The term “X-plane” means an
18 experimental aircraft that is—

19 (A) used to test and evaluate a new tech-
20 nology or aerodynamic concept; and

21 (B) operated by NASA or the Department
22 of Defense.

23 **SEC. 403. EXPERIMENTAL AIRCRAFT PROJECTS.**

24 (a) **SENSE OF CONGRESS.**—It is the sense of Con-
25 gress that—

1 (1) developing high-risk, precompetitive aero-
2 space technologies for which there is not yet a profit
3 rationale is a fundamental role of NASA;

4 (2) large-scale piloted flight test experimen-
5 tation and validation are necessary for—

6 (A) transitioning new technologies and ma-
7 terials, including associated manufacturing
8 processes, for general aviation, commercial avia-
9 tion, and military aeronautics use; and

10 (B) capturing the full extent of benefits
11 from investments made by the Aeronautics Re-
12 search Mission Directorate in priority programs
13 called for in—

14 (i) the National Aeronautics Research
15 and Development Plan issued by the Na-
16 tional Science and Technology Council in
17 February 2010;

18 (ii) the NASA 2014 Strategic Plan;

19 (iii) the Aeronautics Strategic Imple-
20 mentation Plan; and

21 (iv) any updates to the programs
22 called for in the plans described in clauses
23 (i) through (iii); and

24 (3) a level of funding that adequately supports
25 large-scale piloted flight test experimentation and

validation, including related infrastructure, should
 be ensured over a sustained period of time to restore
 the capacity of NASA—

(A) to see legacy priority programs
 through to completion; and

(B) to achieve national economic and security
 objectives.

(b) STATEMENT OF POLICY.—It is the policy of the
 United States—

(1) to maintain world leadership in—

(A) military and civilian aeronautical
 science and technology;

(B) global air power projection; and

(C) industrialization; and

(2) to maintain as a fundamental objective of
 NASA aeronautics research the steady progression
 and expansion of flight research and capabilities, in-
 cluding the science and technology of critical under-
 lying disciplines and competencies, such as—

(A) computational-based analytical and
 predictive tools and methodologies;

(B) aerothermodynamics;

(C) propulsion;

(D) advanced materials and manufacturing
 processes;

1 ~~(E)~~ high-temperature structures and mate-
 2 rials; and

3 ~~(F)~~ guidance, navigation, and flight con-
 4 trols.

5 ~~(c)~~ ESTABLISHMENT AND CONTINUATION OF X-
 6 PLANE PROJECTS.—

7 ~~(1)~~ IN GENERAL.—The Administrator shall es-
 8 tablish or continue to implement, in a manner that
 9 is consistent with the roadmap for supersonic aéro-
 10 nautics research and development required by sec-
 11 tion 604(b) of the National Aeronautics and Space
 12 Administration Transition Authorization Act of
 13 2017 (Public Law 115–10, 131 Stat. 55), the fol-
 14 lowing projects:

15 ~~(A)~~ A low-boom supersonic aircraft project
 16 to demonstrate supersonic aircraft designs and
 17 technologies that—

18 ~~(i)~~ reduce sonic boom noise; and

19 ~~(ii)~~ assist the Administrator of the
 20 Federal Aviation Administration in ena-
 21 bling—

22 ~~(I)~~ the safe commercial deploy-
 23 ment of civil supersonic aircraft tech-
 24 nology; and

1 (HI) the safe and efficient oper-
2 ation of civil supersonic aircraft.

3 (B) A subsonic flight demonstrator aircraft
4 project to advance aircraft designs and tech-
5 nologies that enable significant increases in en-
6 ergy efficiency and reduced life-cycle emissions
7 in the aviation system while reducing noise and
8 emissions.

9 (C) A series of large-scale X-plane dem-
10 onstrators that are—

11 (i) developed sequentially or in par-
12 allel; and

13 (ii) each based on a set of new con-
14 figuration concepts or technologies deter-
15 mined by the Administrator to dem-
16 onstrate—

17 (I) aircraft and propulsion con-
18 cepts and technologies and related ad-
19 vances in alternative propulsion and
20 energy; and

21 (HI) flight propulsion concepts
22 and technologies.

23 (2) ELEMENTS.—For each project under para-
24 graph (1), the Administrator shall—

1 (A) include the development of X-planes
2 and all necessary supporting flight test assets;

3 (B) pursue a robust technology maturation
4 and flight test validation effort;

5 (C) improve necessary facilities, flight test-
6 ing capabilities, and computational tools to sup-
7 port the project;

8 (D) award any primary contracts for de-
9 sign, procurement, and manufacturing to
10 United States persons, consistent with inter-
11 national obligations and commitments;

12 (E) coordinate research and flight test
13 demonstration activities with other Federal
14 agencies and the United States aviation com-
15 munity, as the Administrator considers appro-
16 priate; and

17 (F) ensure that the project is aligned with
18 the Aeronautics Strategic Implementation Plan
19 and any updates to the Aeronautics Strategic
20 Implementation Plan.

21 (3) UNITED STATES PERSON DEFINED.—In this
22 subsection, the term “United States person”
23 means—

1 (A) a United States citizen or an alien law-
 2 fully admitted for permanent residence to the
 3 United States; or

4 (B) an entity organized under the laws of
 5 the United States or of any jurisdiction within
 6 the United States, including a foreign branch of
 7 such an entity.

8 (d) ~~ADVANCED MATERIALS AND MANUFACTURING~~
 9 ~~TECHNOLOGY PROGRAM.—~~

10 (1) ~~IN GENERAL.—~~The Administrator may es-
 11 tablish an advanced materials and manufacturing
 12 technology program—

13 (A) to develop—

14 (i) new materials, including composite
 15 and high-temperature materials, from base
 16 material formulation through full-scale
 17 structural validation and manufacture;

18 (ii) advanced materials and manufac-
 19 turing processes, including additive manu-
 20 facturing, to reduce the cost of manufac-
 21 turing scale-up and certification for use in
 22 general aviation, commercial aviation, and
 23 military aeronautics; and

24 (iii) noninvasive or nondestructive
 25 techniques for testing or evaluating avia-

1 tion and aeronautics structures, including
2 for materials and manufacturing processes;

3 (B) to reduce the time it takes to design,
4 industrialize, and certify advanced materials
5 and manufacturing processes;

6 (C) to provide education and training op-
7 portunities for the aerospace workforce; and

8 (D) to address global cost and human cap-
9 ital competitiveness for United States aero-
10 nautical industries and technological leadership
11 in advanced materials and manufacturing tech-
12 nology.

13 (2) ELEMENTS.—In carrying out a program
14 under paragraph (1), the Administrator shall—

15 (A) build on work that was carried out by
16 the Advanced Composites Project of NASA;

17 (B) partner with the private and academic
18 sectors, such as members of the Advanced Com-
19 posites Consortium of NASA, the Joint Ad-
20 vanced Materials and Structures Center of Ex-
21 cellence of the Federal Aviation Administration,
22 and national laboratories, as the Administrator
23 considers appropriate;

24 (C) provide a structure for managing intel-
25 lectual property generated by the program

1 based on or consistent with the structure estab-
 2 lished for the Advanced Composites Consortium
 3 of NASA;

4 (D) ensure adequate Federal cost share for
 5 applicable research; and

6 (E) coordinate with advanced manufac-
 7 turing and composites initiatives in other mis-
 8 sion directorates of NASA, as the Adminis-
 9 trator considers appropriate.

10 (e) RESEARCH PARTNERSHIPS.—In carrying out the
 11 projects under subsection (c) and a program under sub-
 12 section (d), the Administrator may engage in cooperative
 13 research programs with—

14 (1) academia; and

15 (2) commercial aviation and aerospace manu-
 16 facturers.

17 **SEC. 404. UNMANNED AIRCRAFT SYSTEMS.**

18 (a) UNMANNED AIRCRAFT SYSTEMS OPERATION
 19 PROGRAM.—The Administrator shall—

20 (1) research and test capabilities and concepts,
 21 including unmanned aircraft systems communica-
 22 tions and spectrum-related resources; for integrating
 23 unmanned aircraft systems into the national air-
 24 space system;

1 (2) leverage the partnership NASA has with in-
 2 dustry focused on the advancement of technologies
 3 for future air traffic management systems for un-
 4 manned aircraft systems; and

5 (3) continue to align the research and testing
 6 portfolio of NASA to inform the integration of un-
 7 manned aircraft systems into the national airspace
 8 system, consistent with public safety and national
 9 security objectives.

10 (b) SENSE OF CONGRESS ON COORDINATION WITH
 11 FEDERAL AVIATION ADMINISTRATION.—It is the sense of
 12 Congress that—

13 (1) NASA should continue—

14 (A) to coordinate with the Federal Avia-
 15 tion Administration on research on air traffic
 16 management systems for unmanned aircraft
 17 systems; and

18 (B) to assist the Federal Aviation Admin-
 19 istration in the integration of air traffic man-
 20 agement systems for unmanned aircraft sys-
 21 tems into the national airspace system; and

22 (2) the test ranges (as defined in section 44801
 23 of title 49, United States Code) should continue to
 24 be leveraged for research on—

1 (A) air traffic management systems for un-
2 manned aircraft systems; and

3 (B) the integration of such systems into
4 the national airspace system.

5 **SEC. 405. 21ST CENTURY AERONAUTICS CAPABILITIES INI-**
6 **TIATIVE.**

7 (a) **IN GENERAL.**—The Administrator may establish
8 an initiative, to be known as the “21st Century Aero-
9 nautics Capabilities Initiative”, within the Construction
10 and Environmental Compliance and Restoration Account,
11 to ensure that NASA possesses the infrastructure and ca-
12 pabilities necessary to conduct proposed flight demonstra-
13 tion projects across the range of NASA aeronautics inter-
14 ests.

15 (b) **ACTIVITIES.**—In carrying out the 21st Century
16 Aeronautics Capabilities Initiative, the Administrator may
17 carry out the following activities:

18 (1) Any investments the Administrator con-
19 siders necessary to upgrade and create facilities for
20 civil and national security aeronautics research to
21 support advancements in—

22 (A) long-term foundational science and
23 technology;

24 (B) advanced aircraft systems;

25 (C) air traffic management systems;

- 1 ~~(D)~~ fuel efficiency;
- 2 ~~(E)~~ electric propulsion technologies;
- 3 ~~(F)~~ system-wide safety assurance;
- 4 ~~(G)~~ autonomous aviation; and
- 5 ~~(H)~~ supersonic and hypersonic aircraft de-
- 6 sign and development.

7 ~~(2)~~ Any measures the Administrator considers
 8 necessary to support flight testing activities, includ-
 9 ing—

10 ~~(A)~~ continuous refinement and develop-
 11 ment of free-flight test techniques and meth-
 12 odologies;

13 ~~(B)~~ upgrades and improvements to real-
 14 time tracking and data acquisition; and

15 ~~(C)~~ such other measures relating to aero-
 16 nautics research support and modernization as
 17 the Administrator considers appropriate to
 18 carry out the scientific study of the problems of
 19 flight, with a view to practical solutions for
 20 such problems.

21 **SEC. 406. SENSE OF CONGRESS ON ON-DEMAND AIR TRANS-**
 22 **PORTATION.**

23 It is the sense of Congress that—

- 24 ~~(1)~~ greater use of high-speed air transportation;
- 25 small airports, helipads, vertical flight infrastruc-

ture, and other aviation-related infrastructure can alleviate surface transportation congestion and support economic growth within cities;

(2) with respect to urban air mobility and related concepts, NASA should continue—

(A) to conduct research focused on concepts, technologies, and design tools; and

(B) to support the evaluation of advanced technologies and operational concepts that can be leveraged by—

(i) industry to develop future vehicles and systems; and

(ii) the Federal Aviation Administration to support vehicle safety and operational certification; and

(3) NASA should leverage ongoing efforts to develop advanced technologies to actively support the research needed for on-demand air transportation.

SEC. 407. SENSE OF CONGRESS ON HYPERSONIC TECHNOLOGY RESEARCH.

It is the sense of Congress that—

(1) hypersonic technology is critical to the development of advanced high-speed aerospace vehicles for both civilian and national security purposes;

1 (2) for hypersonic vehicles to be realized, re-
2 search is needed to overcome technical challenges,
3 including in propulsion, advanced materials, and
4 flight performance in a severe environment;

5 (3) NASA plays a critical role in supporting
6 fundamental hypersonic research focused on system
7 design, analysis and validation, and propulsion tech-
8 nologies;

9 (4) NASA research efforts in hypersonic tech-
10 nology should complement research supported by the
11 Department of Defense to the maximum extent
12 practicable, since contributions from both agencies
13 working in partnership with universities and indus-
14 try are necessary to overcome key technical chal-
15 lenges;

16 (5) previous coordinated research programs be-
17 tween NASA and the Department of Defense en-
18 abled important progress on hypersonic technology;

19 (6) the commercial sector could provide flight
20 platforms and other capabilities that are able to host
21 and support NASA hypersonic technology research
22 projects; and

23 (7) in carrying out hypersonic technology re-
24 search projects, the Administrator should—

(A) focus research and development efforts on high-speed propulsion systems, reusable vehicle technologies, high-temperature materials, and systems analysis;

(B) coordinate with the Department of Defense to prevent duplication of efforts and of investments;

(C) include partnerships with universities and industry to accomplish research goals; and

(D) maximize public-private use of commercially available platforms for hosting research and development flight projects.

TITLE V—SPACE TECHNOLOGY

SEC. 501. SPACE TECHNOLOGY MISSION DIRECTORATE.

(a) SENSE OF CONGRESS.—It is the sense of Congress that an independent Space Technology Mission Directorate is critical to ensuring continued investments in the development of technologies for missions across the portfolio of NASA, including science, aeronautics, and human exploration.

(b) SPACE TECHNOLOGY MISSION DIRECTORATE.—The Administrator shall maintain a Space Technology Mission Directorate consistent with section 702 of the National Aeronautics and Space Administration Transition Authorization Act of 2017 (51 U.S.C. 20301 note).

1 **SEC. 502. FLIGHT OPPORTUNITIES PROGRAM.**

2 (a) SENSE OF CONGRESS.—It is the sense of Con-
3 gress that the Administrator should provide flight oppor-
4 tunities for payloads to microgravity environments and
5 suborbital altitudes as required by section 907(e) of the
6 National Aeronautics and Space Administration Author-
7 ization Act of 2010 (42 U.S.C. 18405(e)), as amended by
8 subsection (b).

9 (b) ESTABLISHMENT.—Section 907(e) of the Na-
10 tional Aeronautics and Space Administration Authoriza-
11 tion Act of 2010 (42 U.S.C. 18405(e)) is amended to read
12 as follows:

13 “(e) ESTABLISHMENT.—

14 “(1) IN GENERAL.—The Administrator shall es-
15 tablish a Commercial Reusable Suborbital Research
16 Program within the Space Technology Mission Di-
17 rectorate to fund—

18 “(A) the development of payloads for sci-
19 entific research, technology development, and
20 education;

21 “(B) flight opportunities for those pay-
22 loads to microgravity environments and sub-
23 orbital altitudes; and

24 “(C) transition of those payloads to orbital
25 opportunities.

1 ~~“(2) COMMERCIAL REUSABLE VEHICLE~~
 2 ~~FLIGHTS.—In carrying out the Commercial Reusable~~
 3 ~~Suborbital Research Program, the Administrator~~
 4 ~~may fund engineering and integration demonstra-~~
 5 ~~tions, proofs of concept, and educational experiments~~
 6 ~~for flights of commercial reusable vehicles.~~

7 ~~“(3) COMMERCIAL SUBORBITAL LAUNCH VEHI-~~
 8 ~~CLES.—In carrying out the Commercial Reusable~~
 9 ~~Suborbital Research Program, the Administrator~~
 10 ~~may not fund the development of commercial sub-~~
 11 ~~orbital launch vehicles.~~

12 ~~“(4) WORKING WITH MISSION DIREC-~~
 13 ~~TORATES.—In carrying out the Commercial Reus-~~
 14 ~~able Suborbital Research Program, the Adminis-~~
 15 ~~trator shall work with the mission directorates of~~
 16 ~~NASA to achieve the research, technology, and edu-~~
 17 ~~cation goals of NASA.”.~~

18 ~~(c) CONFORMING AMENDMENT.—Section 907(b) of~~
 19 ~~the National Aeronautics and Space Administration Au-~~
 20 ~~thorization Act of 2010 (42 U.S.C. 18405(b)) is amended,~~
 21 ~~in the first sentence, by striking “Commercial Reusable~~
 22 ~~Suborbital Research Program in” and inserting “Commer-~~
 23 ~~cial Reusable Suborbital Research Program established~~
 24 ~~under subsection (c)(1) within”.~~

1 **SEC. 503. SMALL SPACECRAFT TECHNOLOGY PROGRAM.**

2 (a) SENSE OF CONGRESS.—It is the sense of Con-
3 gress that the Small Spacecraft Technology Program is
4 important for conducting science and technology valida-
5 tion for—

6 (1) short- and long-duration missions in low-
7 Earth orbit; and

8 (2) deep space missions.

9 (b) ACCOMMODATION OF CERTAIN PAYLOADS.—In
10 carrying out the Small Spacecraft Technology Program,
11 the Administrator shall, as the mission risk posture and
12 technology development objectives allow, accommodate
13 science payloads that further the goal of long-term human
14 exploration to the Moon and Mars.

15 **SEC. 504. NUCLEAR PROPULSION TECHNOLOGY.**

16 (a) SENSE OF CONGRESS.—It is the sense of Con-
17 gress that nuclear propulsion is critical to the development
18 of advanced spacecraft for civilian and national defense
19 purposes.

20 (b) DEVELOPMENT; STUDIES.—The Administrator
21 shall, in coordination with the Secretary of Energy and
22 the Secretary of Defense—

23 (1) continue to develop the fuel element design
24 for NASA nuclear propulsion technology;

25 (2) finalize the systems feasibility studies for
26 such technology; and

1 ~~(3) partner with members of commercial indus-~~
 2 ~~try to conduct mission concept studies on such tech-~~
 3 ~~nology.~~

4 ~~(c) NUCLEAR PROPULSION TECHNOLOGY DEM-~~
 5 ~~ONSTRATION.—~~

6 ~~(1) DETERMINATION; REPORT.—Not later than~~
 7 ~~December 31, 2021, the Administrator shall—~~

8 ~~(A) determine the correct approach for~~
 9 ~~conducting a flight demonstration of nuclear~~
 10 ~~propulsion technology; and~~

11 ~~(B) submit to Congress a report on a plan~~
 12 ~~for such a demonstration.~~

13 ~~(2) DEMONSTRATION.—Not later than Decem-~~
 14 ~~ber 31, 2024, the Administrator shall conduct the~~
 15 ~~flight demonstration described in paragraph (1).~~

16 **SEC. 505. MARS-FORWARD TECHNOLOGIES.**

17 ~~(a) SENSE OF CONGRESS.—It is the sense of Con-~~
 18 ~~gress that the Administrator should pursue multiple tech-~~
 19 ~~nical paths for entry, descent, and landing for Mars, in-~~
 20 ~~cluding competitively selected technology demonstration~~
 21 ~~missions.~~

22 ~~(b) PRIORITIZATION OF LONG-LEAD TECHNOLOGIES~~
 23 ~~AND SYSTEMS.—The Administrator shall prioritize, within~~
 24 ~~the Space Technology Mission Directorate, research, test-~~
 25 ~~ing, and development of long-lead technologies and sys-~~

1 tems for Mars, including technologies and systems relating
2 to—

3 (1) entry, descent, and landing; and

4 (2) in-space propulsion, including nuclear pro-
5 pulsion, cryogenic fluid management, and electric
6 propulsion options.

7 **TITLE VI—STEM ENGAGEMENT**

8 **SEC. 601. SENSE OF CONGRESS.**

9 It is the sense of Congress that—

10 (1) NASA serves as a source of inspiration to
11 the people of the United States; and

12 (2) NASA is uniquely positioned to help in-
13 crease student interest in science, technology, engi-
14 neering, and math;

15 (3) engaging students, and providing hands-on
16 experience at an early age, in science, technology,
17 engineering, and math are important aspects of en-
18 suring and promoting United States leadership in
19 innovation; and

20 (4) NASA should strive to leverage its unique
21 position—

22 (A) to increase kindergarten through grade
23 12 involvement in NASA projects;

24 (B) to enhance higher education in STEM
25 fields in the United States;

1 (C) to support individuals who are under-
2 represented in science, technology, engineering,
3 and math fields, such as women, minorities,
4 and individuals in rural areas; and

5 (D) to provide flight opportunities for stu-
6 dent experiments and investigations.

7 **SEC. 602. STEM EDUCATION ENGAGEMENT ACTIVITIES.**

8 (a) IN GENERAL.—The Administrator shall continue
9 to provide opportunities for formal and informal STEM
10 education engagement activities within the Office of
11 NASA STEM Engagement and other NASA directorates,
12 including—

13 (1) the Established Program to Stimulate Com-
14 petitive Research;

15 (2) the Minority University Research and Edu-
16 cation Project; and

17 (3) the National Space Grant College and Fel-
18 lowship Program.

19 (b) LEVERAGING NASA NATIONAL PROGRAMS TO
20 PROMOTE STEM EDUCATION.—The Administrator, in
21 partnership with museums, nonprofit organizations, and
22 commercial entities, shall, to the maximum extent prac-
23 ticable, leverage human spaceflight missions, Deep Space
24 Exploration Systems (including the Space Launch System,
25 Orion, and Exploration Ground Systems), and NASA

1 science programs to engage students at the kindergarten
 2 through grade 12 and higher education levels to pursue
 3 learning and career opportunities in STEM fields.

4 (c) BRIEFING.—Not later than 1 year after the date
 5 of the enactment of this Act, the Administrator shall brief
 6 the appropriate committees of Congress on—

7 (1) the status of the programs described in sub-
 8 section (a); and

9 (2) the manner by which each NASA STEM
 10 education engagement activity is organized and
 11 funded.

12 (d) STEM EDUCATION DEFINED.—In this section,
 13 the term “STEM education” has the meaning given the
 14 term in section 2 of the STEM Education Act of 2015
 15 (Public Law 114–59; 42 U.S.C. 6621 note).

16 **SEC. 603. SKILLED TECHNICAL EDUCATION OUTREACH**
 17 **PROGRAM.**

18 (a) ESTABLISHMENT.—The Administrator shall es-
 19 tablish a program to conduct outreach to secondary school
 20 students—

21 (1) to expose students to careers that require
 22 career and technical education; and

23 (2) to encourage students to pursue careers
 24 that require career and technical education.

1 (b) ~~OUTREACH PLAN.~~—Not later than 180 days after
2 the date of the enactment of this Act, the Administrator
3 shall submit to the appropriate committees of Congress
4 a report on the outreach program under subsection (a)
5 that includes—

6 (1) an implementation plan;

7 (2) a description of the resources needed to
8 carry out the program; and

9 (3) any recommendations on expanding out-
10 reach to secondary school students interested in
11 skilled technical occupations.

12 (c) ~~SYSTEMS OBSERVATION.~~—

13 (1) ~~IN GENERAL.~~—The Administrator shall de-
14 velop a program and associated policies to allow stu-
15 dents from accredited educational institutions to
16 view the manufacturing, assembly, and testing of
17 NASA-funded space and aeronautical systems, as
18 the Administrator considers appropriate.

19 (2) ~~CONSIDERATIONS.~~—In developing the pro-
20 gram and policies under paragraph (1), the Adminis-
21 trator shall take into consideration factors such as
22 workplace safety, mission needs, and the protection
23 of sensitive and proprietary technologies.

1 **TITLE VII—WORKFORCE AND** 2 **INDUSTRIAL BASE**

3 **SEC. 701. APPOINTMENT AND COMPENSATION PILOT PRO-** 4 **GRAM.**

5 (a) **DEFINITION OF COVERED PROVISIONS.**—In this
6 section the term “covered provisions” means the provi-
7 sions of title 5, United States Code, other than—

8 (1) section 2301 of that title;

9 (2) section 2302 of that title;

10 (3) chapter 71 of that title;

11 (4) section 7204 of that title; and

12 (5) chapter 73 of that title.

13 (b) **ESTABLISHMENT.**—There is established a 3-year
14 pilot program under which, notwithstanding section 20113
15 of title 51, United States Code, the Administrator may,
16 with respect to not more than 5,000 designated per-
17 sonnel—

18 (1) appoint and manage such designated per-
19 sonnel of the Administration, without regard to the
20 covered provisions; and

21 (2) fix the compensation of such designated
22 personnel of the Administration, without regard to
23 chapter 51 and subchapter III of chapter 53 of title
24 5, United States Code, at a rate that does not ex-
25 ceed the per annum rate of salary of the Vice Presi-

1 dent of the United States under section 104 of title
2 3, United States Code.

3 ~~(c) ADMINISTRATOR RESPONSIBILITIES.—~~In ear-
4 rying out the pilot program established under subsection
5 (b), the Administrator shall ensure that the pilot pro-
6 gram—

7 ~~(1) uses—~~

8 ~~(A) state-of-the-art recruitment techniques;~~

9 ~~(B) simplified classification methods with~~
10 ~~respect to personnel of the Administration; and~~

11 ~~(C) broad banding; and~~

12 ~~(2) offers—~~

13 ~~(A) competitive compensation; and~~

14 ~~(B) the opportunity for career mobility.~~

15 **SEC. 702. ESTABLISHMENT OF MULTI-INSTITUTION CON-**
16 **SORTIA AND UNIVERSITY-AFFILIATED RE-**
17 **SEARCH CENTERS.**

18 ~~(a) IN GENERAL.—~~The Administrator, pursuant to
19 section ~~2304(c)(3)(B)~~ of title 10, United States Code,
20 may—

21 ~~(1) establish one or more multi-institution con-~~
22 ~~sortia or university-affiliated research centers to fa-~~
23 ~~cilitate access to essential engineering, research, and~~
24 ~~development capabilities in support of NASA mis-~~
25 ~~sions;~~

1 (2) use such a consortium or research center to
 2 fund technical analyses and other engineering sup-
 3 port to address the acquisition, technical, and oper-
 4 ational needs of NASA centers; and

5 (3) ensure such a consortium or research cen-
 6 ter—

7 (A) is held accountable for the technical
 8 quality of the work product developed under
 9 this section; and

10 (B) convenes disparate groups to facilitate
 11 public-private partnerships.

12 (b) POLICIES AND PROCEDURES.—The Adminis-
 13 trator shall develop and implement policies and procedures
 14 to govern, with respect to the establishment of a consor-
 15 tium or research center under subsection (a)—

16 (1) the selection of participants;

17 (2) the award of cooperative agreements or
 18 other contracts;

19 (3) the appropriate use of competitive awards
 20 and sole source awards; and

21 (4) technical capabilities required.

22 (c) ELIGIBILITY.—The following entities shall be eli-
 23 gible to participate in a consortium or research center es-
 24 tablished under subsection (a)—

1 (1) an institution of higher education (as de-
 2 fined in section 102 of the Higher Education Act of
 3 1965 (20 U.S.C. 1002));

4 (2) an operator of a federally funded research
 5 and development center;

6 (3) a nonprofit or not-for-profit research insti-
 7 tution; and

8 (4) a consortium composed of—

9 (A) an entity described in paragraph (1);
 10 (2); or (3); and

11 (B) one or more for-profit entities.

12 **SEC. 703. EXPEDITED ACCESS TO TECHNICAL TALENT AND**
 13 **EXPERTISE.**

14 (a) IN GENERAL.—The Administrator may—

15 (1) establish one or more multi-institution task
 16 order contracts, consortia, cooperative agreements,
 17 or other arrangements to facilitate expedited access
 18 to eligible entities in support of NASA missions; and

19 (2) use such a multi-institution task order con-
 20 tract, consortium, cooperative agreement, or other
 21 arrangement to fund technical analyses and other
 22 engineering support to address the acquisition, tech-
 23 nical, and operational needs of NASA centers.

24 (b) CONSULTATION WITH OTHER NASA-AFFILI-
 25 ATED ENTITIES.—To ensure access to technical expertise

1 and reduce costs and duplicative efforts; a multi-institu-
 2 tion task order contract, consortium, cooperative agree-
 3 ment, or any other arrangement established under sub-
 4 section (a)(1) shall, to the maximum extent practicable,
 5 be carried out in consultation with other NASA-affiliated
 6 entities, including federally funded research and develop-
 7 ment centers, university-affiliated research centers, and
 8 NASA laboratories and test centers.

9 (c) POLICIES AND PROCEDURES.—The Adminis-
 10 trator shall develop and implement policies and procedures
 11 to govern, with respect to the establishment of a multi-
 12 institution task order contract, consortium, cooperative
 13 agreement, or any other arrangement under subsection
 14 (a)(1)—

- 15 (1) the selection of participants;
- 16 (2) the award of task orders;
- 17 (3) the maximum award size for a task;
- 18 (4) the appropriate use of competitive awards
- 19 and sole source awards; and
- 20 (5) technical capabilities required.

21 (d) ELIGIBLE ENTITY DEFINED.—In this section,
 22 the term “eligible entity” means—

- 23 (1) an institution of higher education (as de-
 24 fined in section 102 of the Higher Education Act of
 25 1965 (20 U.S.C. 1002));

1 (2) an operator of a federally funded research
2 and development center;

3 ~~(3) a nonprofit or not-for-profit research insti-~~
4 ~~tution; and~~

5 (4) a consortium composed of—

6 (A) an entity described in paragraph (1);
7 (2); or (3); and

8 (B) one or more for-profit entities.

9 **SEC. 704. REPORT ON INDUSTRIAL BASE FOR CIVIL SPACE**

10 **MISSIONS AND OPERATIONS.**

11 (a) IN GENERAL.—Not later than 1 year after the
12 date of the enactment of this Act, the Administrator shall
13 submit to the appropriate committees of Congress a report
14 on the United States industrial base for NASA civil space
15 missions and operations.

16 (b) ELEMENTS.—The report required by subsection
17 (a) shall include the following:

18 (1) A comprehensive description of the current
19 status of the United States industrial base for
20 NASA civil space missions and operations.

21 (2) A description and assessment of the weak-
22 nesses in the supply chain, skills, manufacturing ca-
23 pacity, raw materials, key components, and other
24 areas of the United States industrial base for NASA
25 civil space missions and operations that could ad-

1 versely impact such missions and operations if un-
2 available.

3 ~~(3)~~ A description and assessment of various
4 mechanisms to address and mitigate the weaknesses
5 described pursuant to paragraph ~~(2)~~.

6 ~~(4)~~ Such other matters relating to the United
7 States industrial base for NASA civil space missions
8 and operations as the Administrator considers ap-
9 propriate.

10 **SEC. 705. SEPARATIONS AND RETIREMENT INCENTIVES.**

11 Section ~~20113~~ of title 51, United States Code, is
12 amended by adding at the end the following:

13 “(o) PROVISIONS RELATED TO SEPARATION AND RE-
14 TIREMENT INCENTIVES.—

15 “(1) DEFINITION.—In this subsection, the term
16 ‘employee’—

17 “(A) means an employee of the Adminis-
18 tration serving under an appointment without
19 time limitation; and

20 “(B) does not include—

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

1 “(ii) an employee having a disability
 2 on the basis of which such employee is or
 3 would be eligible for disability retirement
 4 under any of the retirement systems re-
 5 ferred to in clause (i); or

6 “(iii) for purposes of eligibility for
 7 separation incentives under this subsection;
 8 an employee who is in receipt of a decision
 9 notice of involuntary separation for mis-
 10 conduct or unacceptable performance.

11 “(2) **AUTHORITY.**—The Administrator may es-
 12 tablish a program under which employees may be el-
 13 igible for early retirement, offered separation incen-
 14 tive pay to separate from service voluntarily, or
 15 both. This authority may be used to reduce the
 16 number of personnel employed or to restructure the
 17 workforce to meet mission objectives without reduc-
 18 ing the overall number of personnel. This authority
 19 is in addition to, and notwithstanding, any other au-
 20 thorities established by law or regulation for such
 21 programs.

22 “(3) **EARLY RETIREMENT.**—An employee who
 23 is at least 50 years of age and has completed 20
 24 years of service, or has at least 25 years of service,
 25 may, pursuant to regulations promulgated under

1 this subsection, apply and be retired from the Ad-
 2 ministration and receive benefits in accordance with
 3 subchapter III of chapter 83 or 84 of title 5 if the
 4 employee has been employed continuously within the
 5 Administration for more than 30 days before the
 6 date on which the determination to conduct a reduc-
 7 tion or restructuring within 1 or more Administra-
 8 tion centers is approved.

9 “(4) SEPARATION PAY.—

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

13 “(i) an amount equal to the amount
 14 the employee would be entitled to receive
 15 under section 5595(c) of title 5, if the em-
 16 ployee were entitled to payment under such
 17 section; or

18 “(ii) \$40,000.

19 “(B) LIMITATIONS.—Separation pay shall
 20 not be a basis for payment, and shall not be in-
 21 cluded in the computation, of any other type of
 22 Government benefit. Separation pay shall not
 23 be taken into account for the purpose of deter-
 24 mining the amount of any severance pay to
 25 which an individual may be entitled under sec-

tion ~~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~~

1 Executive agency (as defined by section 105 of
2 title 5) other than the Administration, the Ad-
3 ministrator may, at the request of the head of
4 that agency, waive the repayment if the indi-
5 vidual involved possesses unique abilities and is
6 the only qualified applicant available for the po-
7 sition. If the employment is within the Adminis-
8 tration, the Administrator may waive the repay-
9 ment if the individual involved is the only quali-
10 fied applicant available for the position. If the
11 employment is with an entity in the legislative
12 branch, the head of the entity or the appointing
13 official may waive the repayment if the indi-
14 vidual involved possesses unique abilities and is
15 the only qualified applicant available for the po-
16 sition. If the employment is with the judicial
17 branch, the Director of the Administrative Of-
18 fice of the United States Courts may waive the
19 repayment if the individual involved possesses
20 unique abilities and is the only qualified appli-
21 cant available for the position.

22 “(6) REGULATIONS.—Under the program es-
23 tablished under paragraph (2), early retirement and
24 separation pay may be offered only pursuant to reg-
25 ulations established by the Administrator, subject to

1 such limitations or conditions as the Administrator
2 may require.

3 ~~“(7) USE OF EXISTING FUNDS.—The Adminis-~~
4 ~~trator shall carry out this subsection using amounts~~
5 ~~otherwise made available to the Administrator and~~
6 ~~no additional funds are authorized to be appro-~~
7 ~~riated to carry out this subsection.”.~~

8 **SEC. 706. CONFIDENTIALITY OF MEDICAL QUALITY ASSUR-**
9 **ANCE RECORDS.**

10 (a) ~~IN GENERAL.—Chapter 313 of title 51, United~~
11 ~~States Code, is amended by adding at the end the fol-~~
12 ~~lowing:~~

13 **“§ 31303. Confidentiality of medical quality assurance**
14 **records**

15 ~~“(a) IN GENERAL.—Except as provided in subsection~~
16 ~~(b)(1)—~~

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

21 ~~“(2) an individual who reviews or creates a~~
22 ~~medical quality assurance record for the Administra-~~
23 ~~tion, or participates in any proceeding that reviews~~
24 ~~or creates a medical quality assurance record, may~~

1 not testify in a judicial or administrative proceeding
 2 with respect to—

3 “(A) the medical quality assurance record;
 4 or

5 “(B) any finding, recommendation, evalua-
 6 tion, opinion, or action taken by such individual
 7 or in accordance with such proceeding with re-
 8 spect to the medical quality assurance record.

9 “(b) DISCLOSURE OF RECORDS.—

10 “(1) IN GENERAL.—Notwithstanding subsection
 11 (a), a medical quality assurance record may be dis-
 12 closed to—

13 “(A) a Federal agency or private entity, if
 14 the medical quality assurance record is nec-
 15 essary for the Federal agency or private entity
 16 to carry out—

17 “(i) licensing or accreditation func-
 18 tions relating to Administration healthcare
 19 facilities; or

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

22 “(B) a Federal agency or healthcare pro-
 23 vider, if the medical quality assurance record is
 24 required by the Federal agency or healthcare
 25 provider to enable Administration participation

1 in a healthcare program of the Federal agency
2 or healthcare provider;

3 “(C) a criminal or civil law enforcement
4 agency, or an instrumentality authorized by law
5 to protect the public health or safety, on writ-
6 ten request by a qualified representative of such
7 agency or instrumentality submitted to the Ad-
8 ministrator that includes a description of the
9 lawful purpose for which the medical quality as-
10 surance record is requested;

11 “(D) an officer, an employee, or a con-
12 tractor of the Administration who requires the
13 medical quality assurance record to carry out
14 an official duty associated with healthcare;

15 “(E) healthcare personnel, to the extent
16 necessary to address a medical emergency af-
17 fecting the health or safety of an individual;
18 and

19 “(F) any committee, panel, or board con-
20 vened by the Administration to review the
21 healthcare-related policies and practices of the
22 Administration.

23 “(2) SUBSEQUENT DISCLOSURE PROHIBITED.—

24 An individual or entity to whom a medical quality
25 assurance record has been disclosed under para-

1 graph (1) may not make a subsequent disclosure of
 2 the medical quality assurance record.

3 ~~“(c) PERSONALLY IDENTIFIABLE INFORMATION.—~~

4 ~~“(1) IN GENERAL.—Except as provided in para-~~
 5 ~~graph (2), the personally identifiable information~~
 6 ~~contained in a medical quality assurance record of a~~
 7 ~~patient or an employee of the Administration, or any~~
 8 ~~other individual associated with the Administration~~
 9 ~~for purposes of a medical quality assurance pro-~~
 10 ~~gram, shall be removed before the disclosure of the~~
 11 ~~medical quality assurance record to an entity other~~
 12 ~~than the Administration.~~

13 ~~“(2) EXCEPTION.—Personally identifiable infor-~~
 14 ~~mation described in paragraph (1) may be released~~
 15 ~~to an entity other than the Administration if the Ad-~~
 16 ~~ministrator makes a determination that the release~~
 17 ~~of such personally identifiable information—~~

18 ~~“(A) is in the best interests of the Admin-~~
 19 ~~istration; and~~

20 ~~“(B) does not constitute an unwarranted~~
 21 ~~invasion of personal privacy.~~

22 ~~“(d) EXCLUSION FROM FOIA.—A medical quality~~
 23 ~~assurance record may not be made available to any person~~
 24 ~~under section 552 of title 5, United States Code (com-~~
 25 ~~monly referred to as the ‘Freedom of Information Act’),~~

1 and this section shall be considered a statute described
 2 in subsection (b)(3)(B) of such section 522.

3 “(e) REGULATIONS.—Not later than one year after
 4 the date of the enactment of this section, the Adminis-
 5 trator shall promulgate regulations to implement this sec-
 6 tion.

7 “(f) RULES OF CONSTRUCTION.—Nothing in this
 8 section shall be construed—

9 “(1) to withhold a medical quality assurance
 10 record from a committee of the Senate or House of
 11 Representatives or a joint committee of Congress if
 12 the medical quality assurance record relates to a
 13 matter within the jurisdiction of such committee or
 14 joint committee; or

15 “(2) to limit the use of a medical quality assur-
 16 ance record within the Administration, including the
 17 use by a contractor or consultant of the Administra-
 18 tion.

19 “(g) DEFINITIONS.—In this section:

20 “(1) MEDICAL QUALITY ASSURANCE RECORD.—

21 The term ‘medical quality assurance record’ means
 22 any proceeding, discussion, record, finding, rec-
 23 ommendation, evaluation, opinion, minutes, report,
 24 or other document or action that results from a

1 quality assurance committee, quality assurance pro-
 2 gram, or quality assurance program activity.

3 ~~“(2) QUALITY ASSURANCE PROGRAM.—~~

4 ~~“(A) IN GENERAL.—The term ‘quality as-~~
 5 ~~surance program’ means a comprehensive pro-~~
 6 ~~gram of the Administration—~~

7 ~~“(i) to systematically review and im-~~
 8 ~~prove the quality of medical and behavioral~~
 9 ~~health services provided by the Administra-~~
 10 ~~tion to ensure the safety and security of~~
 11 ~~individuals receiving such health services;~~
 12 ~~and~~

13 ~~“(ii) to evaluate and improve the effi-~~
 14 ~~ciency, effectiveness, and use of staff and~~
 15 ~~resources in the delivery of such health~~
 16 ~~services.~~

17 ~~“(B) INCLUSION.—The term ‘quality as-~~
 18 ~~surance program’ includes any activity carried~~
 19 ~~out by or for the Administration to assess the~~
 20 ~~quality of medical care provided by the Admin-~~
 21 ~~istration.”.~~

22 (b) TECHNICAL AND CONFORMING AMENDMENT.—

23 The table of sections for chapter 313 of title 51, United
 24 States Code, is amended by adding at the end the fol-
 25 lowing:

 “31303. Confidentiality of medical quality assurance records.”.

1 **TITLE VIII—MISCELLANEOUS**
 2 **PROVISIONS**

3 **SEC. 801. CONTRACTING AUTHORITY.**

4 Section 20113 of title 51, United States Code, is
 5 amended by adding at the end the following:

6 “(o) **CONTRACTING AUTHORITY.**—The Administra-
 7 tion—

8 “(1) may enter into an agreement with a pri-
 9 vate, commercial, or State government entity to pro-
 10 vide the entity with supplies, support, and services
 11 related to private, commercial, or State government
 12 space activities carried out at a property owned or
 13 operated by the Administration; and

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

17 “(A) the Administrator determines that
 18 the inclusion of such supplies, support, or serv-
 19 ices in such requirements—

20 “(i) is in the best interest of the Fed-
 21 eral Government;

22 “(ii) does not interfere with the re-
 23 quirements of the Administration; and

1 “(iii) does not compete with the com-
 2 mercial space activities of other such enti-
 3 ties; and

4 “(B) the Administration has full reimburs-
 5 able funding from the entity that requested
 6 supplies, support, and services prior to making
 7 any obligation for the delivery of such supplies;
 8 support, or services under an Administration
 9 procurement contract or any other agreement.”.

10 **SEC. 802. AUTHORITY FOR TRANSACTION PROTOTYPE**
 11 **PROJECTS AND FOLLOW-ON PRODUCTION**
 12 **CONTRACTS.**

13 Section 20113 of title 51, United States Code, as
 14 amended by section 801, is further amended by adding
 15 at the end the following:

16 “(p) TRANSACTION PROTOTYPE PROJECTS AND FOL-
 17 LOW-ON PRODUCTION CONTRACTS.—

18 “(1) IN GENERAL.—The Administration may
 19 enter into a transaction (other than a contract, co-
 20 operative agreement, or grant) to carry out a proto-
 21 type project that is directly relevant to enhancing
 22 the mission effectiveness of the Administration.

23 “(2) SUBSEQUENT AWARD OF FOLLOW-ON PRO-
 24 Duction CONTRACT.—A transaction entered into
 25 under this subsection for a prototype project may

1 provide for the subsequent award of a follow-on pro-
 2 duction contract to participants in the transaction.

3 ~~“(3) INCLUSION.—A transaction under this~~
 4 ~~subsection includes a project awarded to an indi-~~
 5 ~~vidual participant and to all individual projects~~
 6 ~~awarded to a consortium of United States industry~~
 7 ~~and academic institutions.~~

8 ~~“(4) DETERMINATION.—The authority of this~~
 9 ~~section may be exercised for a transaction for a pro-~~
 10 ~~totype project and any follow-on production contract,~~
 11 ~~upon a determination by the head of the contracting~~
 12 ~~activity, in accordance with Administration policies,~~
 13 ~~that—~~

14 ~~“(A) circumstances justify use of a trans-~~
 15 ~~action to provide an innovative business ar-~~
 16 ~~rangement that would not be feasible or appro-~~
 17 ~~priate under a contract; and~~

18 ~~“(B) the use of the authority of this sec-~~
 19 ~~tion is essential to promoting the success of the~~
 20 ~~prototype project.~~

21 ~~“(5) COMPETITIVE PROCEDURE.—~~

22 ~~“(A) IN GENERAL.—To the maximum ex-~~
 23 ~~tent practicable, the Administrator shall use~~
 24 ~~competitive procedures with respect to entering~~

1 into a transaction to carry out a prototype
2 project.

3 “(B) EXCEPTION.—Notwithstanding sec-
4 tion 2304 of title 10, United States Code, a fol-
5 low-on production contract may be awarded to
6 the participants in the prototype transaction
7 without the use of competitive procedures, if—

8 “(i) competitive procedures were used
9 for the selection of parties for participation
10 in the prototype transaction; and

11 “(ii) the participants in the trans-
12 action successfully completed the prototype
13 project provided for in the transaction.

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

20 “(7) PROCUREMENT ETHICS.—A transaction
21 under this authority shall be considered an agency
22 procurement for purposes of chapter 21 of title 41,
23 United States Code, with regard to procurement eth-
24 ics.”.

1 **SEC. 803. PROTECTION OF DATA AND INFORMATION FROM**
 2 **PUBLIC DISCLOSURE.**

3 (a) CERTAIN TECHNICAL DATA.—Section 20131 of
 4 title 51, United States Code, is amended—

5 (1) by redesignating subsection (e) as sub-
 6 section (d);

7 (2) in subsection (a)(3), by striking “subsection
 8 (b)” and inserting “subsection (b) or (c)”;

9 (3) by inserting after subsection (b) the fol-
 10 lowing:

11 “(c) SPECIAL HANDLING OF CERTAIN TECHNICAL
 12 DATA.—

13 “(1) IN GENERAL.—The Administrator may
 14 provide appropriate protections against the public
 15 dissemination of certain technical data, including ex-
 16 emption from subchapter II of chapter 5 of title 5.

17 “(2) DEFINITIONS.—In this subsection:

18 “(A) CERTAIN TECHNICAL DATA.—The
 19 term ‘certain technical data’ means technical
 20 data that may not be exported lawfully outside
 21 the United States without approval, authoriza-
 22 tion, or license under—

23 “(i) the Export Control Reform Act of
 24 2018 (Public Law 115–232, 132 Stat.
 25 2208); or

1 “(ii) the International Security Assist-
 2 ance and Arms Export Control Act of
 3 1976 (Public Law 94-329; 90 Stat. 729).

4 “(B) TECHNICAL DATA.—The term ‘tech-
 5 nical data’ means any blueprint, drawing, pho-
 6 tograph, plan, instruction, computer software,
 7 or documentation, or any other technical infor-
 8 mation.”;

9 (4) in subsection (d), as so redesignated, by in-
 10 serting “, including any data,” after “information”;
 11 and

12 (5) by adding at the end the following:

13 “(e) EXCLUSION FROM FOIA.—This section shall be
 14 considered a statute described in subsection (b)(3)(B) of
 15 section 552 of title 5 (commonly referred to as the ‘Free-
 16 dom of Information Act’).”.

17 (b) CERTAIN VOLUNTARILY PROVIDED SAFETY-RE-
 18 LATED INFORMATION.—

19 (1) IN GENERAL.—The Administrator shall pro-
 20 vide appropriate safeguards against the public dis-
 21 semination of safety-related information collected as
 22 part of a mishap investigation carried out under the
 23 NASA safety reporting system or in conjunction
 24 with an organizational safety assessment, if the Ad-

1 administrator makes a written determination, including
 2 a justification of the determination, that—

3 ~~(A)(i)~~ disclosure of the information would
 4 inhibit individuals from voluntarily providing
 5 safety-related information; and

6 ~~(ii)~~ the ability of NASA to collect such in-
 7 formation improves the safety of NASA pro-
 8 grams and research relating to aeronautics and
 9 space; or

10 ~~(B)~~ withholding such information from
 11 public disclosure improves the safety of such
 12 NASA programs and research.

13 ~~(2)~~ OTHER FEDERAL AGENCIES.—Notwith-
 14 standing any other provision of law, if the Adminis-
 15 trator provides to the head of another Federal agen-
 16 cy safety-related information with respect to which
 17 the Administrator has made a determination under
 18 paragraph ~~(1)~~, the head of the Federal agency shall
 19 withhold the information from public disclosure.

20 ~~(3)~~ PUBLIC AVAILABILITY.—A determination
 21 under paragraph ~~(1)~~ shall be made available to the
 22 public on request, as required under section 552 of
 23 title 5, United States Code (commonly referred to as
 24 the “Freedom of Information Act”).

1 (4) ~~EXCLUSION FROM FOIA.~~—This subsection
 2 shall be considered a statute described in subsection
 3 ~~(b)(3)(B)~~ of section 552 of title 5, United States
 4 Code.

5 **SEC. 804. PHYSICAL SECURITY MODERNIZATION.**

6 Chapter 201 of title 51, United States Code, is
 7 amended—

8 (1) in section 20133(2), by striking “property”
 9 and all that follows through “to the United States,”
 10 and inserting “Administration personnel or of prop-
 11 erty owned or leased by, or under the control of, the
 12 United States”; and

13 (2) in section 20134, in the second sentence—

14 (A) by inserting “Administration personnel
 15 or any” after “protecting”; and

16 (B) by striking “, at facilities owned or
 17 contracted to the Administration”.

18 **SEC. 805. LEASE OF NON-EXCESS PROPERTY.**

19 Section 20145 of title 51, United States Code, is
 20 amended—

21 (1) in paragraph ~~(b)(1)(B)~~, by striking “en-
 22 tered into for the purpose of developing renewable
 23 energy production facilities”; and

24 (2) by striking subsection ~~(g)~~.

1 **SEC. 806. CYBERSECURITY.**

2 (a) **IN GENERAL.**—Section 20301 of title 51, United
3 States Code, is amended by adding at the end the fol-
4 lowing:

5 “(c) **CYBERSECURITY.**—The Administrator shall up-
6 date and improve the cybersecurity of NASA space assets
7 and supporting infrastructure.”.

8 (b) **SECURITY OPERATIONS CENTER.**—

9 (1) **ESTABLISHMENT.**—The Administrator shall
10 maintain a Security Operations Center, to identify
11 and respond to cybersecurity threats to NASA infor-
12 mation technology systems, including institutional
13 systems and mission systems.

14 (2) **INSPECTOR GENERAL RECOMMENDA-**
15 **TIONS.**—The Administrator shall implement, to the
16 maximum extent practicable, each of the rec-
17 ommendations contained in the report of the Inspec-
18 tor General of NASA entitled “Audit of NASA’s Se-
19 curity Operations Center”, issued on May 23, 2018.

20 (c) **CYBER THREAT HUNT.**—

21 (1) **IN GENERAL.**—The Administrator, in co-
22 ordination with the Secretary of Homeland Security
23 and the heads of other relevant Federal agencies,
24 may implement a cyber threat hunt capability to
25 proactively search NASA information systems for

1 advanced cyber threats that otherwise evade existing
2 security tools.

3 ~~(2) THREAT-HUNTING PROCESS.—~~In carrying
4 out paragraph (1), the Administrator shall develop
5 and document a threat-hunting process, including
6 the roles and responsibilities of individuals con-
7 ducting a cyber threat hunt.

8 ~~(d) GAO PRIORITY RECOMMENDATIONS.—~~The Ad-
9 ministrator shall implement, to the maximum extent prac-
10 ticable, the recommendations for NASA contained in the
11 report of the Comptroller General of the United States
12 entitled “Information Security: Agencies Need to Improve
13 Controls over Selected High-Impact Systems”, issued May
14 18, 2016, including—

15 ~~(1) re-evaluating security control assessments;~~
16 and

17 ~~(2) specifying metrics for the continuous moni-~~
18 ~~toring strategy of the Administration.~~

19 **SEC. 807. LIMITATION ON COOPERATION WITH THE PEO-**
20 **PLE’S REPUBLIC OF CHINA.**

21 ~~(a) IN GENERAL.—~~Except as provided by subsection
22 ~~(b),~~ the Administrator, the Director of the Office of
23 Science and Technology Policy, and the Chair of the Na-
24 tional Space Council, shall not—

1 ~~(1)~~ develop, design, plan, promulgate, imple-
 2 ment, or execute a bilateral policy, program, order,
 3 or contract of any kind to participate, collaborate, or
 4 coordinate bilaterally in any manner with—

5 (A) the Government of the People's Repub-
 6 lie of China; or

7 (B) any company—

8 (i) owned by the Government of the
 9 People's Republic of China; or

10 (ii) incorporated under the laws of the
 11 People's Republic of China; and

12 ~~(2)~~ host official visitors from the People's Re-
 13 public of China at a facility belonging to or used by
 14 NASA.

15 ~~(b)~~ WAIVER.—

16 ~~(1)~~ IN GENERAL.—The Administrator, the Di-
 17 rector, or the Chair may waive the limitation under
 18 subsection (a) with respect to an activity described
 19 in that subsection only if the Administrator, the Di-
 20 rector, or the Chair, as applicable, makes a deter-
 21 mination that the activity—

22 (A) does not pose a risk of a transfer of
 23 technology, data, or other information with na-
 24 tional security or economic security implications

to an entity described in paragraph (1) of such subsection; and

(B) does not involve knowing interactions with officials who have been determined by the United States to have direct involvement with violations of human rights.

(2) CERTIFICATION TO CONGRESS.—Not later than 30 days after the date on which a waiver is granted under paragraph (1), the Administrator, the Director, or the Chair, as applicable, shall submit to the Committee on Commerce, Science, and Transportation and the Committee on Appropriations of the Senate and the Committee on Science, Space, and Technology and the Committee on Appropriations of the House of Representatives a written certification that the activity complies with the requirements in subparagraphs (A) and (B) of that paragraph.

SEC. 808. SMALL SATELLITE LAUNCH SERVICES PROGRAM.

(a) IN GENERAL.—The Administrator shall continue to procure dedicated launch services for small satellites, including CubeSats, for the purpose of conducting science and technology missions that further the goals of NASA.

(b) REQUIREMENTS.—In carrying out the program under subsection (a), the Administrator shall—

1 (1) engage with the academic community to
2 maximize awareness and use of dedicated small sat-
3 ellite launch opportunities; and

4 (2) to the maximum extent practicable, use a
5 secondary payload of procured launch services for
6 CubeSats.

7 **SEC. 809. 21ST CENTURY SPACE LAUNCH INFRASTRUC-**
8 **TURE.**

9 (a) IN GENERAL.—The Administrator shall carry out
10 a program to modernize launch infrastructure at NASA
11 facilities—

12 (1) to enhance safety; and

13 (2) to advance Government and commercial
14 space transportation and exploration.

15 (b) PROJECTS.—Projects funded under the program
16 under subsection (a) may include—

17 (1) infrastructure relating to commodities;

18 (2) standard interfaces to meet customer needs
19 for multiple payload processing and launch vehicle
20 processing;

21 (3) enhancements to range capacity and flexi-
22 bility; and

23 (4) such other projects as the Administrator
24 considers appropriate to meet the goals described in
25 subsection (a).

1 (c) **REQUIREMENTS.**—In carrying out the program
2 under subsection (a), the Administrator shall—

3 (1) ~~prioritize investments in projects that can~~
4 ~~be used by multiple users and launch vehicles, in-~~
5 ~~cluding non-NASA users and launch vehicles; and~~

6 (2) ~~limit investments to projects that would not~~
7 ~~otherwise be funded by a NASA program, such as~~
8 ~~an institutional or programmatic infrastructure pro-~~
9 ~~gram.~~

10 (d) **SAVINGS CLAUSE.**—Nothing in this section shall
11 preclude a NASA program, including the Space Launch
12 System and Orion, from using the launch infrastructure
13 modernized under this section.

14 **SEC. 810. MISSIONS OF NATIONAL NEED.**

15 (a) **SENSE OF CONGRESS.**—It is the Sense of Con-
16 gress that—

17 (1) while certain space missions, such as aster-
18 oid detection or space debris mitigation missions,
19 may not provide the highest-value science, as deter-
20 mined by the National Academies of Science, Engi-
21 neering, and Medicine decadal surveys, such mis-
22 sions provide tremendous value to the United States
23 and the world; and

1 (2) the current organizational and funding
2 structure of NASA has not prioritized the funding
3 of missions of national need.

4 (b) STUDY.—

5 (1) IN GENERAL.—The Director of the Office of
6 Science and Technology Policy shall conduct a study
7 on the manner in which NASA funds missions of na-
8 tional need.

9 (2) MATTERS TO BE INCLUDED.—The study
10 conducted under paragraph (1) shall include the fol-
11 lowing:

12 (A) An identification and assessment of
13 the types of missions or technology development
14 programs that constitute missions of national
15 need.

16 (B) An assessment of the manner in which
17 such missions are currently funded and man-
18 aged by NASA.

19 (C) An analysis of the options for funding
20 missions of national need, including—

21 (i) structural changes required to
22 allow NASA to fund such missions; and

23 (ii) an assessment of the capacity of
24 other Federal agencies to make funds
25 available for such missions.

1 (c) ~~REPORT TO CONGRESS.~~—Not later than 1 year
 2 after the date of the enactment of this Act, the Director
 3 of the Office of Science and Technology Policy shall sub-
 4 mit to the appropriate committees of Congress a report
 5 on the results of the study conducted under subsection (b),
 6 including recommendations for funding missions of na-
 7 tional need.

8 **SEC. 811. EXEMPTION FROM THE IRAN, NORTH KOREA, AND**
 9 **SYRIA NONPROLIFERATION ACT.**

10 Section 7(1) of the Iran, North Korea, and Syria
 11 Nonproliferation Act (Public Law 106–178; 50 U.S.C.
 12 1701 note) is amended, in the undesignated matter fol-
 13 lowing subparagraph (B), by striking “December 31,
 14 2020” and inserting “December 31, 2030”.

15 **SEC. 812. DRINKING WATER WELL REPLACEMENT FOR**
 16 **CHINCOTEAGUE, VIRGINIA.**

17 Notwithstanding any other provision of law, during
 18 the 5-year period beginning on the date of the enactment
 19 of this Act, the Administrator may enter into 1 or more
 20 agreements with the town of Chincoteague, Virginia, to
 21 reimburse the town for costs that are directly associated
 22 with—

23 (1) the removal of drinking water wells located
 24 on property administered by the Administration; and

1 (2) the relocation of such wells to property
2 under the administrative control, through lease, own-
3 ership, or easement, of the town.

4 **SEC. 813. PASSENGER CARRIER USE.**

5 Section 1344(a)(2) of title 31, United States Code,
6 is amended—

7 (1) in subparagraph (A), by striking “or” at
8 the end;

9 (2) in subparagraph (B), by inserting “or”
10 after the comma at the end; and

11 (3) by inserting after subparagraph (B) the fol-
12 lowing:

13 “(C) necessary for post-flight transportation of
14 United States Government astronauts subject to re-
15 imbursable arrangements returning from space for
16 the performance of medical research, monitoring, di-
17 agnosis, or treatment, or other official duties, prior
18 to receiving post-flight medical clearance to operate
19 a motor vehicle.”.

20 **SEC. 814. SBIR PHASE FLEXIBILITY FOR THE NATIONAL**
21 **AERONAUTICS AND SPACE ADMINISTRATION.**

22 Section 9(cc) of the Small Business Act (15 U.S.C.
23 638(cc)) is amended by inserting “the National Aero-
24 nautics and Space Administration,” after “through
25 2022,”.

1 **SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

2 (a) *SHORT TITLE*.—*This Act may be cited as the “Na-*
 3 *tional Aeronautics and Space Administration Authoriza-*
 4 *tion Act of 2019”.*

5 (b) *TABLE OF CONTENTS*.—*The table of contents of this*
 6 *Act is as follows:*

Sec. 1. Short title; table of contents.

Sec. 2. Definitions.

TITLE I—AUTHORIZATION OF APPROPRIATIONS

Sec. 101. Authorization of appropriations.

TITLE II—HUMAN SPACEFLIGHT AND EXPLORATION

Sec. 201. Advanced cislunar and lunar surface capabilities.

Sec. 202. Space launch system configurations.

Sec. 203. Advanced spacesuits.

Sec. 204. Life science and physical science research.

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

Sec. 206. Rocket engine test infrastructure.

Sec. 207. Indian River Bridge.

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

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

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

Sec. 211. Low-Earth orbit commercialization.

Sec. 212. Maintaining a national laboratory in space.

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

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

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

Sec. 216. Steppingstone approach to exploration.

Sec. 217. Technical amendments relating to Artemis missions.

TITLE III—SCIENCE

Sec. 301. Science priorities.

Sec. 302. Lunar discovery program.

Sec. 303. Search for life.

Sec. 304. James Webb Space Telescope.

Sec. 305. Wide-Field Infrared Survey Telescope.

Sec. 306. Satellite servicing for science missions.

Sec. 307. Earth science missions and programs.

Sec. 308. Science missions to Mars.

Sec. 309. Planetary Defense Coordination Office.

Sec. 310. Suborbital science flights.

Sec. 311. Earth science data and observations.

- Sec. 312. Sense of Congress on small satellite science.*
Sec. 313. Sense of Congress on commercial space services.
Sec. 314. Procedures for identifying and addressing alleged violations of scientific integrity policy.

TITLE IV—AERONAUTICS

- Sec. 401. Short title.*
Sec. 402. Definitions.
Sec. 403. Experimental aircraft projects.
Sec. 404. Unmanned aircraft systems.
Sec. 405. 21st Century Aeronautics Capabilities Initiative.
Sec. 406. Sense of Congress on on-demand air transportation.
Sec. 407. Sense of Congress on hypersonic technology research.

TITLE V—SPACE TECHNOLOGY

- Sec. 501. Space Technology Mission Directorate.*
Sec. 502. Flight opportunities program.
Sec. 503. Small Spacecraft Technology Program.
Sec. 504. Nuclear propulsion technology.
Sec. 505. Mars-forward technologies.
Sec. 506. Prioritization of low-enriched uranium technology.
Sec. 507. Sense of Congress on next-generation communications technology.

TITLE VI—STEM ENGAGEMENT

- Sec. 601. Sense of Congress.*
Sec. 602. STEM education engagement activities.
Sec. 603. Skilled technical education outreach program.
Sec. 604. National space grant college and fellowship program.

TITLE VII—WORKFORCE AND INDUSTRIAL BASE

- Sec. 701. Appointment and compensation pilot program.*
Sec. 702. Establishment of multi-institution consortia and university-affiliated research centers.
Sec. 703. Expedited access to technical talent and expertise.
Sec. 704. Report on industrial base for civil space missions and operations.
Sec. 705. Separations and retirement incentives.
Sec. 706. Confidentiality of medical quality assurance records.

TITLE VIII—MISCELLANEOUS PROVISIONS

- Sec. 801. Contracting authority.*
Sec. 802. Authority for transaction prototype projects and follow-on production contracts.
Sec. 803. Protection of data and information from public disclosure.
Sec. 804. Physical security modernization.
Sec. 805. Lease of non-excess property.
Sec. 806. Cybersecurity.
Sec. 807. Limitation on cooperation with the People's Republic of China.
Sec. 808. Consideration of issues related to contracting with entities receiving assistance from or affiliated with the People's Republic of China.
Sec. 809. Small satellite launch services program.
Sec. 810. 21st century space launch infrastructure.
Sec. 811. Missions of national need.

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

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

Sec. 814. Passenger carrier use.

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

Sec. 816. President's Space Advisory Board.

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

Sec. 818. Remediation of sites contaminated with trichloroethylene.

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

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

Sec. 821. Review on preference for domestic suppliers.

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

Sec. 823. Active orbital debris mitigation.

Sec. 824. Study on commercial communications services.

1 **SEC. 2. DEFINITIONS.**

2 *In this Act:*

3 (1) *ADMINISTRATION.*—*The term “Administra-*
 4 *tion” means the National Aeronautics and Space Ad-*
 5 *ministration.*

6 (2) *ADMINISTRATOR.*—*The term “Adminis-*
 7 *trator” means the Administrator of the National Aer-*
 8 *onautics and Space Administration.*

9 (3) *APPROPRIATE COMMITTEES OF CONGRESS.*—
 10 *Except as otherwise expressly provided, the term “ap-*
 11 *propriate committees of Congress” means—*

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

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

16 (4) *CISLUNAR SPACE.*—*The term “cislunar*
 17 *space” means the region of space beyond low-Earth*

1 orbit out to and including the region around the sur-
 2 face of the Moon.

3 (5) *DEEP SPACE*.—The term “deep space” means
 4 the region of space beyond low-Earth orbit, including
 5 cislunar space.

6 (6) *DEVELOPMENT COST*.—The term “develop-
 7 ment cost” has the meaning given the term in section
 8 30104 of title 51, United States Code.

9 (7) *ISS*.—The term “ISS” means the Inter-
 10 national Space Station.

11 (8) *ISS MANAGEMENT ENTITY*.—The term “ISS
 12 management entity” means the organization with
 13 which the Administrator has entered into a coopera-
 14 tive agreement under section 504(a) of the National
 15 Aeronautics and Space Administration Authorization
 16 Act of 2010 (42 U.S.C. 18354(a)).

17 (9) *NASA*.—The term “NASA” means the Na-
 18 tional Aeronautics and Space Administration.

19 (10) *ORION*.—The term “Orion” means the mul-
 20 tipurpose crew vehicle described in section 303 of the
 21 National Aeronautics and Space Administration Au-
 22 thorization Act of 2010 (42 U.S.C. 18323).

23 (11) *OSTP*.—The term “OSTP” means the Of-
 24 fice of Science and Technology Policy.

1 (12) *SPACE LAUNCH SYSTEM.*—*The term “Space*
 2 *Launch System” means the Space Launch System*
 3 *authorized under section 302 of the National Aero-*
 4 *nautics and Space Administration Act of 2010 (42*
 5 *U.S.C. 18322).*

6 ***TITLE I—AUTHORIZATION OF***
 7 ***APPROPRIATIONS***

8 ***SEC. 101. AUTHORIZATION OF APPROPRIATIONS.***

9 *There are authorized to be appropriated to the Admin-*
 10 *istration for fiscal year 2020 \$22,750,000,000 as follows:*

11 (1) *For Exploration, \$6,222,600,000.*

12 (2) *For Space Operations, \$4,150,200,000.*

13 (3) *For Science, \$6,905,700,000.*

14 (4) *For Aeronautics, \$783,900,000.*

15 (5) *For Space Technology, \$1,076,400,000.*

16 (6) *For Science, Technology, Engineering, and*
 17 *Mathematics Engagement, \$112,000,000.*

18 (7) *For Safety, Security, and Mission Services,*
 19 *\$2,934,800,000.*

20 (8) *For Construction and Environmental Com-*
 21 *pliance and Restoration, \$524,400,000.*

22 (9) *For Inspector General, \$40,000,000.*

1 ***TITLE II—HUMAN SPACEFLIGHT***
 2 ***AND EXPLORATION***

3 ***SEC. 201. ADVANCED CISLUNAR AND LUNAR SURFACE CA-***
 4 ***PABILITIES.***

5 *(a) SENSE OF CONGRESS.—It is the sense of Congress*
 6 *that—*

7 *(1) commercial entities in the United States have*
 8 *made significant investment and progress toward the*
 9 *development of human-class lunar landers;*

10 *(2) NASA developed the Artemis program—*

11 *(A) to fulfill the goal of landing United*
 12 *States astronauts, including the first woman and*
 13 *the next man, on the Moon; and*

14 *(B) to collaborate with commercial and*
 15 *international partners to establish sustainable*
 16 *lunar exploration by 2028; and*

17 *(3) in carrying out the Artemis program, the*
 18 *Administration should ensure that the entire Artemis*
 19 *program is inclusive and representative of all people*
 20 *of the United States, including women and minori-*
 21 *ties.*

22 *(b) LANDER PROGRAM.—*

23 *(1) IN GENERAL.—The Administrator shall foster*
 24 *the flight demonstration of not more than 2 human-*

1 *class lunar lander designs through public-private*
 2 *partnerships.*

3 (2) *INITIAL DEVELOPMENT PHASE.—The Admin-*
 4 *istrator may support the formulation of more than 2*
 5 *concepts in the initial development phase.*

6 (c) *REQUIREMENTS.—In carrying out the program*
 7 *under subsection (b), the Administrator shall—*

8 (1) *enter into industry-led partnerships using a*
 9 *fixed-price, milestone-based approach;*

10 (2) *to the maximum extent practicable, encour-*
 11 *age reusability and sustainability of systems devel-*
 12 *oped;*

13 (3) *ensure availability of 1 or more lunar polar*
 14 *science payloads for a demonstration mission; and*

15 (4) *to the maximum extent practicable, offer ex-*
 16 *isting capabilities and assets of NASA centers to sup-*
 17 *port these partnerships.*

18 **SEC. 202. SPACE LAUNCH SYSTEM CONFIGURATIONS.**

19 (a) *MOBILE LAUNCH PLATFORM.—The Administrator*
 20 *is authorized to maintain 2 operational mobile launch plat-*
 21 *forms to enable the launch of multiple configurations of the*
 22 *Space Launch System.*

23 (b) *EXPLORATION UPPER STAGE.—To meet the capa-*
 24 *bility requirements under section 302(c)(2) of the National*
 25 *Aeronautics and Space Administration Authorization Act*

1 of 2010 (42 U.S.C. 18322(c)(2)), the Administrator shall
2 continue development of the Exploration Upper Stage for
3 the Space Launch System with a scheduled availability suf-
4 ficient for use on the third launch of the Space Launch Sys-
5 tem.

6 (c) *BRIEFING*.—Not later than 90 days after the date
7 of the enactment of this Act, the Administrator shall brief
8 the appropriate committees of Congress on the development
9 and scheduled availability of the Exploration Upper Stage
10 for the third launch of the Space Launch System.

11 (d) *MAIN PROPULSION TEST ARTICLE*.—To meet the
12 requirements under section 302(c)(3) of the National Aero-
13 nautics and Space Administration Authorization Act of
14 2010 (42 U.S.C. 18322(c)(3)), the Administrator shall—

15 (1) immediately on completion of the first full-
16 duration integrated core stage test of the Space
17 Launch System, initiate development of a main pro-
18 pulsion test article for the integrated core stage pro-
19 pulsion elements of the Space Launch System;

20 (2) not later than 180 days after the date of the
21 enactment of this Act, submit to the appropriate com-
22 mittees of Congress a detailed plan for the develop-
23 ment and operation of such main propulsion test ar-
24 ticle; and

1 (3) *use existing capabilities of NASA centers for*
2 *the design, manufacture, and operation of the main*
3 *propulsion test article.*

4 **SEC. 203. ADVANCED SPACESUITS.**

5 (a) *SENSE OF CONGRESS.—It is the sense of Congress*
6 *that next-generation advanced spacesuits are a critical tech-*
7 *nology for human space exploration and use of low-Earth*
8 *orbit, cislunar space, the surface of the Moon, and Mars.*
9 (b) *DEVELOPMENT PLAN.—The Administrator shall*
10 *establish a detailed plan for the development and manufac-*
11 *ture of advanced spacesuits, consistent with the deep space*
12 *exploration goals and timetables of NASA.*

13 (c) *DIVERSE ASTRONAUT CORPS.—The Administrator*
14 *shall ensure that spacesuits developed and manufactured*
15 *after the date of the enactment of this Act are capable of*
16 *accommodating a wide range of sizes of astronauts so as*
17 *to meet the needs of the diverse NASA astronaut corps.*

18 (d) *ISS USE.—Throughout the operational life of the*
19 *ISS, the Administrator should fully use the ISS for testing*
20 *advanced spacesuits.*

21 (e) *PRIOR INVESTMENTS.—*

22 (1) *IN GENERAL.—In developing an advanced*
23 *spacesuit, the Administrator shall, to the maximum*
24 *extent practicable, partner with industry-proven*
25 *spacesuit design, development, and manufacturing*

1 *suppliers and leverage prior and existing investments*
 2 *in advanced spacesuit technologies to maximize the*
 3 *benefits of such investments and technologies.*

4 (2) *AGREEMENTS WITH PRIVATE ENTITIES.—In*
 5 *carrying out this subsection, the Administrator may*
 6 *enter into 1 or more agreements with 1 or more pri-*
 7 *vate entities for the manufacture of advanced*
 8 *spacesuits, as the Administrator considers appro-*
 9 *priate.*

10 (f) *BRIEFING.—Not later than 180 days after the date*
 11 *of the enactment of this Act, and semiannually thereafter*
 12 *until NASA procures advanced spacesuits under this sec-*
 13 *tion, the Administrator shall brief the appropriate commit-*
 14 *tees of Congress on the development plan in subsection (b).*

15 **SEC. 204. LIFE SCIENCE AND PHYSICAL SCIENCE RE-**
 16 **SEARCH.**

17 (a) *SENSE OF CONGRESS.—It is the sense of Congress*
 18 *that—*

19 (1) *the 2011 decadal survey on biological and*
 20 *physical sciences in space identifies—*

21 (A) *many areas in which fundamental sci-*
 22 *entific research is needed to efficiently advance*
 23 *the range of human activities in space, from the*
 24 *first stages of exploration to eventual economic*
 25 *development; and*

1 (B) many areas of basic and applied sci-
 2 entific research that could use the microgravity,
 3 radiation, and other aspects of the spaceflight en-
 4 vironment to answer fundamental scientific ques-
 5 tions;

6 (2) given the central role of life science and phys-
 7 ical science research in developing the future of space
 8 exploration, NASA should continue to invest strategi-
 9 cally in such research to maintain United States
 10 leadership in space exploration; and

11 (3) such research remains important to the objec-
 12 tives of NASA with respect to long-duration deep
 13 space human exploration to the Moon and Mars.

14 (b) PROGRAM CONTINUATION.—

15 (1) IN GENERAL.—In support of the goals de-
 16 scribed in section 20302 of title 51, United States
 17 Code, the Administrator shall continue to implement
 18 a collaborative, multidisciplinary life science and
 19 physical science fundamental research program—

20 (A) to build a scientific foundation for the
 21 exploration and development of space;

22 (B) to investigate the mechanisms of
 23 changes to biological systems and physical sys-
 24 tems, and the environments of those systems in
 25 space, including the effects of long-duration expo-

1 *sure to deep space-related environmental factors*
 2 *on those systems;*

3 *(C) to understand the effects of combined*
 4 *deep space radiation and altered gravity levels*
 5 *on biological systems so as to inform the develop-*
 6 *ment and testing of potential countermeasures;*

7 *(D) to understand physical phenomena in*
 8 *reduced gravity that affect design and perform-*
 9 *ance of enabling technologies necessary for the*
 10 *space exploration program;*

11 *(E) to provide scientific opportunities to*
 12 *educate, train, and develop the next generation of*
 13 *researchers and engineers; and*

14 *(F) to provide state-of-the-art data reposi-*
 15 *tories and curation of large multi-data sets to*
 16 *enable comparative research analyses.*

17 *(2) ELEMENTS.—The program under paragraph*
 18 *(1) shall—*

19 *(A) include fundamental research relating*
 20 *to life science, space bioscience, and physical*
 21 *science; and*

22 *(B) maximize intra-agency and interagency*
 23 *partnerships to advance space exploration, sci-*
 24 *entific knowledge, and benefits to Earth.*

1 (3) *USE OF FACILITIES.*—*In carrying out the*
 2 *program under paragraph (1), the Administrator*
 3 *may use ground-based, air-based, and space-based fa-*
 4 *cilities in low-Earth orbit and beyond low-Earth*
 5 *orbit.*

6 **SEC. 205. ACQUISITION OF DOMESTIC SPACE TRANSPOR-**
 7 **TATION AND LOGISTICS RESUPPLY SERVICES.**

8 (a) *IN GENERAL.*—*Except as provided in subsection*
 9 *(b), the Administrator shall not enter into any contract*
 10 *with a person or entity that proposes to use, or will use,*
 11 *a foreign launch provider for a commercial service to pro-*
 12 *vide space transportation or logistics resupply for—*

13 (1) *the ISS; or*

14 (2) *any Government-owned or Government-fund-*
 15 *ed platform in Earth orbit or cislunar space, on the*
 16 *lunar surface, or elsewhere in space.*

17 (b) *EXCEPTION.*—*The Administrator may enter into*
 18 *a contract with a person or entity that proposes to use, or*
 19 *will use, a foreign launch provider for a commercial service*
 20 *to carry out an activity described in subsection (a) if a*
 21 *domestic vehicle or service is unavailable.*

22 (c) *RULE OF CONSTRUCTION.*—*Nothing in this section*
 23 *shall be construed to prohibit the Administrator from enter-*
 24 *ing into 1 or more no-exchange-of-funds collaborative agree-*

1 *ments with an international partner in support of the deep*
 2 *space exploration plan of NASA.*

3 **SEC. 206. ROCKET ENGINE TEST INFRASTRUCTURE.**

4 *(a) IN GENERAL.—The Administrator shall carry out*
 5 *a program to modernize rocket propulsion test infrastruc-*
 6 *ture at NASA facilities—*

7 *(1) to increase capabilities;*

8 *(2) to enhance safety;*

9 *(3) to support propulsion development and test-*
 10 *ing; and*

11 *(4) to foster the improvement of Government and*
 12 *commercial space transportation and exploration.*

13 *(b) PROJECTS.—Projects funded under the program*
 14 *under subsection (a) may include—*

15 *(1) infrastructure and other facilities and sys-*
 16 *tems relating to rocket propulsion test stands and*
 17 *rocket propulsion testing;*

18 *(2) enhancements to test facility capacity and*
 19 *flexibility; and*

20 *(3) such other projects as the Administrator con-*
 21 *siders appropriate to meet the goals described in sub-*
 22 *section (a).*

23 *(c) REQUIREMENTS.—In carrying out the program*
 24 *under subsection (a), the Administrator shall—*

1 (1) *prioritize investments in projects that en-*
 2 *hance test and flight certification capabilities for*
 3 *large thrust-level atmospheric and altitude engines*
 4 *and engine systems, and multi-engine integrated test*
 5 *capabilities; and*

6 (2) *ensure that no project carried out under this*
 7 *program shall adversely impact, delay, or defer test-*
 8 *ing or other activities associated with facilities used*
 9 *for Government programs, including—*

10 (A) *the Space Launch System and the Ex-*
 11 *ploration Upper Stage of the Space Launch Sys-*
 12 *tem;*

13 (B) *in-space propulsion to support explo-*
 14 *ration missions; or*

15 (C) *nuclear propulsion testing.*

16 (d) *SAVINGS CLAUSE.—Nothing in this section shall*
 17 *preclude a NASA program, including the Space Launch*
 18 *System and the Exploration Upper Stage of the Space*
 19 *Launch System, from using the modernized test infrastruc-*
 20 *ture developed under this section.*

21 **SEC. 207. INDIAN RIVER BRIDGE.**

22 (a) *IN GENERAL.—The Administrator, in coordination*
 23 *with the heads of other Federal agencies that use the Indian*
 24 *River Bridge on the NASA Causeway, shall develop a plan*
 25 *to ensure that a bridge over the Indian River at such loca-*

1 *tion provides access to the Eastern Range for national secu-*
 2 *rity, civil, and commercial space operations.*

3 *(b) FEE OR TOLL DISCOURAGED.—The plan shall*
 4 *strongly discourage the imposition of a user fee or toll on*
 5 *a bridge over the Indian River at such location.*

6 **SEC. 208. VALUE OF INTERNATIONAL SPACE STATION AND**
 7 **CAPABILITIES IN LOW-EARTH ORBIT.**

8 *(a) SENSE OF CONGRESS.—It is the sense of Congress*
 9 *that—*

10 *(1) it is in the national and economic security*
 11 *interests of the United States to maintain a contin-*
 12 *uous human presence in low-Earth orbit;*

13 *(2) low-Earth orbit should be used as a test bed*
 14 *to advance human space exploration and scientific*
 15 *discoveries; and*

16 *(3) the ISS is a critical component of economic,*
 17 *commercial, and industrial development in low-Earth*
 18 *orbit.*

19 *(b) HUMAN PRESENCE REQUIREMENT.—The United*
 20 *States shall continuously maintain the capability for a con-*
 21 *tinuous human presence in low-Earth orbit through and be-*
 22 *yond the useful life of the ISS.*

1 **SEC. 209. EXTENSION AND MODIFICATION RELATING TO**
 2 **INTERNATIONAL SPACE STATION.**

3 (a) *POLICY.*—Section 501(a) of the National Aero-
 4 nautics and Space Administration Authorization Act of
 5 2010 (42 U.S.C. 18351(a)) is amended by striking “2024”
 6 and inserting “2030”.

7 (b) *MAINTENANCE OF UNITED STATES SEGMENT AND*
 8 *ASSURANCE OF CONTINUED OPERATIONS.*—Section 503(a)
 9 of the National Aeronautics and Space Administration Au-
 10 thorization Act of 2010 (42 U.S.C. 18353(a)) is amended
 11 by striking “September 30, 2024” and inserting “September
 12 30, 2030”.

13 (c) *RESEARCH CAPACITY ALLOCATION AND INTEGRA-*
 14 *TION OF RESEARCH PAYLOADS.*—Section 504(d) of the Na-
 15 tional Aeronautics and Space Administration Authoriza-
 16 tion Act of 2010 (42 U.S.C. 18354(d)) is amended—

17 (1) in paragraph (1), in the first sentence—

18 (A) by striking “As soon as practicable”
 19 and all that follows through “2011,” and insert-
 20 ing “The”; and

21 (B) by striking “September 30, 2024” and
 22 inserting “September 30, 2030”; and

23 (2) in paragraph (2), in the third sentence, by
 24 striking “September 30, 2024” and inserting “Sep-
 25 tember 30, 2030”.

26 (d) *MAINTENANCE OF USE.*—

1 (1) *IN GENERAL.*—Section 70907 of title 51,
2 *United States Code*, is amended—

3 (A) in the section heading, by striking
4 “**2024**” and inserting “**2030**”;

5 (B) in subsection (a), by striking “Sep-
6 tember 30, 2024” and inserting “September 30,
7 2030”; and

8 (C) in subsection (b)(3), by striking “Sep-
9 tember 30, 2024” and inserting “September 30,
10 2030”.

11 (e) *TRANSITION PLAN REPORTS.*—Section 50111(c)(2)
12 *of title 51, United States Code* is amended—

13 (1) in the matter preceding subparagraph (A),
14 by striking “2023” and inserting “2028”; and

15 (2) in subparagraph (J), by striking “2028” and
16 inserting “2030”.

17 (f) *ELIMINATION OF INTERNATIONAL SPACE STATION*
18 *NATIONAL LABORATORY ADVISORY COMMITTEE.*—Section
19 70906 of title 51, *United States Code*, is repealed.

20 (g) *CONFORMING AMENDMENTS.*—Chapter 709 of title
21 51, *United States Code*, is amended—

22 (1) by redesignating section 70907 as section
23 70906; and

1 (2) *in the table of sections for the chapter, by*
 2 *striking the items relating to sections 70906 and*
 3 *70907 and inserting the following:*

“70906. Maintaining use through at least 2030.”.

4 **SEC. 210. DEPARTMENT OF DEFENSE ACTIVITIES ON INTER-**
 5 **NATIONAL SPACE STATION.**

6 (a) *IN GENERAL.*—*Not later than March 1, 2020, the*
 7 *Secretary of Defense shall—*

8 (1) *identify and review each activity, program,*
 9 *and project of the Department of Defense completed,*
 10 *being carried out, or planned to be carried out on the*
 11 *ISS as of the date of the review; and*

12 (2) *provide to the appropriate committees of*
 13 *Congress a briefing that describes the results of the re-*
 14 *view.*

15 (b) *APPROPRIATE COMMITTEES OF CONGRESS DE-*
 16 *FINED.*—*In this section, the term “appropriate committees*
 17 *of Congress” means—*

18 (1) *the Committee on Armed Services and the*
 19 *Committee on Commerce, Science, and Transpor-*
 20 *tation of the Senate; and*

21 (2) *the Committee on Armed Services and the*
 22 *Committee on Science, Space, and Technology of the*
 23 *House of Representatives.*

1 **SEC. 211. LOW-EARTH ORBIT COMMERCIALIZATION.**

2 (a) *STATEMENT OF POLICY.*—*It is the policy of the*
3 *United States to encourage the development of a thriving*
4 *and robust United States commercial sector in low-Earth*
5 *orbit.*

6 (b) *PREFERENCE FOR UNITED STATES COMMERCIAL*
7 *PRODUCTS AND SERVICES.*—*The Administrator shall con-*
8 *tinue to increase the use of assets, products, and services*
9 *of private entities in the United States to fulfill the low-*
10 *Earth orbit requirements of the Administration.*

11 (c) *NONCOMPETITION.*—

12 (1) *IN GENERAL.*—*Except as provided in para-*
13 *graph (2), the Administrator may not offer to a for-*
14 *ign person or a foreign government a spaceflight*
15 *product or service relating to the ISS, if a com-*
16 *parable spaceflight product or service, as applicable,*
17 *is offered by a private entity in the United States.*

18 (2) *EXCEPTION.*—*The Administrator may offer a*
19 *spaceflight product or service relating to the ISS to*
20 *the government of a country that is a signatory to the*
21 *Agreement Among the Government of Canada, Gov-*
22 *ernments of Member States of the European Space*
23 *Agency, the Government of Japan, the Government of*
24 *the Russian Federation, and the Government of the*
25 *United States of America Concerning Cooperation on*
26 *the Civil International Space Station, signed at*

1 *Washington January 29, 1998, and entered into force*
 2 *on March 27, 2001 (TIAS 12927).*

3 *(d) SHORT-DURATION COMMERCIAL MISSIONS.—To*
 4 *provide opportunities for additional transport of astronauts*
 5 *to the ISS and help establish a commercial market in low-*
 6 *Earth orbit, the Administrator may permit short-duration*
 7 *missions to the ISS for commercial passengers.*

8 *(e) PROGRAM AUTHORIZATION.—*

9 *(1) ESTABLISHMENT.—The Administrator shall*
 10 *establish a low-Earth orbit commercialization pro-*
 11 *gram to encourage the fullest commercial use and de-*
 12 *velopment of space by private entities in the United*
 13 *States.*

14 *(2) ELEMENTS.—The program established under*
 15 *paragraph (1) shall, to the maximum extent prac-*
 16 *ticable, include activities—*

17 *(A) to stimulate demand for—*

18 *(i) space-based commercial research,*
 19 *development, and manufacturing;*

20 *(ii) spaceflight products and services;*

21 *and*

22 *(iii) human spaceflight products and*
 23 *services in low-Earth orbit;*

24 *(B) to improve the capability of the ISS to*
 25 *accommodate commercial users; and*

1 (C) *subject to paragraph (3), to foster the*
2 *development of commercial space stations and*
3 *habitats.*

4 (3) *COMMERCIAL SPACE STATIONS AND HABI-*
5 *TATS.—*

6 (A) *PRIORITY.—With respect to an activity*
7 *to develop a commercial space station or habitat,*
8 *the Administrator shall give priority to an activ-*
9 *ity for which a private entity provides a share*
10 *of the cost to develop and operate the activity.*

11 (B) *LIMITATION.—The Administrator may*
12 *not provide funding for the development of a*
13 *commercial space station or habitat until after*
14 *the date on which the Administrator awards a*
15 *contract for the use of a docking port on the ISS.*

16 (C) *REPORT.—Not later than 30 days after*
17 *the date that an award or agreement is made to*
18 *carry out an activity to develop a commercial*
19 *space station or habitat, the Administrator shall*
20 *submit to the appropriate committees of Congress*
21 *a report on the development of the commercial*
22 *space station or habitat, as applicable, that in-*
23 *cludes—*

24 (i) *a business plan that describes the*
25 *manner in which the project will—*

1 (I) *meet the future requirements*
 2 *of NASA for low-Earth orbit human*
 3 *space-flight services; and*

4 (II) *fulfill the cost-share funding*
 5 *prioritization under subparagraph (A);*
 6 *and*

7 (ii) *a review of the viability of the*
 8 *operational business case, including—*

9 (I) *the level of expected Govern-*
 10 *ment participation;*

11 (II) *a list of anticipated non-*
 12 *governmental an international cus-*
 13 *tomers and associated contributions;*
 14 *and*

15 (III) *an assessment of long-term*
 16 *sustainability for the nongovernmental*
 17 *customers, including an independent*
 18 *assessment of the viability of the mar-*
 19 *ket for such commercial services or*
 20 *products.*

21 **SEC. 212. MAINTAINING A NATIONAL LABORATORY IN**
 22 **SPACE.**

23 (a) *SENSE OF CONGRESS.—It is the sense of Congress*
 24 *that—*

1 (1) *the United States segment of the Inter-*
2 *national Space Station (as defined in section 70905*
3 *of title 51, United States Code), which is designated*
4 *as a national laboratory under section 70905(b) of*
5 *title 51, United States Code—*

6 (A) *benefits the scientific community and*
7 *promotes commerce in space;*

8 (B) *fosters stronger relationships among*
9 *NASA and other Federal agencies, the private*
10 *sector, and research groups and universities;*

11 (C) *advances science, technology, engineer-*
12 *ing, and mathematics education through use of*
13 *the unique microgravity environment; and*

14 (D) *advances human knowledge and inter-*
15 *national cooperation;*

16 (2) *after the ISS is decommissioned, the United*
17 *States should maintain a national microgravity lab-*
18 *oratory in space;*

19 (3) *in maintaining a national microgravity lab-*
20 *oratory in space, the United States should make ap-*
21 *propriate accommodations for different types of own-*
22 *ership and operation arrangements for the ISS and*
23 *future space stations;*

24 (4) *to the maximum extent practicable, a na-*
25 *tional microgravity laboratory in space should be*

1 *maintained in cooperation with international space*
 2 *partners; and*

3 (5) *NASA should continue to support funda-*
 4 *mental science research on future platforms in low-*
 5 *Earth orbit and cislunar space, orbital and suborbital*
 6 *flights, drop towers, and other microgravity testing*
 7 *environments.*

8 (b) *REPORT.—The Administrator, in coordination*
 9 *with the National Space Council and other Federal agencies*
 10 *as the Administrator considers appropriate, shall issue a*
 11 *report detailing the feasibility of establishing a micro-*
 12 *gravity national laboratory federally funded research and*
 13 *development center to carry out activities relating to the*
 14 *study and use of in-space conditions.*

15 **SEC. 213. INTERNATIONAL SPACE STATION NATIONAL LAB-**
 16 **ORATORY; PROPERTY RIGHTS IN INVEN-**
 17 **TIONS.**

18 (a) *IN GENERAL.—Subchapter III of chapter 201 of*
 19 *title 51, United States Code, is amended by adding at the*
 20 *end the following:*

21 **“§ 20150. Property rights in designated inventions**

22 “(a) *EXCLUSIVE PROPERTY RIGHTS.—Notwith-*
 23 *standing section 3710a of title 15, chapter 18 of title 35,*
 24 *section 20135, or any other provision of law, a designated*

1 *invention shall be the exclusive property of a user, and shall*
 2 *not be subject to a Government-purpose license, if—*

3 “(1) *the Administration is reimbursed under the*
 4 *terms of the contract for the full cost of a contribution*
 5 *by the Federal Government of the use of Federal fa-*
 6 *cilities, equipment, materials, proprietary informa-*
 7 *tion of the Federal Government, or services of a Fed-*
 8 *eral employee during working hours, including the*
 9 *cost for the Administration to carry out its respon-*
 10 *sibilities under paragraphs (1) and (4) of section*
 11 *504(d) of the National Aeronautics and Space Ad-*
 12 *ministration Authorization Act of 2010 (42 U.S.C.*
 13 *18354(d));*

14 “(2) *Federal funds are not transferred to the user*
 15 *under the contract; and*

16 “(3) *the invention was made (as defined in sec-*
 17 *tion 20135(a))—*

18 “(A) *solely by the user; or*

19 “(B)(i) *by the user with the services of a*
 20 *Federal employee under the terms of the contract;*
 21 *and*

22 “(ii) *the Administration is reimbursed for*
 23 *such services under paragraph (1).*

24 “(b) *RULE OF CONSTRUCTION.—Nothing in this sec-*
 25 *tion may be construed to affect the rights of the Federal*

1 *Government, including property rights in inventions, under*
 2 *any contract, except in the case of a written contract with*
 3 *the Administration or the ISS management entity for the*
 4 *performance of a designated activity.*

5 “(c) *DEFINITIONS.—In this section—*

6 “(1) *CONTRACT.—The term ‘contract’ has the*
 7 *meaning giving the term in section 20135(a).*

8 “(2) *DESIGNATED ACTIVITY.—The term ‘des-*
 9 *ignated activity’ means any non-NASA scientific use*
 10 *of the ISS national laboratory as described in section*
 11 *504 of the National Aeronautics and Space Adminis-*
 12 *tration Authorization Act of 2010 (42 U.S.C. 18354).*

13 “(3) *DESIGNATED INVENTION.—The term ‘des-*
 14 *ignated invention’ means any invention conceived or*
 15 *first reduced to practice by any person in the per-*
 16 *formance of a designated activity under a written*
 17 *contract with the Administration or the ISS manage-*
 18 *ment entity.*

19 “(4) *GOVERNMENT-PURPOSE LICENSE.—The*
 20 *term ‘Government-purpose license’ means the reserva-*
 21 *tion by the Federal Government of an irrevocable,*
 22 *nonexclusive, nontransferable, royalty-free license for*
 23 *the use of an invention throughout the world by or on*
 24 *behalf of the United States or any foreign government*

1 *pursuant to a treaty or agreement with the United*
 2 *States.*

3 “(5) *ISS MANAGEMENT ENTITY.*—*The term ‘ISS*
 4 *management entity’ means the organization with*
 5 *which the Administrator enters into a cooperative*
 6 *agreement under section 504(a) of the National Aero-*
 7 *nautics and Space Administration Authorization Act*
 8 *of 2010 (42 U.S.C. 18354(a)).*

9 “(6) *USER.*—*The term ‘user’ means a person, in-*
 10 *cluding a nonprofit organization or small business*
 11 *firm (as such terms are defined in section 201 of title*
 12 *35), or class of persons that enters into a written con-*
 13 *tract with the Administration or the ISS manage-*
 14 *ment entity for the performance of designated activi-*
 15 *ties.”.*

16 (b) *CONFORMING AMENDMENT.*—*The table of sections*
 17 *for chapter 201 of title 51, United States Code, is amended*
 18 *by inserting after the item relating to section 20149 the fol-*
 19 *lowing:*

 “20150. *Property rights in designated inventions.*”.

20 **SEC. 214. DATA FIRST PRODUCED DURING NON-NASA SCI-**
 21 **ENTIFIC USE OF THE ISS NATIONAL LABORA-**
 22 **TORY.**

23 (a) *DATA RIGHTS.*—*Subchapter III of chapter 201 of*
 24 *title 51, United States Code, as amended by section 213,*
 25 *is further amended by adding at the end the following:*

1 **“§ 20151. Data rights**

2 “(a) *NON-NASA SCIENTIFIC USE OF THE ISS NA-*
 3 *TIONAL LABORATORY.*—*The Federal Government may not*
 4 *use or reproduce, or disclose outside of the Government, any*
 5 *data first produced in the performance of a designated ac-*
 6 *tivity under a written contract with the Administration or*
 7 *the ISS management entity, unless—*

8 “(1) *otherwise agreed under the terms of the con-*
 9 *tract with the Administration or the ISS manage-*
 10 *ment entity, as applicable;*

11 “(2) *the designated activity is carried out with*
 12 *Federal funds;*

13 “(3) *disclosure is required by law;*

14 “(4) *the Federal Government has rights in the*
 15 *data under another Federal contract, grant, coopera-*
 16 *tive agreement, or other transaction; or*

17 “(5) *the data is—*

18 “(A) *otherwise lawfully acquired or inde-*
 19 *pendently developed by the Federal Government;*

20 “(B) *related to the health and safety of per-*
 21 *sonnel on the ISS; or*

22 “(C) *essential to the performance of work by*
 23 *the ISS management entity or NASA personnel.*

24 “(b) *DEFINITIONS.*—*In this section:*

25 “(1) *CONTRACT.*—*The term ‘contract’ has the*
 26 *meaning given the term under section 20135(a).*

1 “(2) *DATA*.—

2 “(A) *IN GENERAL*.—*The term ‘data’ means*
 3 *recorded information, regardless of form or the*
 4 *media on which it may be recorded.*

5 “(B) *INCLUSIONS*.—*The term ‘data’ in-*
 6 *cludes technical data and computer software.*

7 “(C) *EXCLUSIONS*.—*The term ‘data’ does*
 8 *not include information incidental to contract*
 9 *administration, such as financial, administra-*
 10 *tive, cost or pricing, or management informa-*
 11 *tion.*

12 “(3) *DESIGNATED ACTIVITY*.—*The term ‘des-*
 13 *ignated activity’ has the meaning given the term in*
 14 *section 20150.*

15 “(4) *ISS MANAGEMENT ENTITY*.—*The term ‘ISS*
 16 *management entity’ has the meaning given the term*
 17 *in section 20150.”.*

18 (b) *SPECIAL HANDLING OF TRADE SECRETS OR CON-*
 19 *FIDENTIAL INFORMATION*.—*Section 20131(b)(2) of title 51,*
 20 *United States Code, is amended to read as follows:*

21 “(2) *INFORMATION DESCRIBED*.—

22 “(A) *ACTIVITIES UNDER AGREEMENT*.—*In-*
 23 *formation referred to in paragraph (1) is infor-*
 24 *mation that—*

1 “(i) results from activities conducted
2 under an agreement entered into under sub-
3 sections (e) and (f) of section 20113; and

4 “(ii) would be a trade secret or com-
5 mercial or financial information that is
6 privileged or confidential within the mean-
7 ing of section 552(b)(4) of title 5 if the in-
8 formation had been obtained from a non-
9 Federal party participating in such an
10 agreement.

11 “(B) CERTAIN DATA.—Information referred
12 to in paragraph (1) includes data (as defined in
13 section 20151) that—

14 “(i) was first produced by the Admin-
15 istration in the performance of any des-
16 ignated activity (as defined in section
17 20150); and

18 “(ii) would be a trade secret or com-
19 mercial or financial information that is
20 privileged or confidential within the mean-
21 ing of section 552(b)(4) of title 5 if the data
22 had been obtained from a non-Federal
23 party.”.

24 (c) CONFORMING AMENDMENT.—The table of sections
25 for chapter 201 of title 51, United States Code, as amended

1 *by section 213, is further amended by inserting after the*
 2 *item relating to section 20150 the following:*

“20151. Data rights.”.

3 **SEC. 215. ROYALTIES AND OTHER PAYMENTS RECEIVED**
 4 **FOR DESIGNATED ACTIVITIES.**

5 (a) *SENSE OF CONGRESS.—It is the sense of Congress*
 6 *that the Administrator should determine a threshold for*
 7 *which it may be appropriate for NASA to recoup the costs*
 8 *of supporting the creation of invention aboard the ISS,*
 9 *through the negotiation of royalties, similar to agreements*
 10 *made by other Federal agencies that support private sector*
 11 *innovation.*

12 (b) *IN GENERAL.—Subchapter III of chapter 201 of*
 13 *title 51, United States Code, as amended by sections 213*
 14 *and 214, is further amended by adding at the end the fol-*
 15 *lowing:*

16 **“§20152. Royalties and other payments received for**
 17 **designated activities**

18 *“(a) DESIGNATED INVENTIONS MADE WITH FEDERAL*
 19 *ASSISTANCE.—Notwithstanding any other provision of law,*
 20 *if the Administration, under the terms of a written contract*
 21 *for the performance of a designated activity, agrees to pro-*
 22 *vide, unreimbursed, the total cost of a contribution by the*
 23 *Federal Government of the use of Federal facilities, equip-*
 24 *ment, materials, proprietary information of the Federal*
 25 *Government, or services of a Federal employee during work-*

1 ing hours, including the cost for the Administration to
 2 carry out its responsibilities under paragraphs (1) and (4)
 3 of section 504(d) of the National Aeronautics and Space
 4 Administration Authorization Act of 2010 (42 U.S.C.
 5 18354(d)), the Administrator shall negotiate an agreement
 6 on the terms and rates of royalty payments with respect
 7 to an invention or class of inventions conceived or first re-
 8 duced to practice by any person or class of persons in the
 9 performance of such designated activities.

10 “(b) *LICENSING AND ASSIGNMENT OF INVENTIONS.*—
 11 Notwithstanding sections 3710a and 3710c of title 15 and
 12 any other provision of law, after payment in accordance
 13 with subsection (A)(i) of such section 3710c(a)(1)(A)(i) to
 14 the inventors who have directly assigned to the Federal Gov-
 15 ernment their interests in an invention under a written
 16 contract with the Administration or the ISS management
 17 entity for the performance of a designated activity, the bal-
 18 ance of any royalty or other payment received by the Ad-
 19 ministrator or the ISS management entity from licensing
 20 and assignment of such invention shall be paid by the Ad-
 21 ministrator or the ISS management entity, as applicable,
 22 to the Space Exploration Fund.

23 “(c) *SPACE EXPLORATION FUND.*—

24 “(1) *ESTABLISHMENT.*—There is established in
 25 the Treasury of the United States a fund, to be known

1 as the ‘Space Exploration Fund’ (referred to in this
2 subsection as the ‘Fund’), to be administered by the
3 Administrator.

4 “(2) *USE OF FUND.*—The Fund shall be avail-
5 able without fiscal year limitation and without fur-
6 ther appropriation to carry out space exploration ac-
7 tivities under section 20302.

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

10 “(A) amounts appropriated to the Fund;

11 “(B) fees and royalties collected by the Ad-
12 ministrator or the ISS management entity under
13 subsections (a) and (b); and

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

16 “(4) *RULE OF CONSTRUCTION.*—Amounts avail-
17 able to the Administrator under this subsection shall
18 be in addition to amounts otherwise made available
19 for the purpose described in paragraph (2).

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

22 “(c) *CONFORMING AMENDMENT.*—The table of sections
23 for chapter 201 of title 51, United States Code, as amended
24 by sections 213 and 214, is further amended by inserting
25 after the item relating to section 20151 the following:

“20152. *Royalties and other payments received for designated activities.*”.

1 **SEC. 216. STEPPINGSTONE APPROACH TO EXPLORATION.**

2 (a) *IN GENERAL.*—Section 70504 of title 51, United
3 States Code, is amended to read as follows:

4 **“§ 70504. Steppingstone approach to exploration**

5 “(a) *IN GENERAL.*—The Administrator, in sustainable
6 steps, may conduct missions to intermediate destinations,
7 such as the Moon, in accordance with section 20302(b), and
8 on a timetable determined by the availability of funding,
9 in order to achieve the objective of human exploration of
10 Mars specified in section 202(b)(5) of the National Aero-
11 nautics and Space Administration Authorization Act of
12 2010 (42 U.S.C. 18312(b)(5)), if the Administrator—

13 “(1) determines that each such mission dem-
14 onstrates or advances a technology or operational con-
15 cept that will enable human missions to Mars; and

16 “(2) incorporates each such mission into the
17 human exploration roadmap under section 432 of the
18 National Aeronautics and Space Administration
19 Transition Authorization Act of 2017 (Public Law
20 115–10; 51 U.S.C. 20302 note).

21 “(b) *CISLUNAR SPACE EXPLORATION ACTIVITIES.*—In
22 conducting a mission under subsection (a), the Adminis-
23 trator shall—

24 “(1) use a combination of launches of the Space
25 Launch System and space transportation services

1 *from United States commercial providers, as appro-*
2 *priate, for the mission;*

3 “(2) *plan for not fewer than 1 Space Launch*
4 *System launch annually beginning after the first suc-*
5 *cessful crewed launch of Orion on the Space Launch*
6 *System; and*

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

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

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

15 “(C) *can function as a point of departure,*
16 *return, or staging for Administration or non-*
17 *governmental or international partner missions*
18 *to multiple locations on the lunar surface or*
19 *other destinations.*

20 “(c) *COST-EFFECTIVENESS.—To maximize the cost-ef-*
21 *fectiveness of the long-term space exploration and utiliza-*
22 *tion activities of the United States, the Administrator shall*
23 *take all necessary steps, including engaging nongovern-*
24 *mental and international partners, to ensure that activities*
25 *in the Administration’s human space exploration program*

1 *are balanced in order to help meet the requirements of fu-*
2 *ture exploration and utilization activities leading to human*
3 *habitation on the surface of Mars.*

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

8 “(e) *INTERNATIONAL PARTICIPATION.*—To achieve the
9 *goal of successfully conducting a crewed mission to the sur-*
10 *face of Mars, the Administrator shall invite the partners*
11 *in the ISS program and other nations, as appropriate, to*
12 *participate in an international initiative under the leader-*
13 *ship of the United States.”.*

14 (b) *DEFINITION OF CISLUNAR SPACE.*—Section 10101
15 *of title 51, United States Code, is amended by adding at*
16 *the end the following:*

17 “(3) *CISLUNAR SPACE.*—The term ‘cislunar
18 *space’ means the region of space beyond low-Earth*
19 *orbit out to and including the region around the sur-*
20 *face of the Moon.”.*

21 (c) *TECHNICAL AND CONFORMING AMENDMENTS.*—
22 *Section 3 of the National Aeronautics and Space Adminis-*
23 *tration Authorization Act of 2010 (42 U.S.C. 18302) is*
24 *amended by striking paragraphs (2) and (3) and inserting*
25 *the following:*

1 “(2) *APPROPRIATE COMMITTEES OF CON-*
 2 *GRESS.—The term ‘appropriate committees of Con-*
 3 *gress’ means—*

4 “(A) *the Committee on Commerce, Science,*
 5 *and Transportation of the Senate; and*

6 “(B) *the Committee on Science, Space, and*
 7 *Technology of the House of Representatives.*

8 “(3) *CISLUNAR SPACE.—The term ‘cislunar*
 9 *space’ means the region of space beyond low-Earth*
 10 *orbit out to and including the region around the sur-*
 11 *face of the Moon.’.*

12 **SEC. 217. TECHNICAL AMENDMENTS RELATING TO ARTEMIS**
 13 **MISSIONS.**

14 (a) *Section 421 of the National Aeronautics and Space*
 15 *Administration Authorization Act of 2017 (Public Law*
 16 *115–10; 51 U.S.C. 20301 note) is amended—*

17 (1) *in subsection (c)(3)—*

18 (A) *by striking “EM–1” and inserting*
 19 *“Artemis 1”;*

20 (B) *by striking “EM–2” and inserting*
 21 *“Artemis 2”; and*

22 (C) *by striking “EM–3” and inserting*
 23 *“Artemis 3”; and*

24 (2) *in subsection (f)(3), by striking “EM–3” and*
 25 *inserting “Artemis 3”.*

1 (b) *Section 432(b) of the National Aeronautics and*
 2 *Space Administration Authorization Act of 2017 (Public*
 3 *Law 115–10; 51 U.S.C. 20302 note) is amended—*

4 (1) *in paragraph (3)(D)—*

5 (A) *by striking “EM–1” and inserting*
 6 *“Artemis 1”; and*

7 (B) *by striking “EM–2” and inserting*
 8 *“Artemis 2”; and*

9 (2) *in paragraph (4)(C), by striking “EM–3”*
 10 *and inserting “Artemis 3”.*

11 ***TITLE III—SCIENCE***

12 ***SEC. 301. SCIENCE PRIORITIES.***

13 (a) *SENSE OF CONGRESS ON SCIENCE PORTFOLIO.—*
 14 *Congress reaffirms the sense of Congress that—*

15 (1) *a balanced and adequately funded set of ac-*
 16 *tivities, consisting of research and analysis grant pro-*
 17 *grams, technology development, suborbital research*
 18 *activities, and small, medium, and large space mis-*
 19 *sions, contributes to a robust and productive science*
 20 *program and serves as a catalyst for innovation and*
 21 *discovery; and*

22 (2) *the Administrator should set science prior-*
 23 *ities by following the guidance provided by the sci-*
 24 *entific community through the decadal surveys of the*

1 *National Academies of Sciences, Engineering, and*
 2 *Medicine.*

3 (b) *NATIONAL ACADEMIES DECADAL SURVEYS.*—*Sec-*
 4 *tion 20305(c) of title 51, United States Code, is amended—*

5 *(1) by striking “The Administrator shall” and*
 6 *inserting the following:*

7 *“(1) REEXAMINATION OF PRIORITIES BY NA-*
 8 *TIONAL ACADEMIES.—The Administrator shall”; and*

9 *(2) by adding at the end the following:*

10 *“(2) REEXAMINATION OF PRIORITIES BY ADMIN-*
 11 *ISTRATOR.—If the Administrator decides to reexam-*
 12 *ine the applicability of the priorities of the decadal*
 13 *surveys to the missions and activities of the Adminis-*
 14 *tration due to scientific discoveries or external factors,*
 15 *the Administrator shall consult with the relevant com-*
 16 *mittees of the National Academies.”.*

17 **SEC. 302. LUNAR DISCOVERY PROGRAM.**

18 (a) *IN GENERAL.*—*The Administrator may carry out*
 19 *a program to conduct lunar science research, including mis-*
 20 *sions to the surface of the Moon, that materially contributes*
 21 *to the objective described in section 20102(d)(1) of title 51,*
 22 *United States Code.*

23 (b) *COMMERCIAL LANDERS.*—*In carrying out a pro-*
 24 *gram under subsection (a), the Administrator shall procure*
 25 *the services of commercial landers developed primarily by*

1 *United States industry to land science payloads of all class-*
 2 *es on the lunar surface.*

3 (c) *LUNAR SCIENCE RESEARCH.*—*The Administrator*
 4 *shall ensure that lunar science research carried out under*
 5 *subsection (a) is consistent with recommendations made by*
 6 *the National Academies of Sciences, Engineering, and Med-*
 7 *icine.*

8 (d) *LUNAR POLAR VOLATILES.*—*In carrying out a*
 9 *program under subsection (a), the Administrator shall, at*
 10 *the earliest opportunity, consider mission proposals to*
 11 *evaluate the potential of lunar polar volatiles to contribute*
 12 *to sustainable lunar exploration.*

13 **SEC. 303. SEARCH FOR LIFE.**

14 (a) *SENSE OF CONGRESS.*—*It is the sense of Congress*
 15 *that—*

16 (1) *the report entitled “An Astrobiology Strategy*
 17 *for the Search for Life in the Universe” published by*
 18 *the National Academies of Sciences, Engineering, and*
 19 *Medicine outlines the key scientific questions and*
 20 *methods for fulfilling the objective of NASA to search*
 21 *for the origin, evolution, distribution, and future of*
 22 *life in the universe; and*

23 (2) *the interaction of lifeforms with their envi-*
 24 *ronment, a central focus of astrobiology research, is a*

1 *topic of broad significance to life sciences research in*
 2 *space and on Earth.*

3 ***(b) PROGRAM CONTINUATION.—***

4 ***(1) IN GENERAL.—****The Administrator shall con-*
 5 *tinue to implement a collaborative, multidisciplinary*
 6 *science and technology development program to search*
 7 *for proof of the existence or historical existence of life*
 8 *beyond Earth in support of the objective described in*
 9 *section 20102(d)(10) of title 51, United States Code.*

10 ***(2) ELEMENT.—****The program under paragraph*
 11 *(1) shall include activities relating to astronomy, bi-*
 12 *ology, geology, and planetary science.*

13 ***(3) COORDINATION WITH LIFE SCIENCES PRO-***
 14 ***GRAM.—****In carrying out the program under para-*
 15 *graph (1), the Administrator shall coordinate efforts*
 16 *with the life sciences program of the Administration.*

17 ***(4) TECHNOSIGNATURES.—****In carrying out the*
 18 *program under paragraph (1), the Administrator*
 19 *shall support activities to search for and analyze*
 20 *technosignatures.*

21 ***(5) INSTRUMENTATION AND SENSOR TECH-***
 22 ***NOLOGY.—****In carrying out the program under para-*
 23 *graph (1), the Administrator may strategically invest*
 24 *in the development of new instrumentation and sensor*
 25 *technology.*

1 **SEC. 304. JAMES WEBB SPACE TELESCOPE.**

2 (a) *SENSE OF CONGRESS.*—*It is the sense of Congress*
3 *that—*

4 (1) *the James Webb Space Telescope will be the*
5 *next premier observatory in space and has great po-*
6 *tential to further scientific study and assist scientists*
7 *in making new discoveries in the field of astronomy;*

8 (2) *the James Webb Space Telescope was devel-*
9 *oped as an ambitious project with a scope that was*
10 *not fully defined at inception and with risk that was*
11 *not fully known or understood;*

12 (3) *despite the major technology development and*
13 *innovation that was needed to construct the James*
14 *Webb Space Telescope, major negative impacts to the*
15 *cost and schedule of the James Webb Space Telescope*
16 *resulted from poor program management and poor*
17 *contractor performance;*

18 (4) *the Administrator should take into account*
19 *the lessons learned from the cost and schedule issues*
20 *relating to the development of the James Webb Space*
21 *Telescope in making decisions regarding the scope of*
22 *and the technologies needed for future scientific mis-*
23 *sions;*

24 (5) *in selecting future scientific missions, the Ad-*
25 *ministrator should take into account the impact that*
26 *large programs that overrun cost and schedule esti-*

1 *mates may have on other NASA programs in earlier*
 2 *phases of development; and*

3 *(6) the Administrator should continue to develop*
 4 *the James Webb Space Telescope with a development*
 5 *cost of not more than \$8,802,700,000, as estimated by*
 6 *the James Webb Space Telescope Independent Review*
 7 *Board Report released in May 2018.*

8 *(b) PROJECT CONTINUATION.—*

9 *(1) IN GENERAL.—The Administrator shall con-*
 10 *tinue—*

11 *(A) to closely track the cost and schedule*
 12 *performance of the James Webb Space Telescope*
 13 *project; and*

14 *(B) to improve the reliability of cost esti-*
 15 *mates and contractor performance data through-*
 16 *out the remaining development of the James*
 17 *Webb Space Telescope.*

18 *(2) KEY PROGRAM OBJECTIVE.—The Adminis-*
 19 *trator shall continue to develop the James Webb*
 20 *Space Telescope on a schedule to meet the objective of*
 21 *safely launching the James Webb Space Telescope not*
 22 *later than March 31, 2021.*

23 **SEC. 305. WIDE-FIELD INFRARED SURVEY TELESCOPE.**

24 *(a) SENSE OF CONGRESS.—It is the sense of Congress*
 25 *that—*

1 (1) *major growth in the cost of astrophysics flag-*
 2 *ship-class missions has impacted the overall portfolio*
 3 *balance of the Science Mission Directorate; and*

4 (2) *the Administrator should continue to develop*
 5 *the Wide-Field Infrared Survey Telescope with a de-*
 6 *velopment cost of not more than \$3,200,000,000.*

7 (b) *PROJECT CONTINUATION.—The Administrator*
 8 *shall continue to develop the Wide-Field Infrared Survey*
 9 *Telescope to meet the objectives outlined in the 2010 decadal*
 10 *survey on astronomy and astrophysics of the National*
 11 *Academies of Sciences, Engineering, and Medicine in a*
 12 *manner that maximizes scientific productivity based on the*
 13 *resources invested.*

14 **SEC. 306. SATELLITE SERVICING FOR SCIENCE MISSIONS.**

15 (a) *STUDY.—*

16 (1) *IN GENERAL.—The Administrator shall con-*
 17 *duct a study on the feasibility of using in-space*
 18 *robotic refueling, repair, or refurbishment capabilities*
 19 *to extend the useful life of telescopes and other science*
 20 *missions that are operational or in development as of*
 21 *the date of the enactment of this Act.*

22 (2) *ELEMENTS.—The study conducted under*
 23 *paragraph (1) shall include the following:*

24 (A) *An identification of the technologies and*
 25 *in-space testing required to demonstrate the in-*

1 *space robotic refueling, repair, or refurbishment*
 2 *capabilities described in paragraph (1).*

3 *(B) The projected cost of using such capa-*
 4 *bilities, including the cost of extended operations*
 5 *for science missions described in that paragraph.*

6 *(b) BRIEFING.—Not later than 1 year after the date*
 7 *of the enactment of this Act, the Administrator shall provide*
 8 *to the appropriate committees of Congress and the Space*
 9 *Studies Board of the National Academies of Sciences, Engi-*
 10 *neering, and Medicine a briefing on the results of the study*
 11 *conducted under subsection (a)(1).*

12 **SEC. 307. EARTH SCIENCE MISSIONS AND PROGRAMS.**

13 *(a) SENSE OF CONGRESS.—It is the sense of Congress*
 14 *that the Earth Science Division of NASA plays an impor-*
 15 *tant role in national efforts—*

16 *(1) to collect and use Earth observations in serv-*
 17 *ice to society; and*

18 *(2) to understand global change.*

19 *(b) EARTH SCIENCE MISSIONS AND PROGRAMS.—With*
 20 *respect to the missions and programs of the Earth Science*
 21 *Division, the Administrator shall, to the maximum extent*
 22 *practicable, follow the recommendations and guidance pro-*
 23 *vided by the scientific community through the decadal sur-*
 24 *vey for Earth science and applications from space of the*

1 *National Academies of Sciences, Engineering, and Medi-*
2 *cine, including—*

3 (1) *the science priorities described in such sur-*
4 *vey;*

5 (2) *the execution of the series of existing or pre-*
6 *viously planned observations (commonly known as the*
7 *“program of record”); and*

8 (3) *the development of a range of missions of all*
9 *classes, including opportunities for principal investi-*
10 *gator-led, competitively selected missions.*

11 **SEC. 308. SCIENCE MISSIONS TO MARS.**

12 (a) *IN GENERAL.—The Administrator shall conduct 1*
13 *or more science missions to Mars to enable the selection of*
14 *1 or more sites for human landing.*

15 (b) *SAMPLE PROGRAM.—The Administrator may*
16 *carry out a program—*

17 (1) *to collect samples from the surface of Mars;*
18 *and*

19 (2) *to return such samples to Earth for scientific*
20 *analysis.*

21 (c) *USE OF EXISTING CAPABILITIES AND ASSETS.—*
22 *In carrying out this section, the Administrator shall, to the*
23 *maximum extent practicable, use existing capabilities and*
24 *assets of NASA centers.*

1 **SEC. 309. PLANETARY DEFENSE COORDINATION OFFICE.**

2 (a) *FINDINGS.*—Congress makes the following findings:

3 (1) *Near-Earth objects remain a threat to the*
4 *United States.*

5 (2) *Section 321(d)(1) of the National Aero-*
6 *navitics and Space Administration Authorization Act*
7 *of 2005 (Public Law 109–155; 119 Stat. 2922; 51*
8 *U.S.C. 71101 note prec.) established a requirement*
9 *that the Administrator plan, develop, and implement*
10 *a Near-Earth Object Survey program to detect, track,*
11 *catalogue, and characterize the physical characteris-*
12 *tics of near-Earth objects equal to or greater than 140*
13 *meters in diameter in order to assess the threat of*
14 *such near-Earth objects to the Earth, with the goal of*
15 *90-percent completion of the catalogue of such near-*
16 *Earth objects by December 30, 2020.*

17 (3) *The current planetary defense strategy of*
18 *NASA acknowledges that such goal will not be met.*

19 (4) *The report of the National Academies of*
20 *Sciences, Engineering, and Medicine entitled “Find-*
21 *ing Hazardous Asteroids Using Infrared and Visible*
22 *Wavelength Telescopes” issued in 2019 states that—*

23 (A) *NASA cannot accomplish such goal*
24 *with currently available assets;*

25 (B) *NASA should develop and launch a*
26 *dedicated space-based infrared survey telescope to*

1 *meet the requirements of section 321(d)(1) of the*
2 *National Aeronautics and Space Administration*
3 *Authorization Act of 2005 (Public Law 109–155;*
4 *119 Stat. 2922; 51 U.S.C. 71101 note prec.); and*

5 *(C) the early detection of potentially haz-*
6 *ardous near-Earth objects enabled by a space-*
7 *based infrared survey telescope is important to*
8 *enable deflection of a dangerous asteroid.*

9 *(5) A comprehensive survey of near-Earth objects*
10 *is vital to—*

11 *(A) the national security of the United*
12 *States; and*

13 *(B) the safety and security of the assets and*
14 *personnel of the United States Armed Forces*
15 *throughout the world.*

16 *(b) ESTABLISHMENT OF PLANETARY DEFENSE CO-*
17 *ORDINATION OFFICE.—*

18 *(1) IN GENERAL.—Not later than 90 days after*
19 *the date of the enactment of this Act, the Adminis-*
20 *trator shall establish an office within the Planetary*
21 *Science Division of the Science Mission Directorate,*
22 *to be known as the “Planetary Defense Coordination*
23 *Office”, to plan, develop, and implement a program*
24 *to survey threats posed by near-Earth objects equal to*
25 *or greater than 140 meters in diameter, as required*

1 *by section 321(d)(1) of the National Aeronautics and*
2 *Space Administration Authorization Act of 2005*
3 *(Public Law 109–155; 119 Stat. 2922; 51 U.S.C.*
4 *71101 note prec.).*

5 *(2) ACTIVITIES.—The Administrator shall—*

6 *(A) develop and, not later than September*
7 *30, 2025, launch a space-based infrared survey*
8 *telescope that is capable of detecting near-Earth*
9 *objects equal to or greater than 140 meters in di-*
10 *ameter, with preference given to planetary mis-*
11 *sions selected by the Administrator as of the date*
12 *of the enactment of this Act to pursue concept de-*
13 *sign studies relating to the development of a*
14 *space-based infrared survey telescope;*

15 *(B) identify, track, and characterize poten-*
16 *tially hazardous near-Earth objects and issue*
17 *warnings of the effects of potential impacts of*
18 *such objects; and*

19 *(C) assist in coordinating Government*
20 *planning for response to a potential impact of a*
21 *near-Earth object.*

22 *(3) DEPARTMENT OF DEFENSE SUPPORT.—The*
23 *Secretary of Defense shall, as appropriate, support ef-*
24 *forts of the Administrator in carrying out this sec-*
25 *tion.*

1 (c) *ANNUAL REPORT*.—Section 321(f) of the National
 2 *Aeronautics and Space Administration Authorization Act*
 3 *of 2005 (Public Law 109–155; 119 Stat. 2922; 51 U.S.C.*
 4 *71101 note prec.) is amended to read as follows:*

5 “(f) *ANNUAL REPORT*.—Not later than September 30,
 6 2020, and annually thereafter through 90-percent comple-
 7 tion of the catalogue required by subsection (d)(1), the Ad-
 8 ministrators shall submit to the Committee on Commerce,
 9 Science, and Transportation of the Senate and the Com-
 10 mittee on Science, Space, and Technology of the House of
 11 Representatives a report that includes the following:

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

17 “(2) A description of the progress with respect to
 18 the design, development, and launch of the space-
 19 based infrared survey telescope required by section
 20 309(b)(2)(A) of the National Aeronautics and Space
 21 Administration Authorization Act of 2019.

22 “(3) An assessment of the progress toward meet-
 23 ing the requirements of subsection (d)(1).

24 “(4) A description of the status of efforts to co-
 25 ordinate planetary defense activities in response to a

1 *threat posed by a near-Earth object with other Fed-*
2 *eral agencies since the date of enactment of the Na-*
3 *tional Aeronautics and Space Administration Author-*
4 *ization Act of 2019.*

5 “(5) *A description of the status of efforts to co-*
6 *ordinate and cooperate with other countries to dis-*
7 *cover hazardous asteroids and comets, plan a mitiga-*
8 *tion strategy, and implement that strategy in the*
9 *event of the discovery of an object on a likely collision*
10 *course with Earth.*

11 “(6) *A summary of expenditures for all activities*
12 *carried out by the Planetary Defense Coordination*
13 *Office since the date of enactment of the National Aer-*
14 *onautics and Space Administration Authorization*
15 *Act of 2019.”.*

16 (d) *LIMITATION ON USE OF FUNDS.—Of the amounts*
17 *authorized to be appropriated by this Act, not more than*
18 *80 percent of amounts authorized to be appropriated for*
19 *the Office of the Administrator for a fiscal year may be*
20 *obligated or expended until the date on which the Adminis-*
21 *trator submits the report for such fiscal year required by*
22 *section 321(f) of the National Aeronautics and Space Ad-*
23 *ministration Authorization Act of 2005 (Public Law 109–*
24 *155; 119 Stat. 2922; 51 U.S.C. 71101 note prec.).*

1 (e) *NEAR-EARTH OBJECT DEFINED.*—*In this section,*
 2 *the term “near-Earth object” means an asteroid or comet*
 3 *with a perihelion distance of less than 1.3 Astronomical*
 4 *Units from the Sun.*

5 **SEC. 310. SUBORBITAL SCIENCE FLIGHTS.**

6 (a) *SENSE OF CONGRESS.*—*It is the sense of Congress*
 7 *that commercially available suborbital flight platforms en-*
 8 *able low-cost access to a microgravity environment to ad-*
 9 *vance science and train scientists and engineers under the*
 10 *Suborbital Research Program established under section*
 11 *802(c) of the National Aeronautics and Space Administra-*
 12 *tion Authorization Act of 2010 (42 U.S.C. 18382(c)).*

13 (b) *REPORT.*—

14 (1) *IN GENERAL.*—*Not later than 270 days after*
 15 *the date of the enactment of this Act, the Adminis-*
 16 *trator shall submit to the appropriate committees of*
 17 *Congress a report evaluating the manner in which*
 18 *suborbital flight platforms can contribute to meeting*
 19 *the science objectives of NASA for the Science Mission*
 20 *Directorate and the Human Exploration and Oper-*
 21 *ations Mission Directorate.*

22 (2) *CONTENTS.*—*The report required by para-*
 23 *graph (1) shall include the following:*

24 (A) *An assessment of the advantages of sub-*
 25 *orbital flight platforms to meet science objectives.*

1 (B) *An evaluation of the challenges to great-*
 2 *er use of commercial suborbital flight platforms*
 3 *for science purposes.*

4 (C) *An analysis of whether commercial sub-*
 5 *orbital flight platforms can provide low-cost*
 6 *flight opportunities to test lunar and Mars*
 7 *science payloads.*

8 **SEC. 311. EARTH SCIENCE DATA AND OBSERVATIONS.**

9 (a) *IN GENERAL.*—*The Administrator shall make*
 10 *available to the public in an easily accessible electronic*
 11 *database all data (including metadata, documentation,*
 12 *models, data processing methods, images, synchronization*
 13 *frames, communications headers, duplicate data, and re-*
 14 *search results) of the missions and programs of the Earth*
 15 *Science Division of the Administration, or any successor*
 16 *division.*

17 (b) *OPEN DATA PROGRAM.*—*In carrying out sub-*
 18 *section (a), the Administrator shall establish and continue*
 19 *to operate an open data program that—*

20 (1) *is consistent with the greatest degree of inter-*
 21 *activity, interoperability, and accessibility; and*

22 (2) *enables outside communities, including the*
 23 *research and applications community, private indus-*
 24 *try, academia, and the general public, to effectively*
 25 *collaborate in areas important to—*

1 (A) studying the Earth system and improv-
2 ing the prediction of Earth system change; and

3 (B) improving model development, data as-
4 similation techniques, systems architecture inte-
5 gration, and computational efficiencies; and

6 (3) meets basic end-user requirements for run-
7 ning on public computers and networks located out-
8 side of secure Administration information and tech-
9 nology systems.

10 (c) *HOSTING*.—The program under subsection (b) shall
11 use, as appropriate and cost-effective, innovative strategies
12 and methods for hosting and management of part or all
13 of the program, including cloud-based computing capabili-
14 ties.

15 **SEC. 312. SENSE OF CONGRESS ON SMALL SATELLITE**
16 **SCIENCE.**

17 *It is the sense of Congress that—*

18 (1) *small satellites—*

19 (A) *are increasingly robust, effective, and*
20 *affordable platforms for carrying out space*
21 *science missions;*

22 (B) *can work in tandem with or augment*
23 *larger NASA spacecraft to support high-priority*
24 *science missions of NASA; and*

1 (C) are cost effective solutions that may
 2 allow NASA to continue collecting legacy obser-
 3 vations while developing next-generation science
 4 missions; and

5 (2) NASA should continue to support small sat-
 6 ellite research, development, technologies, and pro-
 7 grams, including technologies for compact and light-
 8 weight instrumentation for small satellites.

9 **SEC. 313. SENSE OF CONGRESS ON COMMERCIAL SPACE**
 10 **SERVICES.**

11 *It is the sense of Congress that—*

12 (1) the Administration should explore partner-
 13 ships with the commercial space industry for space
 14 science missions in and beyond Earth orbit, including
 15 partnerships relating to payload and instrument
 16 hosting and commercially available datasets; and

17 (2) such partnerships could result in increased
 18 mission cadence, technology advancement, and cost
 19 savings for the Administration.

20 **SEC. 314. PROCEDURES FOR IDENTIFYING AND ADDRESS-**
 21 **ING ALLEGED VIOLATIONS OF SCIENTIFIC IN-**
 22 **TEGRITY POLICY.**

23 *Not later than October 1, 2020, the Administrator shall*
 24 *develop and document procedures for identifying and ad-*

1 *dressings alleged violations of the scientific integrity policy*
 2 *of NASA.*

3 ***TITLE IV—AERONAUTICS***

4 ***SEC. 401. SHORT TITLE.***

5 *This title may be cited as the “Aeronautics Innovation*
 6 *Act”.*

7 ***SEC. 402. DEFINITIONS.***

8 *In this title:*

9 (1) *AERONAUTICS STRATEGIC IMPLEMENTATION*
 10 *PLAN.—The term “Aeronautics Strategic Implementa-*
 11 *tion Plan” means the Aeronautics Strategic Imple-*
 12 *mentation Plan issued by the Aeronautics Research*
 13 *Mission Directorate.*

14 (2) *UNMANNED AIRCRAFT; UNMANNED AIRCRAFT*
 15 *SYSTEM.—The terms “unmanned aircraft” and “un-*
 16 *manned aircraft system” have the meanings given*
 17 *those terms in section 44801 of title 49, United States*
 18 *Code.*

19 (3) *X-PLANE.—The term “X-plane” means an*
 20 *experimental aircraft that is—*

21 (A) *used to test and evaluate a new tech-*
 22 *nology or aerodynamic concept; and*

23 (B) *operated by NASA or the Department*
 24 *of Defense.*

1 **SEC. 403. EXPERIMENTAL AIRCRAFT PROJECTS.**

2 (a) *SENSE OF CONGRESS.—It is the sense of Congress*
3 *that—*

4 (1) *developing high-risk, precompetitive aero-*
5 *space technologies for which there is not yet a profit*
6 *rationale is a fundamental role of NASA;*

7 (2) *large-scale piloted flight test experimentation*
8 *and validation are necessary for—*

9 (A) *transitioning new technologies and ma-*
10 *terials, including associated manufacturing proc-*
11 *esses, for general aviation, commercial aviation,*
12 *and military aeronautics use; and*

13 (B) *capturing the full extent of benefits*
14 *from investments made by the Aeronautics Re-*
15 *search Mission Directorate in priority programs*
16 *called for in—*

17 (i) *the National Aeronautics Research*
18 *and Development Plan issued by the Na-*
19 *tional Science and Technology Council in*
20 *February 2010;*

21 (ii) *the NASA 2014 Strategic Plan;*

22 (iii) *the Aeronautics Strategic Imple-*
23 *mentation Plan; and*

24 (iv) *any updates to the programs*
25 *called for in the plans described in clauses*

26 *(i) through (iii);*

1 (3) *a level of funding that adequately supports*
 2 *large-scale piloted flight test experimentation and val-*
 3 *idation, including related infrastructure, should be*
 4 *ensured over a sustained period of time to restore the*
 5 *capacity of NASA—*

6 *(A) to see legacy priority programs through*
 7 *to completion; and*

8 *(B) to achieve national economic and secu-*
 9 *rity objectives; and*

10 (4) *NASA should not be directly involved in the*
 11 *Type Certification of aircraft for current and future*
 12 *scheduled commercial air service under part 121 or*
 13 *135 of title 14, Code of Federal Regulations, that*
 14 *would result in reductions in crew augmentation or*
 15 *single pilot or autonomously operated aircraft.*

16 (b) *STATEMENT OF POLICY.—It is the policy of the*
 17 *United States—*

18 *(1) to maintain world leadership in—*

19 *(A) military and civilian aeronautical*
 20 *science and technology;*

21 *(B) global air power projection; and*

22 *(C) industrialization; and*

23 (2) *to maintain as a fundamental objective of*
 24 *NASA aeronautics research the steady progression*
 25 *and expansion of flight research and capabilities, in-*

cluding the science and technology of critical underlying disciplines and competencies, such as—

(A) computational-based analytical and predictive tools and methodologies;

(B) aerothermodynamics;

(C) propulsion;

(D) advanced materials and manufacturing processes;

(E) high-temperature structures and materials; and

(F) guidance, navigation, and flight controls.

(c) *ESTABLISHMENT AND CONTINUATION OF X-PLANE PROJECTS.*—

(1) *IN GENERAL.*—The Administrator shall establish or continue to implement, in a manner that is consistent with the roadmap for supersonic aeronautics research and development required by section 604(b) of the National Aeronautics and Space Administration Transition Authorization Act of 2017 (Public Law 115–10; 131 Stat. 55), the following projects:

(A) A low-boom supersonic aircraft project to demonstrate supersonic aircraft designs and technologies that—

(i) reduce sonic boom noise; and

1 (ii) assist the Administrator of the
2 Federal Aviation Administration in ena-
3 bling—

4 (I) the safe commercial deploy-
5 ment of civil supersonic aircraft tech-
6 nology; and

7 (II) the safe and efficient oper-
8 ation of civil supersonic aircraft.

9 (B) A subsonic flight demonstrator aircraft
10 project to advance aircraft designs and tech-
11 nologies that enable significant increases in en-
12 ergy efficiency and reduced life-cycle emissions
13 in the aviation system while reducing noise and
14 emissions.

15 (C) A series of large-scale X-plane dem-
16 onstrators that are—

17 (i) developed sequentially or in par-
18 allel; and

19 (ii) each based on a set of new configu-
20 ration concepts or technologies determined
21 by the Administrator to demonstrate—

22 (I) aircraft and propulsion con-
23 cepts and technologies and related ad-
24 vances in alternative propulsion and
25 energy; and

1 (II) *flight propulsion concepts*
2 *and technologies.*

3 (2) *ELEMENTS.—For each project under para-*
4 *graph (1), the Administrator shall—*

5 (A) *include the development of X-planes and*
6 *all necessary supporting flight test assets;*

7 (B) *pursue a robust technology maturation*
8 *and flight test validation effort;*

9 (C) *improve necessary facilities, flight test-*
10 *ing capabilities, and computational tools to sup-*
11 *port the project;*

12 (D) *award any primary contracts for de-*
13 *sign, procurement, and manufacturing to United*
14 *States persons, consistent with international ob-*
15 *ligations and commitments;*

16 (E) *coordinate research and flight test dem-*
17 *onstration activities with other Federal agencies*
18 *and the United States aviation community, as*
19 *the Administrator considers appropriate; and*

20 (F) *ensure that the project is aligned with*
21 *the Aeronautics Strategic Implementation Plan*
22 *and any updates to the Aeronautics Strategic*
23 *Implementation Plan.*

24 (3) *UNITED STATES PERSON DEFINED.—In this*
25 *subsection, the term “United States person” means—*

1 (A) a United States citizen or an alien law-
 2 fully admitted for permanent residence to the
 3 United States; or

4 (B) an entity organized under the laws of
 5 the United States or of any jurisdiction within
 6 the United States, including a foreign branch of
 7 such an entity.

8 (d) *ADVANCED MATERIALS AND MANUFACTURING*
 9 *TECHNOLOGY PROGRAM.*—

10 (1) *IN GENERAL.*—*The Administrator may estab-*
 11 *lish an advanced materials and manufacturing tech-*
 12 *nology program—*

13 (A) to develop—

14 (i) new materials, including composite
 15 and high-temperature materials, from base
 16 material formulation through full-scale
 17 structural validation and manufacture;

18 (ii) advanced materials and manufac-
 19 turing processes, including additive manu-
 20 facturing, to reduce the cost of manufac-
 21 turing scale-up and certification for use in
 22 general aviation, commercial aviation, and
 23 military aeronautics; and

24 (iii) noninvasive or nondestructive
 25 techniques for testing or evaluating aviation

1 *and aeronautics structures, including for*
2 *materials and manufacturing processes;*

3 *(B) to reduce the time it takes to design, in-*
4 *dustrialize, and certify advanced materials and*
5 *manufacturing processes;*

6 *(C) to provide education and training op-*
7 *portunities for the aerospace workforce; and*

8 *(D) to address global cost and human cap-*
9 *ital competitiveness for United States aero-*
10 *nautical industries and technological leadership*
11 *in advanced materials and manufacturing tech-*
12 *nology.*

13 *(2) ELEMENTS.—In carrying out a program*
14 *under paragraph (1), the Administrator shall—*

15 *(A) build on work that was carried out by*
16 *the Advanced Composites Project of NASA;*

17 *(B) partner with the private and academic*
18 *sectors, such as members of the Advanced Com-*
19 *posites Consortium of NASA, the Joint Advanced*
20 *Materials and Structures Center of Excellence of*
21 *the Federal Aviation Administration, the Manu-*
22 *facturing USA institutes of the Department of*
23 *Commerce, and national laboratories, as the Ad-*
24 *ministrator considers appropriate;*

1 (C) provide a structure for managing intel-
2 lectual property generated by the program based
3 on or consistent with the structure established for
4 the Advanced Composites Consortium of NASA;

5 (D) ensure adequate Federal cost share for
6 applicable research; and

7 (E) coordinate with advanced manufac-
8 turing and composites initiatives in other mis-
9 sion directorates of NASA, as the Administrator
10 considers appropriate.

11 (e) *RESEARCH PARTNERSHIPS.*—In carrying out the
12 projects under subsection (c) and a program under sub-
13 section (d), the Administrator may engage in cooperative
14 research programs with—

15 (1) academia; and

16 (2) commercial aviation and aerospace manufac-
17 turers.

18 **SEC. 404. UNMANNED AIRCRAFT SYSTEMS.**

19 (a) *UNMANNED AIRCRAFT SYSTEMS OPERATION PRO-*
20 *GRAM.*—The Administrator shall—

21 (1) research and test capabilities and concepts,
22 including unmanned aircraft systems communica-
23 tions, for integrating unmanned aircraft systems into
24 the national airspace system;

1 (2) *leverage the partnership NASA has with in-*
 2 *dustry focused on the advancement of technologies for*
 3 *future air traffic management systems for unmanned*
 4 *aircraft systems; and*

5 (3) *continue to align the research and testing*
 6 *portfolio of NASA to inform the integration of un-*
 7 *manned aircraft systems into the national airspace*
 8 *system, consistent with public safety and national se-*
 9 *curity objectives.*

10 (b) *SENSE OF CONGRESS ON COORDINATION WITH*
 11 *FEDERAL AVIATION ADMINISTRATION.—It is the sense of*
 12 *Congress that—*

13 (1) *NASA should continue—*

14 (A) *to coordinate with the Federal Aviation*
 15 *Administration on research on air traffic man-*
 16 *agement systems for unmanned aircraft systems;*
 17 *and*

18 (B) *to assist the Federal Aviation Adminis-*
 19 *tration in the integration of air traffic manage-*
 20 *ment systems for unmanned aircraft systems*
 21 *into the national airspace system; and*

22 (2) *the test ranges (as defined in section 44801*
 23 *of title 49, United States Code) should continue to be*
 24 *leveraged for research on—*

1 (A) *air traffic management systems for un-*
 2 *manned aircraft systems; and*

3 (B) *the integration of such systems into the*
 4 *national airspace system.*

5 **SEC. 405. 21ST CENTURY AERONAUTICS CAPABILITIES INI-**
 6 **TIATIVE.**

7 (a) *IN GENERAL.*—*The Administrator may establish*
 8 *an initiative, to be known as the “21st Century Aeronautics*
 9 *Capabilities Initiative”, within the Construction and Envi-*
 10 *ronmental Compliance and Restoration Account, to ensure*
 11 *that NASA possesses the infrastructure and capabilities nec-*
 12 *essary to conduct proposed flight demonstration projects*
 13 *across the range of NASA aeronautics interests.*

14 (b) *ACTIVITIES.*—*In carrying out the 21st Century*
 15 *Aeronautics Capabilities Initiative, the Administrator may*
 16 *carry out the following activities:*

17 (1) *Any investments the Administrator considers*
 18 *necessary to upgrade and create facilities for civil*
 19 *and national security aeronautics research to support*
 20 *advancements in—*

21 (A) *long-term foundational science and*
 22 *technology;*

23 (B) *advanced aircraft systems;*

24 (C) *air traffic management systems;*

25 (D) *fuel efficiency;*

- 1 (E) electric propulsion technologies;
- 2 (F) system-wide safety assurance;
- 3 (G) autonomous aviation; and
- 4 (H) supersonic and hypersonic aircraft de-
- 5 sign and development.

6 (2) Any measures the Administrator considers
 7 necessary to support flight testing activities, includ-
 8 ing—

9 (A) continuous refinement and development
 10 of free-flight test techniques and methodologies;

11 (B) upgrades and improvements to real-
 12 time tracking and data acquisition; and

13 (C) such other measures relating to aero-
 14 nautics research support and modernization as
 15 the Administrator considers appropriate to carry
 16 out the scientific study of the problems of flight,
 17 with a view to practical solutions for such prob-
 18 lems.

19 **SEC. 406. SENSE OF CONGRESS ON ON-DEMAND AIR TRANS-**
 20 **PORTATION.**

21 *It is the sense of Congress that—*

22 (1) greater use of high-speed air transportation,
 23 small airports, helipads, vertical flight infrastructure,
 24 and other aviation-related infrastructure can alleviate

1 *surface transportation congestion and support eco-*
 2 *nomie growth within cities;*

3 *(2) with respect to urban air mobility and re-*
 4 *lated concepts, NASA should continue—*

5 *(A) to conduct research focused on concepts,*
 6 *technologies, and design tools; and*

7 *(B) to support the evaluation of advanced*
 8 *technologies and operational concepts that can be*
 9 *leveraged by—*

10 *(i) industry to develop future vehicles*
 11 *and systems; and*

12 *(ii) the Federal Aviation Administra-*
 13 *tion to support vehicle safety and oper-*
 14 *ational certification; and*

15 *(3) NASA should leverage ongoing efforts to de-*
 16 *velop advanced technologies to actively support the re-*
 17 *search needed for on-demand air transportation.*

18 **SEC. 407. SENSE OF CONGRESS ON HYPERSONIC TECH-**
 19 **NOLOGY RESEARCH.**

20 *It is the sense of Congress that—*

21 *(1) hypersonic technology is critical to the devel-*
 22 *opment of advanced high-speed aerospace vehicles for*
 23 *both civilian and national security purposes;*

24 *(2) for hypersonic vehicles to be realized, research*
 25 *is needed to overcome technical challenges, including*

1 *in propulsion, advanced materials, and flight per-*
2 *formance in a severe environment;*

3 (3) *NASA plays a critical role in supporting*
4 *fundamental hypersonic research focused on system*
5 *design, analysis and validation, and propulsion tech-*
6 *nologies;*

7 (4) *NASA research efforts in hypersonic tech-*
8 *nology should complement research supported by the*
9 *Department of Defense to the maximum extent prac-*
10 *ticable, since contributions from both agencies work-*
11 *ing in partnership with universities and industry are*
12 *necessary to overcome key technical challenges;*

13 (5) *previous coordinated research programs be-*
14 *tween NASA and the Department of Defense enabled*
15 *important progress on hypersonic technology;*

16 (6) *the commercial sector could provide flight*
17 *platforms and other capabilities that are able to host*
18 *and support NASA hypersonic technology research*
19 *projects; and*

20 (7) *in carrying out hypersonic technology re-*
21 *search projects, the Administrator should—*

22 (A) *focus research and development efforts*
23 *on high-speed propulsion systems, reusable vehi-*
24 *cle technologies, high-temperature materials, and*
25 *systems analysis;*

1 (B) coordinate with the Department of De-
 2 fense to prevent duplication of efforts and of in-
 3 vestments;

4 (C) include partnerships with universities
 5 and industry to accomplish research goals; and

6 (D) maximize public-private use of commer-
 7 cially available platforms for hosting research
 8 and development flight projects.

9 **TITLE V—SPACE TECHNOLOGY**

10 **SEC. 501. SPACE TECHNOLOGY MISSION DIRECTORATE.**

11 (a) *SENSE OF CONGRESS.*—It is the sense of Congress
 12 that an independent Space Technology Mission Directorate
 13 is critical to ensuring continued investments in the develop-
 14 ment of technologies for missions across the portfolio of
 15 NASA, including science, aeronautics, and human explo-
 16 ration.

17 (b) *SPACE TECHNOLOGY MISSION DIRECTORATE.*—
 18 The Administrator shall maintain a Space Technology Mis-
 19 sion Directorate consistent with section 702 of the National
 20 Aeronautics and Space Administration Transition Author-
 21 ization Act of 2017 (51 U.S.C. 20301 note).

22 **SEC. 502. FLIGHT OPPORTUNITIES PROGRAM.**

23 (a) *SENSE OF CONGRESS.*—It is the sense of Congress
 24 that the Administrator should provide flight opportunities
 25 for payloads to microgravity environments and suborbital

1 *altitudes as required by section 907(c) of the National Aero-*
 2 *nautics and Space Administration Authorization Act of*
 3 *2010 (42 U.S.C. 18405(c)), as amended by subsection (b).*

4 *(b) ESTABLISHMENT.—Section 907(c) of the National*
 5 *Aeronautics and Space Administration Authorization Act*
 6 *of 2010 (42 U.S.C. 18405(c)) is amended to read as follows:*

7 *“(c) ESTABLISHMENT.—*

8 *“(1) IN GENERAL.—The Administrator shall es-*
 9 *tablish a Commercial Reusable Suborbital Research*
 10 *Program within the Space Technology Mission Direc-*
 11 *torate to fund—*

12 *“(A) the development of payloads for sci-*
 13 *entific research, technology development, and*
 14 *education;*

15 *“(B) flight opportunities for those payloads*
 16 *to microgravity environments and suborbital al-*
 17 *titudes; and*

18 *“(C) transition of those payloads to orbital*
 19 *opportunities.*

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

1 “(3) *COMMERCIAL SUBORBITAL LAUNCH VEHI-*
 2 *CLES.—In carrying out the Commercial Reusable*
 3 *Suborbital Research Program, the Administrator may*
 4 *not fund the development of commercial suborbital*
 5 *launch vehicles.*

6 “(4) *WORKING WITH MISSION DIRECTORATES.—*
 7 *In carrying out the Commercial Reusable Suborbital*
 8 *Research Program, the Administrator shall work with*
 9 *the mission directorates of NASA to achieve the re-*
 10 *search, technology, and education goals of NASA.”.*

11 “(c) *CONFORMING AMENDMENT.—Section 907(b) of the*
 12 *National Aeronautics and Space Administration Author-*
 13 *ization Act of 2010 (42 U.S.C. 18405(b)) is amended, in*
 14 *the first sentence, by striking “Commercial Reusable Sub-*
 15 *orbital Research Program in” and inserting “Commercial*
 16 *Reusable Suborbital Research Program established under*
 17 *subsection (c)(1) within”.*

18 **SEC. 503. SMALL SPACECRAFT TECHNOLOGY PROGRAM.**

19 “(a) *SENSE OF CONGRESS.—It is the sense of Congress*
 20 *that the Small Spacecraft Technology Program is impor-*
 21 *tant for conducting science and technology validation for—*

22 (1) *short- and long-duration missions in low-*
 23 *Earth orbit;*

24 (2) *deep space missions; and*

1 (3) *deorbiting capabilities designed specifically*
 2 *for smaller spacecraft.*

3 (b) *ACCOMMODATION OF CERTAIN PAYLOADS.—In car-*
 4 *rying out the Small Spacecraft Technology Program, the*
 5 *Administrator shall, as the mission risk posture and tech-*
 6 *nology development objectives allow, accommodate science*
 7 *payloads that further the goal of long-term human explo-*
 8 *ration to the Moon and Mars.*

9 **SEC. 504. NUCLEAR PROPULSION TECHNOLOGY.**

10 (a) *SENSE OF CONGRESS.—It is the sense of Congress*
 11 *that nuclear propulsion is critical to the development of ad-*
 12 *vanced spacecraft for civilian and national defense pur-*
 13 *poses.*

14 (b) *DEVELOPMENT; STUDIES.—The Administrator*
 15 *shall, in coordination with the Secretary of Energy and the*
 16 *Secretary of Defense—*

17 (1) *continue to develop the fuel element design*
 18 *for NASA nuclear propulsion technology;*

19 (2) *finalize the systems feasibility studies for*
 20 *such technology; and*

21 (3) *partner with members of commercial indus-*
 22 *try to conduct mission concept studies on such tech-*
 23 *nology.*

24 (c) *NUCLEAR PROPULSION TECHNOLOGY DEMONSTRA-*
 25 *TION.—*

1 (1) *DETERMINATION; REPORT.*—Not later than
2 *December 31, 2021, the Administrator shall—*

3 (A) *determine the correct approach for con-*
4 *ducting a flight demonstration of nuclear pro-*
5 *pulsion technology; and*

6 (B) *submit to Congress a report on a plan*
7 *for such a demonstration.*

8 (2) *DEMONSTRATION.*—Not later than *December*
9 *31, 2024, the Administrator shall conduct the flight*
10 *demonstration described in paragraph (1).*

11 **SEC. 505. MARS-FORWARD TECHNOLOGIES.**

12 (a) *SENSE OF CONGRESS.*—It is the sense of Congress
13 *that the Administrator should pursue multiple technical*
14 *paths for entry, descent, and landing for Mars, including*
15 *competitively selected technology demonstration missions.*

16 (b) *PRIORITIZATION OF LONG-LEAD TECHNOLOGIES*
17 *AND SYSTEMS.*—The Administrator shall prioritize, within
18 *the Space Technology Mission Directorate, research, testing,*
19 *and development of long-lead technologies and systems for*
20 *Mars, including technologies and systems relating to—*

21 (1) *entry, descent, and landing; and*

22 (2) *in-space propulsion, including nuclear pro-*
23 *pulsion, cryogenic fluid management, in-situ large-*
24 *scale additive manufacturing, and electric propulsion*
25 *(including solar electric propulsion leveraging lessons*

1 *learned from the power and propulsion element of the*
 2 *lunar outpost) options.*

3 **SEC. 506. PRIORITIZATION OF LOW-ENRICHED URANIUM**
 4 **TECHNOLOGY.**

5 *(a) SENSE OF CONGRESS.—It is the sense of Congress*
 6 *that—*

7 *(1) space technology, including nuclear propul-*
 8 *sion technology and space surface power reactors,*
 9 *should be developed in a manner consistent with*
 10 *broader United States foreign policy, national de-*
 11 *fense, and space exploration and commercialization*
 12 *priorities;*

13 *(2) highly enriched uranium presents security*
 14 *and nuclear nonproliferation concerns;*

15 *(3) since 1977, based on the concerns associated*
 16 *with highly enriched uranium, the United States has*
 17 *promoted the use of low-enriched uranium over highly*
 18 *enriched uranium in nonmilitary contexts, including*
 19 *research and commercial applications;*

20 *(4) as part of United States efforts to limit*
 21 *international use of highly enriched uranium, the*
 22 *United States has actively pursued—*

23 *(A) since 1978, the conversion of domestic*
 24 *and foreign research reactors that use highly en-*
 25 *riched uranium fuel to low-enriched uranium*

1 *fuel and the avoidance of any new research reac-*
 2 *tors that use highly enriched uranium fuel; and*

3 *(B) since 1994, the elimination of inter-*
 4 *national commerce in highly enriched uranium*
 5 *for civilian purposes; and*

6 *(5) the use of low-enriched uranium in place of*
 7 *highly enriched uranium has security, nonprolifera-*
 8 *tion, and economic benefits, including for the na-*
 9 *tional space program.*

10 ***(b) PRIORITIZATION OF LOW-ENRICHED URANIUM***
 11 ***TECHNOLOGY.***—*The Administrator shall establish and*
 12 *prioritize, within the Space Technology Mission Direc-*
 13 *torate, a program for the research, testing, and development*
 14 *of a space surface power reactor design that uses low-en-*
 15 *riched uranium fuel.*

16 ***(c) REPORT ON NUCLEAR TECHNOLOGY***
 17 ***PRIORITIZATION.***—*Not later than 120 days after the date*
 18 *of the enactment of this Act, the Administrator shall submit*
 19 *to the appropriate committees of Congress a report that—*

20 *(1) details the actions taken to implement sub-*
 21 *section (b); and*

22 *(2) identifies a plan and timeline under which*
 23 *such subsection will be implemented.*

24 ***(d) DEFINITIONS.***—*In this section:*

1 (1) *HIGHLY ENRICHED URANIUM.*—*The term*
 2 *“highly enriched uranium” means uranium having*
 3 *an assay of 20 percent or greater of the uranium-235*
 4 *isotope.*

5 (2) *LOW-ENRICHED URANIUM.*—*The term “low-*
 6 *enriched uranium” means uranium having an assay*
 7 *greater than the assay for natural uranium but less*
 8 *than 20 percent of the uranium-235 isotope.*

9 **SEC. 507. SENSE OF CONGRESS ON NEXT-GENERATION**
 10 **COMMUNICATIONS TECHNOLOGY.**

11 *It is the sense of Congress that—*

12 (1) *optical communications technologies—*

13 (A) *will be critical to the development of*
 14 *next-generation space-based communications net-*
 15 *works;*

16 (B) *have the potential to allow NASA to ex-*
 17 *pand the volume of data transmissions in low-*
 18 *Earth orbit and deep space; and*

19 (C) *may provide more secure and cost-effec-*
 20 *tive solutions than current radio frequency com-*
 21 *munications systems;*

22 (2) *quantum encryption technology has prom-*
 23 *ising implications for the security of the satellite and*
 24 *terrestrial communications networks of the United*
 25 *States, including optical communications networks,*

1 *and further research and development by NASA with*
 2 *respect to quantum encryption is essential to main-*
 3 *taining the security of the United States and United*
 4 *States leadership in space; and*

5 *(3) in order to provide NASA with more secure*
 6 *and reliable space-based communications, the Space*
 7 *Communications and Navigation program office of*
 8 *NASA should continue—*

9 *(A) to support research on and development*
 10 *of optical communications; and*

11 *(B) to develop quantum encryption capa-*
 12 *bilities, especially as those capabilities apply to*
 13 *optical communications networks.*

14 ***TITLE VI—STEM ENGAGEMENT***

15 ***SEC. 601. SENSE OF CONGRESS.***

16 *It is the sense of Congress that—*

17 *(1) NASA serves as a source of inspiration to the*
 18 *people of the United States; and*

19 *(2) NASA is uniquely positioned to help increase*
 20 *student interest in science, technology, engineering,*
 21 *and math;*

22 *(3) engaging students, and providing hands-on*
 23 *experience at an early age, in science, technology, en-*
 24 *gineering, and math are important aspects of ensur-*

1 *ing and promoting United States leadership in inno-*
 2 *vation; and*

3 *(4) NASA should strive to leverage its unique po-*
 4 *sition—*

5 *(A) to increase kindergarten through grade*
 6 *12 involvement in NASA projects;*

7 *(B) to enhance higher education in STEM*
 8 *fields in the United States;*

9 *(C) to support individuals who are under-*
 10 *represented in science, technology, engineering,*
 11 *and math fields, such as women, minorities, and*
 12 *individuals in rural areas; and*

13 *(D) to provide flight opportunities for stu-*
 14 *dent experiments and investigations.*

15 **SEC. 602. STEM EDUCATION ENGAGEMENT ACTIVITIES.**

16 *(a) IN GENERAL.—The Administrator shall continue*
 17 *to provide opportunities for formal and informal STEM*
 18 *education engagement activities within the Office of NASA*
 19 *STEM Engagement and other NASA directorates, includ-*
 20 *ing—*

21 *(1) the Established Program to Stimulate Com-*
 22 *petitive Research;*

23 *(2) the Minority University Research and Edu-*
 24 *cation Project; and*

1 (3) *the National Space Grant College and Fel-*
 2 *lowship Program.*

3 (b) *LEVERAGING NASA NATIONAL PROGRAMS TO PRO-*
 4 *MOTE STEM EDUCATION.*—*The Administrator, in partner-*
 5 *ship with museums, nonprofit organizations, and commer-*
 6 *cial entities, shall, to the maximum extent practicable, le-*
 7 *verage human spaceflight missions, Deep Space Explo-*
 8 *ration Systems (including the Space Launch System,*
 9 *Orion, and Exploration Ground Systems), and NASA*
 10 *science programs to engage students at the kindergarten*
 11 *through grade 12 and higher education levels to pursue*
 12 *learning and career opportunities in STEM fields.*

13 (c) *BRIEFING.*—*Not later than 1 year after the date*
 14 *of the enactment of this Act, the Administrator shall brief*
 15 *the appropriate committees of Congress on—*

16 (1) *the status of the programs described in sub-*
 17 *section (a); and*

18 (2) *the manner by which each NASA STEM edu-*
 19 *cation engagement activity is organized and funded.*

20 (d) *STEM EDUCATION DEFINED.*—*In this section, the*
 21 *term “STEM education” has the meaning given the term*
 22 *in section 2 of the STEM Education Act of 2015 (Public*
 23 *Law 114–59; 42 U.S.C. 6621 note).*

1 **SEC. 603. SKILLED TECHNICAL EDUCATION OUTREACH**
2 **PROGRAM.**

3 (a) *ESTABLISHMENT.*—*The Administrator shall estab-*
4 *lish a program to conduct outreach to secondary school stu-*
5 *dents—*

6 (1) *to expose students to careers that require ca-*
7 *reer and technical education; and*

8 (2) *to encourage students to pursue careers that*
9 *require career and technical education.*

10 (b) *OUTREACH PLAN.*—*Not later than 180 days after*
11 *the date of the enactment of this Act, the Administrator*
12 *shall submit to the appropriate committees of Congress a*
13 *report on the outreach program under subsection (a) that*
14 *includes—*

15 (1) *an implementation plan;*

16 (2) *a description of the resources needed to carry*
17 *out the program; and*

18 (3) *any recommendations on expanding outreach*
19 *to secondary school students interested in skilled tech-*
20 *nical occupations.*

21 (c) *SYSTEMS OBSERVATION.*—

22 (1) *IN GENERAL.*—*The Administrator shall de-*
23 *velop a program and associated policies to allow stu-*
24 *dents from accredited educational institutions to view*
25 *the manufacturing, assembly, and testing of NASA-*

1 *funded space and aeronautical systems, as the Ad-*
 2 *ministrator considers appropriate.*

3 (2) *CONSIDERATIONS.—In developing the pro-*
 4 *gram and policies under paragraph (1), the Adminis-*
 5 *trator shall take into consideration factors such as*
 6 *workplace safety, mission needs, and the protection of*
 7 *sensitive and proprietary technologies.*

8 **SEC. 604. NATIONAL SPACE GRANT COLLEGE AND FELLOW-**
 9 **SHIP PROGRAM.**

10 (a) *PURPOSES.—Section 40301 of title 51, United*
 11 *States Code, is amended—*

12 (1) *in paragraph (3)—*

13 (A) *in subparagraph (B), by striking “and”*
 14 *at the end;*

15 (B) *in subparagraph (C), by adding “and”*
 16 *after the semicolon at the end; and*

17 (C) *by adding at the end the following:*

18 “(D) *promote equally the State and re-*
 19 *gional STEM interests of each space grant con-*
 20 *sortium;”;* and

21 (2) *in paragraph (4), by striking “made up of*
 22 *university and industry members, in order to ad-*
 23 *vance” and inserting “comprised of members of uni-*
 24 *versities in each State and other entities, such as 2-*

1 *year colleges, industries, science learning centers, mu-*
 2 *seums, and government entities, to advance”.*

3 *(b) DEFINITIONS.—Section 40302 of title 51, United*
 4 *States Code, is amended—*

5 *(1) by striking paragraph (3);*

6 *(2) by inserting after paragraph (2) the fol-*
 7 *lowing:*

8 *“(3) LEAD INSTITUTION.—The term ‘lead insti-*
 9 *tution’ means an entity in a State that—*

10 *“(A) was designated by the Administrator*
 11 *under section 40306, as in effect on the day be-*
 12 *fore the date of the enactment of the National*
 13 *Aeronautics and Space Administration Author-*
 14 *ization Act of 2019; or*

15 *“(B) is designated by the Administrator*
 16 *under section 40303(d)(3).”;*

17 *(3) in paragraph (4), by striking “space grant*
 18 *college, space grant regional consortium, institution of*
 19 *higher education,” and inserting “lead institution,*
 20 *space grant consortium,”;*

21 *(4) by striking paragraphs (6), (7), and (8);*

22 *(5) by inserting after paragraph (5) the fol-*
 23 *lowing:*

24 *“(6) SPACE GRANT CONSORTIUM.—The term*
 25 *‘space grant consortium’ means a State-wide group,*

1 *led by a lead institution, that has established partner-*
 2 *ships with other academic institutions, industries,*
 3 *science learning centers, museums, and government*
 4 *entities to promote a strong educational base in the*
 5 *space and aeronautical sciences.”;*

6 *(6) by redesignating paragraph (9) as para-*
 7 *graph (7);*

8 *(7) in paragraph (7)(B), as so redesignated, by*
 9 *inserting “and aeronautics” after “space”;*

10 *(8) by striking paragraph (10); and*

11 *(9) by adding at the end the following:*

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

14 *(c) PROGRAM OBJECTIVE.—Section 40303 of title 51,*
 15 *United States Code, is amended—*

16 *(1) by striking subsections (d) and (e);*

17 *(2) by redesignating subsection (c) as subsection*
 18 *(e); and*

19 *(3) by striking subsection (b) and inserting the*
 20 *following:*

21 *“(b) PROGRAM OBJECTIVE.—*

22 *“(1) IN GENERAL.—The Administrator shall*
 23 *carry out the national space grant college and fellow-*
 24 *ship program with the objective of providing hands-*
 25 *on research, training, and education programs with*

1 *measurable outcomes in each State, including pro-*
 2 *grams to provide—*

3 *“(A) internships, fellowships, and scholar-*
 4 *ships;*

5 *“(B) interdisciplinary hands-on mission*
 6 *programs and design projects;*

7 *“(C) student internships with industry or*
 8 *university researchers or at centers of the Ad-*
 9 *ministration;*

10 *“(D) faculty and curriculum development*
 11 *initiatives;*

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

15 *“(F) STEM engagement programs for kin-*
 16 *dergarten through grade 12 teachers and stu-*
 17 *dents.*

18 *“(2) PROGRAM PRIORITIES.—In carrying out the*
 19 *objective described in paragraph (1), the Adminis-*
 20 *trator shall ensure that each program carried out by*
 21 *a space grant consortium under the national space*
 22 *grant college and fellowship program balances the fol-*
 23 *lowing priorities:*

1 “(A) *The space and aeronautics research*
 2 *needs of the Administration, including the mis-*
 3 *sion directorates.*

4 “(B) *The need to develop a national STEM*
 5 *workforce.*

6 “(C) *The STEM workforce needs of the*
 7 *State.*

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

12 “(d) *SUSPENSION; TERMINATION; NEW COMPETI-*
 13 *TION.—*

14 “(1) *SUSPENSION.—The Administrator may, for*
 15 *cause and after an opportunity for hearing, suspend*
 16 *a lead institution that was designated by the Admin-*
 17 *istrator under section 40306, as in effect on the day*
 18 *before the date of the enactment of the National Aero-*
 19 *navitics and Space Administration Authorization Act*
 20 *of 2019.*

21 “(2) *TERMINATION.—If the issue resulting in a*
 22 *suspension under paragraph (1) is not resolved with-*
 23 *in a period determined by the Administrator, the Ad-*
 24 *ministrator may terminate the designation of the en-*
 25 *tity as a lead institution.*

1 “(3) *NEW COMPETITION.*—*If the Administrator*
 2 *terminates the designation of an entity as a lead in-*
 3 *stitution, the Administrator may initiate a new com-*
 4 *petition in the applicable State for the designation of*
 5 *a lead institution.”.*

6 (d) *GRANTS.*—*Section 40304 of title 51, United States*
 7 *Code, is amended to read as follows:*

8 **“§ 40304. Grants**

9 “(a) *ELIGIBLE SPACE GRANT CONSORTIUM DE-*
 10 *FINED.*—*In this section, the term ‘eligible space grant con-*
 11 *sortium’ means a space grant consortium that the Adminis-*
 12 *trator has determined—*

13 “(1) *has the capability and objective to carry out*
 14 *not fewer than 3 of the 6 programs under section*
 15 *40303(b)(1);*

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

18 “(3) *is engaged in research, training, and edu-*
 19 *cation relating to space and aeronautics.*

20 “(b) *GRANTS.*—

21 “(1) *IN GENERAL.*—*The Administrator shall*
 22 *award grants to the lead institutions of eligible space*
 23 *grant consortia to carry out the programs under sec-*
 24 *tion 40303(b)(1).*

25 “(2) *REQUEST FOR PROPOSALS.*—

1 “(A) *IN GENERAL.*—Not later than 180
 2 days after the date of the enactment of the Na-
 3 tional Aeronautics and Space Administration
 4 Authorization Act of 2019, the Administrator
 5 shall issue a request for proposals from space
 6 grant consortia for the award of grants under
 7 this section.

8 “(B) *APPLICATIONS.*—A lead institution of
 9 a space grant consortium that seeks a grant
 10 under this section shall submit, on behalf of such
 11 space grant consortium, an application to the
 12 Administrator at such time, in such manner,
 13 and accompanied by such information as the Ad-
 14 ministrator may require.

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

19 “(A) *each State;*

20 “(B) *the District of Columbia; and*

21 “(C) *the Commonwealth of Puerto Rico.*

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

1 “(c) *ALLOCATION OF FUNDING.*—

2 “(1) *PROGRAM IMPLEMENTATION.*—

3 “(A) *IN GENERAL.*—*To carry out the objec-*
 4 *tive described in section 40303(b)(1), of the funds*
 5 *made available each fiscal year for the national*
 6 *space grant college and fellowship program, the*
 7 *Administrator shall allocate not less than 85 per-*
 8 *cent as follows:*

9 “(i) *The 52 eligible space grant con-*
 10 *sortia shall each receive an equal share.*

11 “(ii) *The territories of Guam and the*
 12 *United States Virgin Islands shall each re-*
 13 *ceive funds equal to approximately $\frac{1}{5}$ of the*
 14 *share for each eligible space grant consortia.*

15 “(B) *MATCHING REQUIREMENT.*—*Each eli-*
 16 *gible space grant consortium shall match the*
 17 *funds allocated under subparagraph (A)(i) on a*
 18 *basis of not less than 1 non-Federal dollar for*
 19 *every 1 Federal dollar, except that any program*
 20 *funded under paragraph (3) or any program to*
 21 *carry out 1 or more internships or fellowships*
 22 *shall not be subject to that matching require-*
 23 *ment.*

24 “(2) *PROGRAM ADMINISTRATION.*—

1 “(A) *IN GENERAL.*—Of the funds made
 2 available each fiscal year for the national space
 3 grant college and fellowship program, the Ad-
 4 ministrators shall allocate not more than 10 per-
 5 cent for the administration of the program.

6 “(B) *COSTS COVERED.*—The funds allocated
 7 under subparagraph (A) shall cover all costs of
 8 the Administration associated with the adminis-
 9 tration of the national space grant college and
 10 fellowship program, including—

11 “(i) direct costs of the program, includ-
 12 ing costs relating to support services and
 13 civil service salaries and benefits;

14 “(ii) indirect general and administra-
 15 tive costs of centers and facilities of the Ad-
 16 ministration; and

17 “(iii) indirect general and administra-
 18 tive costs of the Administration head-
 19 quarters.

20 “(3) *SPECIAL PROGRAMS.*—Of the funds made
 21 available each fiscal year for the national space grant
 22 college and fellowship program, the Administrator
 23 shall allocate not more than 5 percent to the lead in-
 24 stitutions of space grant consortia established as of
 25 the date of the enactment of the National Aeronautics

1 *and Space Administration Authorization Act of 2019*
2 *for grants to carry out innovative approaches and*
3 *programs to further science and education relating to*
4 *the missions of the Administration and STEM dis-*
5 *ciplines.*

6 “(d) *TERMS AND CONDITIONS.*—

7 “(1) *LIMITATIONS.*—*Amounts made available*
8 *through a grant under this section may not be ap-*
9 *plied to—*

10 “(A) *the purchase of land;*

11 “(B) *the purchase, construction, preserva-*
12 *tion, or repair of a building; or*

13 “(C) *the purchase or construction of a*
14 *launch facility or launch vehicle.*

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

19 “(3) *RECORDS.*—

20 “(A) *IN GENERAL.*—*Any person that re-*
21 *ceives or uses the proceeds of a grant under this*
22 *section shall keep such records as the Adminis-*
23 *trator shall by regulation prescribe as being nec-*
24 *essary and appropriate to facilitate effective*
25 *audit and evaluation, including records that*

1 *fully disclose the amount and disposition by a*
 2 *recipient of such proceeds, the total cost of the*
 3 *program or project in connection with which*
 4 *such proceeds were used, and the amount, if any,*
 5 *of such cost that was provided through other*
 6 *sources.*

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

11 “(C) *ACCESS.*—*For the purpose of audit*
 12 *and evaluation, the Administrator and the*
 13 *Comptroller General of the United States shall*
 14 *have access to any books, documents, papers, and*
 15 *records of receipts relating to a grant under this*
 16 *section, as determined by the Administrator or*
 17 *Comptroller General.”.*

18 (e) *PROGRAM STREAMLINING.*—*Title 51, United States*
 19 *Code, is amended—*

20 (1) *by striking sections 40305 through 40308,*
 21 *40310, and 40311; and*

22 (2) *by redesignating section 40309 as section*
 23 *40305.*

24 (f) *CONFORMING AMENDMENT.*—*The table of sections*
 25 *at the beginning of chapter 403 of title 51, United States*

1 *Code, is amended by striking the items relating to sections*
 2 *40304 through 40311 and inserting the following:*

“40304. Grants.

“40305. Availability of other Federal personnel and data.”.

3 ***TITLE VII—WORKFORCE AND***
 4 ***INDUSTRIAL BASE***

5 ***SEC. 701. APPOINTMENT AND COMPENSATION PILOT PRO-***
 6 ***GRAM.***

7 *(a) DEFINITION OF COVERED PROVISIONS.—In this*
 8 *section, the term “covered provisions” means the provisions*
 9 *of title 5, United States Code, other than—*

10 *(1) section 2301 of that title;*

11 *(2) section 2302 of that title;*

12 *(3) chapter 71 of that title;*

13 *(4) section 7204 of that title; and*

14 *(5) chapter 73 of that title.*

15 *(b) ESTABLISHMENT.—There is established a 3-year*
 16 *pilot program under which, notwithstanding section 20113*
 17 *of title 51, United States Code, the Administrator may,*
 18 *with respect to not more than 5,000 designated personnel—*

19 *(1) appoint and manage such designated per-*
 20 *sonnel of the Administration, without regard to the*
 21 *covered provisions; and*

22 *(2) fix the compensation of such designated per-*
 23 *sonnel of the Administration, without regard to chap-*
 24 *ter 51 and subchapter III of chapter 53 of title 5,*

1 *United States Code, at a rate that does not exceed the*
 2 *per annum rate of salary of the Vice President of the*
 3 *United States under section 104 of title 3, United*
 4 *States Code.*

5 *(c) ADMINISTRATOR RESPONSIBILITIES.—In carrying*
 6 *out the pilot program established under subsection (b), the*
 7 *Administrator shall ensure that the pilot program—*

8 *(1) uses—*

9 *(A) state-of-the-art recruitment techniques;*

10 *(B) simplified classification methods with*
 11 *respect to personnel of the Administration; and*

12 *(C) broad banding; and*

13 *(2) offers—*

14 *(A) competitive compensation; and*

15 *(B) the opportunity for career mobility.*

16 **SEC. 702. ESTABLISHMENT OF MULTI-INSTITUTION CON-**
 17 **SORTIA AND UNIVERSITY-AFFILIATED RE-**
 18 **SEARCH CENTERS.**

19 *(a) IN GENERAL.—The Administrator, pursuant to*
 20 *section 2304(c)(3)(B) of title 10, United States Code,*
 21 *may—*

22 *(1) establish one or more multi-institution con-*
 23 *sortia or university-affiliated research centers to fa-*
 24 *cilitate access to essential engineering, research, and*

1 *development capabilities in support of NASA mis-*
 2 *sions;*

3 *(2) use such a consortium or research center to*
 4 *fund technical analyses and other engineering support*
 5 *to address the acquisition, technical, and operational*
 6 *needs of NASA centers; and*

7 *(3) ensure such a consortium or research cen-*
 8 *ter—*

9 *(A) is held accountable for the technical*
 10 *quality of the work product developed under this*
 11 *section; and*

12 *(B) convenes disparate groups to facilitate*
 13 *public-private partnerships.*

14 *(b) POLICIES AND PROCEDURES.—The Administrator*
 15 *shall develop and implement policies and procedures to gov-*
 16 *ern, with respect to the establishment of a consortium or*
 17 *research center under subsection (a)—*

18 *(1) the selection of participants;*

19 *(2) the award of cooperative agreements or other*
 20 *contracts;*

21 *(3) the appropriate use of competitive awards*
 22 *and sole source awards; and*

23 *(4) technical capabilities required.*

1 (c) *ELIGIBILITY.*—*The following entities shall be eligi-*
 2 *ble to participate in a consortium or research center estab-*
 3 *lished under subsection (a):*

4 (1) *An institution of higher education (as de-*
 5 *finied in section 102 of the Higher Education Act of*
 6 *1965 (20 U.S.C. 1002)).*

7 (2) *An operator of a federally funded research*
 8 *and development center.*

9 (3) *A nonprofit or not-for-profit research institu-*
 10 *tion.*

11 (4) *A consortium composed of—*

12 (A) *an entity described in paragraph (1),*
 13 *(2), or (3); and*

14 (B) *one or more for-profit entities.*

15 **SEC. 703. EXPEDITED ACCESS TO TECHNICAL TALENT AND**
 16 **EXPERTISE.**

17 (a) *IN GENERAL.*—*The Administrator may—*

18 (1) *establish one or more multi-institution task*
 19 *order contracts, consortia, cooperative agreements, or*
 20 *other arrangements to facilitate expedited access to el-*
 21 *igible entities in support of NASA missions; and*

22 (2) *use such a multi-institution task order con-*
 23 *tract, consortium, cooperative agreement, or other ar-*
 24 *rangement to fund technical analyses and other engi-*

1 neering support to address the acquisition, technical,
2 and operational needs of NASA centers.

3 (b) *CONSULTATION WITH OTHER NASA-AFFILIATED*
4 *ENTITIES.*—To ensure access to technical expertise and re-
5 duce costs and duplicative efforts, a multi-institution task
6 order contract, consortium, cooperative agreement, or any
7 other arrangement established under subsection (a)(1) shall,
8 to the maximum extent practicable, be carried out in con-
9 sultation with other NASA-affiliated entities, including fed-
10 erally funded research and development centers, university-
11 affiliated research centers, and NASA laboratories and test
12 centers.

13 (c) *POLICIES AND PROCEDURES.*—The Administrator
14 shall develop and implement policies and procedures to gov-
15 ern, with respect to the establishment of a multi-institution
16 task order contract, consortium, cooperative agreement, or
17 any other arrangement under subsection (a)(1)—

18 (1) the selection of participants;

19 (2) the award of task orders;

20 (3) the maximum award size for a task;

21 (4) the appropriate use of competitive awards
22 and sole source awards; and

23 (5) technical capabilities required.

24 (d) *ELIGIBLE ENTITY DEFINED.*—In this section, the
25 term “eligible entity” means—

1 (1) *an institution of higher education (as defined*
 2 *in section 102 of the Higher Education Act of 1965*
 3 *(20 U.S.C. 1002));*

4 (2) *an operator of a federally funded research*
 5 *and development center;*

6 (3) *a nonprofit or not-for-profit research institu-*
 7 *tion; and*

8 (4) *a consortium composed of—*

9 (A) *an entity described in paragraph (1),*
 10 (2), or (3); and

11 (B) *one or more for-profit entities.*

12 **SEC. 704. REPORT ON INDUSTRIAL BASE FOR CIVIL SPACE**
 13 **MISSIONS AND OPERATIONS.**

14 (a) *IN GENERAL.*—*Not later than 1 year after the date*
 15 *of the enactment of this Act, and from time to time there-*
 16 *after, the Administrator shall submit to the appropriate*
 17 *committees of Congress a report on the United States indus-*
 18 *trial base for NASA civil space missions and operations.*

19 (b) *ELEMENTS.*—*The report required by subsection (a)*
 20 *shall include the following:*

21 (1) *A comprehensive description of the current*
 22 *status of the United States industrial base for NASA*
 23 *civil space missions and operations.*

24 (2) *A description and assessment of the weak-*
 25 *nesses in the supply chain, skills, manufacturing ca-*

1 *capacity, raw materials, key components, and other*
2 *areas of the United States industrial base for NASA*
3 *civil space missions and operations that could ad-*
4 *versely impact such missions and operations if un-*
5 *available.*

6 (3) *A description and assessment of various*
7 *mechanisms to address and mitigate the weaknesses*
8 *described pursuant to paragraph (2).*

9 (4) *A comprehensive list of the collaborative ef-*
10 *forts, including future and proposed collaborative ef-*
11 *forts, between NASA and the Manufacturing USA in-*
12 *stitutes of the Department of Commerce.*

13 (5) *An assessment of—*

14 (A) *the defense and aerospace manufac-*
15 *turing supply chains relevant to NASA in each*
16 *region of the United States; and*

17 (B) *the feasibility and benefits of estab-*
18 *lishing a supply chain center of excellence in a*
19 *State in which NASA does not, as of the date of*
20 *the enactment of this Act, have a research center*
21 *or test facility.*

22 (6) *Such other matters relating to the United*
23 *States industrial base for NASA civil space missions*
24 *and operations as the Administrator considers appro-*
25 *priate.*

1 **SEC. 705. SEPARATIONS AND RETIREMENT INCENTIVES.**

2 *Section 20113 of title 51, United States Code, is*
 3 *amended by adding at the end the following:*

4 “(o) *PROVISIONS RELATED TO SEPARATION AND RE-*
 5 *TIREMENT INCENTIVES.*—

6 “(1) *DEFINITION.*—*In this subsection, the term*
 7 *‘employee’—*

8 “(A) *means an employee of the Administra-*
 9 *tion serving under an appointment without time*
 10 *limitation; and*

11 “(B) *does not include—*

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

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

21 “(iii) *for purposes of eligibility for sep-*
 22 *aration incentives under this subsection, an*
 23 *employee who is in receipt of a decision no-*
 24 *tice of involuntary separation for mis-*
 25 *conduct or unacceptable performance.*

1 “(2) *AUTHORITY.*—*The Administrator may es-*
2 *tablish a program under which employees may be eli-*
3 *gible for early retirement, offered separation incentive*
4 *pay to separate from service voluntarily, or both. This*
5 *authority may be used to reduce the number of per-*
6 *sonnel employed or to restructure the workforce to*
7 *meet mission objectives without reducing the overall*
8 *number of personnel. This authority is in addition to,*
9 *and notwithstanding, any other authorities estab-*
10 *lished by law or regulation for such programs.*

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

22 “(4) *SEPARATION PAY.*—

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

1 “(i) *an amount equal to the amount*
2 *the employee would be entitled to receive*
3 *under section 5595(c) of title 5, if the em-*
4 *ployee were entitled to payment under such*
5 *section; or*

6 “(ii) *\$40,000.*

7 “(B) *LIMITATIONS.—Separation pay shall*
8 *not be a basis for payment, and shall not be in-*
9 *cluded in the computation, of any other type of*
10 *Government benefit. Separation pay shall not be*
11 *taken into account for the purpose of deter-*
12 *mining the amount of any severance pay to*
13 *which an individual may be entitled under sec-*
14 *tion 5595 of title 5, based on any other separa-*
15 *tion.*

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

22 “(5) *LIMITATIONS ON REEMPLOYMENT.—*

23 “(A) *An employee who receives separation*
24 *pay under such program may not be reemployed*
25 *by the Administration for a 12-month period be-*

1 *ginning on the effective date of the employee's*
2 *separation, unless this prohibition is waived by*
3 *the Administrator on a case-by-case basis.*

4 *“(B) An employee who receives separation*
5 *pay under this section on the basis of a separa-*
6 *tion and accepts employment with the Govern-*
7 *ment of the United States, or who commences*
8 *work through a personal services contract with*
9 *the United States within 5 years after the date*
10 *of the separation on which payment of the sepa-*
11 *ration pay is based, shall be required to repay*
12 *the entire amount of the separation pay to the*
13 *Administration. If the employment is with an*
14 *Executive agency (as defined by section 105 of*
15 *title 5) other than the Administration, the Ad-*
16 *ministrator may, at the request of the head of*
17 *that agency, waive the repayment if the indi-*
18 *vidual involved possesses unique abilities and is*
19 *the only qualified applicant available for the po-*
20 *sition. If the employment is within the Adminis-*
21 *tration, the Administrator may waive the repay-*
22 *ment if the individual involved is the only quali-*
23 *fied applicant available for the position. If the*
24 *employment is with an entity in the legislative*
25 *branch, the head of the entity or the appointing*

1 *official may waive the repayment if the indi-*
 2 *vidual involved possesses unique abilities and is*
 3 *the only qualified applicant available for the po-*
 4 *sition. If the employment is with the judicial*
 5 *branch, the Director of the Administrative Office*
 6 *of the United States Courts may waive the re-*
 7 *payment if the individual involved possesses*
 8 *unique abilities and is the only qualified appli-*
 9 *cant available for the position.*

10 “(6) *REGULATIONS.*—*Under the program estab-*
 11 *lished under paragraph (2), early retirement and sep-*
 12 *aration pay may be offered only pursuant to regula-*
 13 *tions established by the Administrator, subject to such*
 14 *limitations or conditions as the Administrator may*
 15 *require.*

16 “(7) *USE OF EXISTING FUNDS.*—*The Adminis-*
 17 *trator shall carry out this subsection using amounts*
 18 *otherwise made available to the Administrator and no*
 19 *additional funds are authorized to be appropriated to*
 20 *carry out this subsection.”.*

21 **SEC. 706. CONFIDENTIALITY OF MEDICAL QUALITY ASSUR-**
 22 **ANCE RECORDS.**

23 “(a) *IN GENERAL.*—*Chapter 313 of title 51, United*
 24 *States Code, is amended by adding at the end the following:*

1 **“§ 31303. Confidentiality of medical quality assurance**
 2 **records**

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

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

9 “(2) *an individual who reviews or creates a med-*
 10 *ical quality assurance record for the Administration,*
 11 *or participates in any proceeding that reviews or cre-*
 12 *ates a medical quality assurance record, may not tes-*
 13 *tify in a judicial or administrative proceeding with*
 14 *respect to—*

15 “(A) *the medical quality assurance record;*
 16 *or*

17 “(B) *any finding, recommendation, evalua-*
 18 *tion, opinion, or action taken by such individual*
 19 *or in accordance with such proceeding with re-*
 20 *spect to the medical quality assurance record.*

21 “(b) *DISCLOSURE OF RECORDS.*—

22 “(1) *IN GENERAL.*—*Notwithstanding subsection*
 23 *(a), a medical quality assurance record may be dis-*
 24 *closed to—*

25 “(A) *a Federal agency or private entity, if*
 26 *the medical quality assurance record is necessary*

1 *for the Federal agency or private entity to carry*
2 *out—*

3 “(i) *licensing or accreditation func-*
4 *tions relating to Administration healthcare*
5 *facilities; or*

6 “(ii) *monitoring of Administration*
7 *healthcare facilities required by law;*

8 “(B) *a Federal agency or healthcare pro-*
9 *vider, if the medical quality assurance record is*
10 *required by the Federal agency or healthcare*
11 *provider to enable Administration participation*
12 *in a healthcare program of the Federal agency or*
13 *healthcare provider;*

14 “(C) *a criminal or civil law enforcement*
15 *agency, or an instrumentality authorized by law*
16 *to protect the public health or safety, on written*
17 *request by a qualified representative of such*
18 *agency or instrumentality submitted to the Ad-*
19 *ministrator that includes a description of the*
20 *lawful purpose for which the medical quality as-*
21 *surance record is requested;*

22 “(D) *an officer, an employee, or a con-*
23 *tractor of the Administration who requires the*
24 *medical quality assurance record to carry out an*
25 *official duty associated with healthcare;*

1 “(E) healthcare personnel, to the extent nec-
2 essary to address a medical emergency affecting
3 the health or safety of an individual; and

4 “(F) any committee, panel, or board con-
5 vened by the Administration to review the
6 healthcare-related policies and practices of the
7 Administration.

8 “(2) *SUBSEQUENT DISCLOSURE PROHIBITED.*—
9 An individual or entity to whom a medical quality
10 assurance record has been disclosed under paragraph
11 (1) may not make a subsequent disclosure of the med-
12 ical quality assurance record.

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

14 “(1) *IN GENERAL.*—Except as provided in para-
15 graph (2), the personally identifiable information
16 contained in a medical quality assurance record of a
17 patient or an employee of the Administration, or any
18 other individual associated with the Administration
19 for purposes of a medical quality assurance program,
20 shall be removed before the disclosure of the medical
21 quality assurance record to an entity other than the
22 Administration.

23 “(2) *EXCEPTION.*— Personally identifiable infor-
24 mation described in paragraph (1) may be released to
25 an entity other than the Administration if the Ad-

1 *ministrator makes a determination that the release of*
2 *such personally identifiable information—*

3 *“(A) is in the best interests of the Adminis-*
4 *tration; and*

5 *“(B) does not constitute an unwarranted*
6 *invasion of personal privacy.*

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

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

16 *“(f) RULES OF CONSTRUCTION.—Nothing in this sec-*
17 *tion shall be construed—*

18 *“(1) to withhold a medical quality assurance*
19 *record from a committee of the Senate or House of*
20 *Representatives or a joint committee of Congress if*
21 *the medical quality assurance record relates to a mat-*
22 *ter within the jurisdiction of such committee or joint*
23 *committee; or*

24 *“(2) to limit the use of a medical quality assur-*
25 *ance record within the Administration, including the*

1 *use by a contractor or consultant of the Administra-*
 2 *tion.*

3 “(g) *DEFINITIONS.—In this section:*

4 “(1) *MEDICAL QUALITY ASSURANCE RECORD.—*
 5 *The term ‘medical quality assurance record’ means*
 6 *any proceeding, discussion, record, finding, rec-*
 7 *ommendation, evaluation, opinion, minutes, report,*
 8 *or other document or action that results from a qual-*
 9 *ity assurance committee, quality assurance program,*
 10 *or quality assurance program activity.*

11 “(2) *QUALITY ASSURANCE PROGRAM.—*

12 “(A) *IN GENERAL.—The term ‘quality as-*
 13 *surance program’ means a comprehensive pro-*
 14 *gram of the Administration—*

15 “(i) *to systematically review and im-*
 16 *prove the quality of medical and behavioral*
 17 *health services provided by the Administra-*
 18 *tion to ensure the safety and security of in-*
 19 *dividuals receiving such health services; and*

20 “(ii) *to evaluate and improve the effi-*
 21 *ciency, effectiveness, and use of staff and re-*
 22 *sources in the delivery of such health serv-*
 23 *ices.*

24 “(B) *INCLUSION.—The term ‘quality assur-*
 25 *ance program’ includes any activity carried out*

1 *by or for the Administration to assess the quality*
 2 *of medical care provided by the Administra-*
 3 *tion.”.*

4 ***(b) TECHNICAL AND CONFORMING AMENDMENT.—The***
 5 *table of sections for chapter 313 of title 51, United States*
 6 *Code, is amended by adding at the end the following:*

“31303. Confidentiality of medical quality assurance records.”.

7 ***TITLE VIII—MISCELLANEOUS***
 8 ***PROVISIONS***

9 ***SEC. 801. CONTRACTING AUTHORITY.***

10 *Section 20113 of title 51, United States Code, as*
 11 *amended by section 705, is further amended by adding at*
 12 *the end the following:*

13 ***“(p) CONTRACTING AUTHORITY.—The Administra-***
 14 ***tion—***

15 *“(1) may enter into an agreement with a pri-*
 16 *vate, commercial, or State government entity to pro-*
 17 *vide the entity with supplies, support, and services re-*
 18 *lated to private, commercial, or State government*
 19 *space activities carried out at a property owned or*
 20 *operated by the Administration; and*

21 *“(2) upon the request of such an entity, may in-*
 22 *clude such supplies, support, and services in the re-*
 23 *quirements of the Administration if—*

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

4 “(i) is in the best interest of the Fed-
5 eral Government;

6 “(ii) does not interfere with the re-
7 quirements of the Administration; and

8 “(iii) does not compete with the com-
9 mercial space activities of other such enti-
10 ties; and

11 “(B) the Administration has full reimburs-
12 able funding from the entity that requested sup-
13 plies, support, and services prior to making any
14 obligation for the delivery of such supplies, sup-
15 port, or services under an Administration pro-
16 curement contract or any other agreement.”.

17 **SEC. 802. AUTHORITY FOR TRANSACTION PROTOTYPE**
18 **PROJECTS AND FOLLOW-ON PRODUCTION**
19 **CONTRACTS.**

20 Section 20113 of title 51, United States Code, as
21 amended by section 801, is further amended by adding at
22 the end the following:

23 “(q) TRANSACTION PROTOTYPE PROJECTS AND FOL-
24 LOW-ON PRODUCTION CONTRACTS.—

1 “(1) *IN GENERAL.*—*The Administration may*
 2 *enter into a transaction (other than a contract, coop-*
 3 *erative agreement, or grant) to carry out a prototype*
 4 *project that is directly relevant to enhancing the mis-*
 5 *sion effectiveness of the Administration.*

6 “(2) *SUBSEQUENT AWARD OF FOLLOW-ON PRO-*
 7 *DUCTION CONTRACT.*—*A transaction entered into*
 8 *under this subsection for a prototype project may pro-*
 9 *vide for the subsequent award of a follow-on produc-*
 10 *tion contract to participants in the transaction.*

11 “(3) *INCLUSION.*—*A transaction under this sub-*
 12 *section includes a project awarded to an individual*
 13 *participant and to all individual projects awarded to*
 14 *a consortium of United States industry and academic*
 15 *institutions.*

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

22 “(A) *circumstances justify use of a trans-*
 23 *action to provide an innovative business ar-*
 24 *rangement that would not be feasible or appro-*
 25 *priate under a contract; and*

1 “(B) *the use of the authority of this section*
 2 *is essential to promoting the success of the proto-*
 3 *type project.*

4 “(5) *COMPETITIVE PROCEDURE.—*

5 “(A) *IN GENERAL.—To the maximum ex-*
 6 *tent practicable, the Administrator shall use*
 7 *competitive procedures with respect to entering*
 8 *into a transaction to carry out a prototype*
 9 *project.*

10 “(B) *EXCEPTION.—Notwithstanding section*
 11 *2304 of title 10, United States Code, a follow-on*
 12 *production contract may be awarded to the par-*
 13 *ticipants in the prototype transaction without*
 14 *the use of competitive procedures, if—*

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

18 “(ii) *the participants in the trans-*
 19 *action successfully completed the prototype*
 20 *project provided for in the transaction.*

21 “(6) *COST SHARE.—A transaction to carry out*
 22 *a prototype project and a follow-on production con-*
 23 *tract may require that part of the total cost of the*
 24 *transaction or contract be paid by the participant or*

1 *contractor from a source other than the Federal Gov-*
 2 *ernment.*

3 “(7) *PROCUREMENT ETHICS.*—*A transaction*
 4 *under this authority shall be considered an agency*
 5 *procurement for purposes of chapter 21 of title 41,*
 6 *United States Code, with regard to procurement eth-*
 7 *ics.”.*

8 **SEC. 803. PROTECTION OF DATA AND INFORMATION FROM**
 9 **PUBLIC DISCLOSURE.**

10 (a) *CERTAIN TECHNICAL DATA.*—*Section 20131 of*
 11 *title 51, United States Code, is amended—*

12 (1) *by redesignating subsection (c) as subsection*
 13 (d);

14 (2) *in subsection (a)(3), by striking “subsection*
 15 (b)” and inserting “subsection (b) or (c)”;

16 (3) *by inserting after subsection (b) the fol-*
 17 *lowing:*

18 “(c) *SPECIAL HANDLING OF CERTAIN TECHNICAL*
 19 *DATA.*—

20 “(1) *IN GENERAL.*—*The Administrator may pro-*
 21 *vide appropriate protections against the public dis-*
 22 *semination of certain technical data, including ex-*
 23 *emption from subchapter II of chapter 5 of title 5.*

24 “(2) *DEFINITIONS.*—*In this subsection:*

1 “(A) *CERTAIN TECHNICAL DATA*.—The term
 2 ‘certain technical data’ means technical data
 3 that may not be exported lawfully outside the
 4 United States without approval, authorization,
 5 or license under—

6 “(i) the *Export Control Reform Act of*
 7 2018 (*Public Law 115–232; 132 Stat.*
 8 2208); or

9 “(ii) the *International Security Assist-*
 10 *ance and Arms Export Control Act of 1976*
 11 (*Public Law 94–329; 90 Stat. 729*).

12 “(B) *TECHNICAL DATA*.—The term ‘tech-
 13 nical data’ means any blueprint, drawing, pho-
 14 tograph, plan, instruction, computer software, or
 15 documentation, or any other technical informa-
 16 tion.”;

17 (4) in subsection (d), as so redesignated, by in-
 18 serting “, including any data,” after “information”;
 19 and

20 (5) by adding at the end the following:

21 “(e) *EXCLUSION FROM FOIA*.—This section shall be
 22 considered a statute described in subsection (b)(3)(B) of sec-
 23 tion 552 of title 5 (commonly referred to as the ‘Freedom
 24 of Information Act’).”.

1 (b) *CERTAIN VOLUNTARILY PROVIDED SAFETY-RE-*
 2 *LATED INFORMATION.*—

3 (1) *IN GENERAL.*—*The Administrator shall pro-*
 4 *vide appropriate safeguards against the public dis-*
 5 *semination of safety-related information collected as*
 6 *part of a mishap investigation carried out under the*
 7 *NASA safety reporting system or in conjunction with*
 8 *an organizational safety assessment, if the Adminis-*
 9 *trator makes a written determination, including a*
 10 *justification of the determination, that—*

11 (A)(i) *disclosure of the information would*
 12 *inhibit individuals from voluntarily providing*
 13 *safety-related information; and*

14 (ii) *the ability of NASA to collect such in-*
 15 *formation improves the safety of NASA pro-*
 16 *grams and research relating to aeronautics and*
 17 *space; or*

18 (B) *withholding such information from public*
 19 *disclosure improves the safety of such NASA pro-*
 20 *grams and research.*

21 (2) *OTHER FEDERAL AGENCIES.*—*Notwith-*
 22 *standing any other provision of law, if the Adminis-*
 23 *trator provides to the head of another Federal agency*
 24 *safety-related information with respect to which the*
 25 *Administrator has made a determination under para-*

1 *graph (1), the head of the Federal agency shall with-*
 2 *hold the information from public disclosure.*

3 (3) *PUBLIC AVAILABILITY.*—*A determination*
 4 *under paragraph (1) shall be made available to the*
 5 *public on request, as required under section 552 of*
 6 *title 5, United States Code (commonly referred to as*
 7 *the “Freedom of Information Act”).*

8 (4) *EXCLUSION FROM FOIA.*—*This subsection*
 9 *shall be considered a statute described in subsection*
 10 *(b)(3)(B) of section 552 of title 5, United States Code.*

11 **SEC. 804. PHYSICAL SECURITY MODERNIZATION.**

12 *Chapter 201 of title 51, United States Code, is amend-*
 13 *ed—*

14 (1) *in section 20133(2), by striking “property”*
 15 *and all that follows through “to the United States,”*
 16 *and inserting “Administration personnel or of prop-*
 17 *erty owned or leased by, or under the control of, the*
 18 *United States”; and*

19 (2) *in section 20134, in the second sentence—*

20 (A) *by inserting “Administration personnel*
 21 *or any” after “protecting”; and*

22 (B) *by striking “, at facilities owned or*
 23 *contracted to the Administration”.*

1 **SEC. 805. LEASE OF NON-EXCESS PROPERTY.**

2 Section 20145 of title 51, United States Code, is
3 amended—

4 (1) in paragraph (b)(1)(B), by striking “entered
5 into for the purpose of developing renewable energy
6 production facilities”; and

7 (2) by striking subsection (g).

8 **SEC. 806. CYBERSECURITY.**

9 (a) *IN GENERAL.*—Section 20301 of title 51, United
10 States Code, is amended by adding at the end the following:

11 “(c) *CYBERSECURITY.*—The Administrator shall up-
12 date and improve the cybersecurity of NASA space assets
13 and supporting infrastructure.”.

14 (b) *SECURITY OPERATIONS CENTER.*—

15 (1) *ESTABLISHMENT.*—The Administrator shall
16 maintain a Security Operations Center, to identify
17 and respond to cybersecurity threats to NASA infor-
18 mation technology systems, including institutional
19 systems and mission systems.

20 (2) *INSPECTOR GENERAL RECOMMENDATIONS.*—

21 The Administrator shall implement, to the maximum
22 extent practicable, each of the recommendations con-
23 tained in the report of the Inspector General of NASA
24 entitled “Audit of NASA’s Security Operations Cen-
25 ter”, issued on May 23, 2018.

26 (c) *CYBER THREAT HUNT.*—

1 (1) *IN GENERAL.*—*The Administrator, in coordi-*
2 *nation with the Secretary of Homeland Security and*
3 *the heads of other relevant Federal agencies, may im-*
4 *plement a cyber threat hunt capability to proactively*
5 *search NASA information systems for advanced cyber*
6 *threats that otherwise evade existing security tools.*

7 (2) *THREAT-HUNTING PROCESS.*—*In carrying*
8 *out paragraph (1), the Administrator shall develop*
9 *and document a threat-hunting process, including the*
10 *roles and responsibilities of individuals conducting a*
11 *cyber threat hunt.*

12 (d) *GAO PRIORITY RECOMMENDATIONS.*—*The Admin-*
13 *istrator shall implement, to the maximum extent prac-*
14 *ticable, the recommendations for NASA contained in the re-*
15 *port of the Comptroller General of the United States entitled*
16 *“Information Security: Agencies Need to Improve Controls*
17 *over Selected High-Impact Systems”, issued May 18, 2016,*
18 *including—*

19 (1) *re-evaluating security control assessments;*
20 *and*

21 (2) *specifying metrics for the continuous moni-*
22 *toring strategy of the Administration.*

1 **SEC. 807. LIMITATION ON COOPERATION WITH THE PEO-**
 2 **PLE'S REPUBLIC OF CHINA.**

3 (a) *IN GENERAL.*—*Except as provided by subsection*
 4 *(b), the Administrator, the Director of the Office of Science*
 5 *and Technology Policy, and the Chair of the National Space*
 6 *Council, shall not—*

7 (1) *develop, design, plan, promulgate, imple-*
 8 *ment, or execute a bilateral policy, program, order, or*
 9 *contract of any kind to participate, collaborate, or co-*
 10 *ordinate bilaterally in any manner with—*

11 (A) *the Government of the People's Republic*
 12 *of China; or*

13 (B) *any company—*

14 (i) *owned by the Government of the*
 15 *People's Republic of China; or*

16 (ii) *incorporated under the laws of the*
 17 *People's Republic of China; and*

18 (2) *host official visitors from the People's Repub-*
 19 *lic of China at a facility belonging to or used by*
 20 *NASA.*

21 (b) *WAIVER.*—

22 (1) *IN GENERAL.*—*The Administrator, the Direc-*
 23 *tor, or the Chair may waive the limitation under sub-*
 24 *section (a) with respect to an activity described in*
 25 *that subsection only if the Administrator, the Direc-*

1 *tor, or the Chair, as applicable, makes a determina-*
2 *tion that the activity—*

3 *(A) does not pose a risk of a transfer of*
4 *technology, data, or other information with na-*
5 *tional security or economic security implications*
6 *to an entity described in paragraph (1) of such*
7 *subsection; and*

8 *(B) does not involve knowing interactions*
9 *with officials who have been determined by the*
10 *United States to have direct involvement with*
11 *violations of human rights.*

12 *(2) CERTIFICATION TO CONGRESS.—Not later*
13 *than 30 days after the date on which a waiver is*
14 *granted under paragraph (1), the Administrator, the*
15 *Director, or the Chair, as applicable, shall submit to*
16 *the Committee on Commerce, Science, and Transpor-*
17 *tation and the Committee on Appropriations of the*
18 *Senate and the Committee on Science, Space, and*
19 *Technology and the Committee on Appropriations of*
20 *the House of Representatives a written certification*
21 *that the activity complies with the requirements in*
22 *subparagraphs (A) and (B) of that paragraph.*

23 *(c) GAO REVIEW.—*

24 *(1) IN GENERAL.—The Comptroller General of*
25 *the United States shall conduct a review of NASA*

1 *contracts that may subject the Administration to un-*
 2 *acceptable transfers of intellectual property or tech-*
 3 *nology to any entity—*

4 *(A) owned or controlled (in whole or in*
 5 *part) by, or otherwise affiliated with, the Gov-*
 6 *ernment of the People’s Republic of China; or*

7 *(B) organized under, or otherwise subject to,*
 8 *the laws of the People’s Republic of China.*

9 *(2) ELEMENTS.—The review required under*
 10 *paragraph (1) shall assess—*

11 *(A) whether the Administrator is aware—*

12 *(i) of any NASA contractor that bene-*
 13 *fits from significant financial assistance*
 14 *from—*

15 *(I) the Government of the People’s*
 16 *Republic of China;*

17 *(II) any entity controlled by the*
 18 *Government of the People’s Republic of*
 19 *China; or*

20 *(III) any other governmental enti-*
 21 *ty of the People’s Republic of China;*
 22 *and*

23 *(ii) that the Government of the People’s*
 24 *Republic of China, or an entity controlled*

1 *by the Government of the People's Republic*
2 *of China, may be—*

3 *(I) leveraging United States com-*
4 *panies that share ownership with*
5 *NASA contractors; or*

6 *(II) obtaining intellectual prop-*
7 *erty or technology illicitly or by other*
8 *unacceptable means; and*

9 *(B) the steps the Administrator is taking to*
10 *ensure that—*

11 *(i) NASA contractors are not being le-*
12 *veraged (directly or indirectly) by the Gov-*
13 *ernment of the People's Republic of China*
14 *or by an entity controlled by the Govern-*
15 *ment of the People's Republic of China;*

16 *(ii) the intellectual property and tech-*
17 *nology of NASA contractors are adequately*
18 *protected; and*

19 *(iii) NASA flight-critical components*
20 *are not sourced from the People's Republic*
21 *of China through any entity benefiting from*
22 *Chinese investments, loans, or other assist-*
23 *ance.*

24 *(3) RECOMMENDATIONS.—The Comptroller Gen-*
25 *eral shall provide to the Administrator recommenda-*

1 *tions for future NASA contracting based on the re-*
 2 *sults of the review.*

3 *(4) PLAN.—Not later than 180 days after the*
 4 *date on which the Comptroller General completes the*
 5 *review, the Administrator shall—*

6 *(A) develop a plan to implement the rec-*
 7 *ommendations of the Comptroller General; and*

8 *(B) submit the plan to the appropriate com-*
 9 *mittees of Congress.*

10 **SEC. 808. CONSIDERATION OF ISSUES RELATED TO CON-**
 11 **TRACTING WITH ENTITIES RECEIVING AS-**
 12 **SISTANCE FROM OR AFFILIATED WITH THE**
 13 **PEOPLE’S REPUBLIC OF CHINA.**

14 *In considering any response to a request for proposal,*
 15 *request for information, broad area announcement, or any*
 16 *other form of request or solicitation, and in considering or*
 17 *undertaking any negotiation or conclusion of any contract,*
 18 *agreement, or other transaction with any commercial or*
 19 *non-commercial entity, the Administrator shall, in con-*
 20 *sultation with appropriate Federal departments and agen-*
 21 *cies, take into account the implications of any benefit re-*
 22 *ceived by such commercial or non-commercial entity (or*
 23 *any other commercial or non-commercial entity related*
 24 *through ownership, control, or other affiliation to such enti-*

1 *ty) as a result of a significant loan or other financial assist-*
 2 *ance provided by—*

3 *(1) any governmental organization of the Peo-*
 4 *ple’s Republic of China; or*

5 *(2) any other entity that is—*

6 *(A) owned or controlled by, or otherwise af-*
 7 *filiated with, any governmental organization of*
 8 *the People’s Republic of China; or*

9 *(B) organized under, or otherwise subject to,*
 10 *the laws of the People’s Republic of China.*

11 **SEC. 809. SMALL SATELLITE LAUNCH SERVICES PROGRAM.**

12 *(a) IN GENERAL.—The Administrator shall continue*
 13 *to procure dedicated launch services for small satellites, in-*
 14 *cluding CubeSats, for the purpose of conducting science and*
 15 *technology missions that further the goals of NASA.*

16 *(b) REQUIREMENTS.—In carrying out the program*
 17 *under subsection (a), the Administrator shall—*

18 *(1) engage with the academic community to*
 19 *maximize awareness and use of dedicated small sat-*
 20 *ellite launch opportunities; and*

21 *(2) to the maximum extent practicable, use a sec-*
 22 *ondary payload of procured launch services for*
 23 *CubeSats.*

1 **SEC. 810. 21ST CENTURY SPACE LAUNCH INFRASTRUCTURE.**

2 (a) *IN GENERAL.*—*The Administrator shall carry out*
3 *a program to modernize launch infrastructure at NASA fa-*
4 *cilities—*

5 (1) *to enhance safety; and*

6 (2) *to advance Government and commercial*
7 *space transportation and exploration.*

8 (b) *PROJECTS.*—*Projects funded under the program*
9 *under subsection (a) may include—*

10 (1) *infrastructure relating to commodities;*

11 (2) *standard interfaces to meet customer needs*
12 *for multiple payload processing and launch vehicle*
13 *processing;*

14 (3) *enhancements to range capacity and flexi-*
15 *bility; and*

16 (4) *such other projects as the Administrator con-*
17 *siders appropriate to meet the goals described in sub-*
18 *section (a).*

19 (c) *REQUIREMENTS.*—*In carrying out the program*
20 *under subsection (a), the Administrator shall—*

21 (1) *prioritize investments in projects that can be*
22 *used by multiple users and launch vehicles, including*
23 *non-NASA users and launch vehicles; and*

24 (2) *limit investments to projects that would not*
25 *otherwise be funded by a NASA program, such as an*

1 *institutional or programmatic infrastructure pro-*
2 *gram.*

3 (d) *SAVINGS CLAUSE.*—*Nothing in this section shall*
4 *preclude a NASA program, including the Space Launch*
5 *System and Orion, from using the launch infrastructure*
6 *modernized under this section.*

7 **SEC. 811. MISSIONS OF NATIONAL NEED.**

8 (a) *SENSE OF CONGRESS.*—*It is the Sense of Congress*
9 *that—*

10 (1) *while certain space missions, such as asteroid*
11 *detection or space debris mitigation or removal mis-*
12 *sions, may not provide the highest-value science, as*
13 *determined by the National Academies of Science, En-*
14 *gineering, and Medicine decadal surveys, such mis-*
15 *sions provide tremendous value to the United States*
16 *and the world; and*

17 (2) *the current organizational and funding*
18 *structure of NASA has not prioritized the funding of*
19 *missions of national need.*

20 (b) *STUDY.*—

21 (1) *IN GENERAL.*—*The Director of the Office of*
22 *Science and Technology Policy shall conduct a study*
23 *on the manner in which NASA funds missions of na-*
24 *tional need.*

1 (2) *MATTERS TO BE INCLUDED.*—*The study con-*
2 *ducted under paragraph (1) shall include the fol-*
3 *lowing:*

4 (A) *An identification and assessment of the*
5 *types of missions or technology development pro-*
6 *grams that constitute missions of national need.*

7 (B) *An assessment of the manner in which*
8 *such missions are currently funded and managed*
9 *by NASA.*

10 (C) *An analysis of the options for funding*
11 *missions of national need, including—*

12 (i) *structural changes required to allow*
13 *NASA to fund such missions; and*

14 (ii) *an assessment of the capacity of*
15 *other Federal agencies to make funds avail-*
16 *able for such missions.*

17 (c) *REPORT TO CONGRESS.*—*Not later than 1 year*
18 *after the date of the enactment of this Act, the Director of*
19 *the Office of Science and Technology Policy shall submit*
20 *to the appropriate committees of Congress a report on the*
21 *results of the study conducted under subsection (b), includ-*
22 *ing recommendations for funding missions of national need.*

1 **SEC. 812. EXEMPTION FROM THE IRAN, NORTH KOREA, AND**
 2 **SYRIA NONPROLIFERATION ACT.**

3 *Section 7(1) of the Iran, North Korea, and Syria Non-*
 4 *proliferation Act (Public Law 106–178; 50 U.S.C. 1701*
 5 *note) is amended, in the undesignated matter following sub-*
 6 *paragraph (B), by striking “December 31, 2025” and in-*
 7 *serting “December 31, 2030”.*

8 **SEC. 813. DRINKING WATER WELL REPLACEMENT FOR**
 9 **CHINCOTEAGUE, VIRGINIA.**

10 *Notwithstanding any other provision of law, during*
 11 *the 5-year period beginning on the date of the enactment*
 12 *of this Act, the Administrator may enter into 1 or more*
 13 *agreements with the town of Chincoteague, Virginia, to re-*
 14 *imburse the town for costs that are directly associated*
 15 *with—*

16 *(1) the removal of drinking water wells located*
 17 *on property administered by the Administration; and*

18 *(2) the relocation of such wells to property under*
 19 *the administrative control, through lease, ownership,*
 20 *or easement, of the town.*

21 **SEC. 814. PASSENGER CARRIER USE.**

22 *Section 1344(a)(2) of title 31, United States Code, is*
 23 *amended—*

24 *(1) in subparagraph (A), by striking “or” at the*
 25 *end;*

1 (2) in subparagraph (B), by inserting “or” after
2 the comma at the end; and

3 (3) by inserting after subparagraph (B) the fol-
4 lowing:

5 “(C) necessary for post-flight transportation of
6 United States Government astronauts, and other as-
7 tronauts subject to reimbursable arrangements, re-
8 turning from space for the performance of medical re-
9 search, monitoring, diagnosis, or treatment, or other
10 official duties, prior to receiving post-flight medical
11 clearance to operate a motor vehicle.”.

12 **SEC. 815. USE OF COMMERCIAL NEAR-SPACE BALLOONS.**

13 (a) *SENSE OF CONGRESS.*—It is the sense of Congress
14 that the use of an array of capabilities, including the use
15 of commercially available near-space balloon assets, is in
16 the best interest of the United States.

17 (b) *USE OF COMMERCIAL NEAR-SPACE BALLOONS.*—
18 The Administrator shall use commercially available balloon
19 assets operating at near-space altitudes, to the maximum
20 extent practicable, as part of a diverse set of capabilities
21 to effectively and efficiently meet the goals of the Adminis-
22 tration.

1 **SEC. 816. PRESIDENT'S SPACE ADVISORY BOARD.**

2 *Section 121 of the National Aeronautics and Space*
 3 *Administration Authorization Act, Fiscal Year 1991 (Pub-*
 4 *lic Law 101-611; 51 U.S.C. 20111 note) is amended—*

5 *(1) in the section heading, by striking “USERS’*
 6 *ADVISORY GROUP” and inserting “PRESIDENT’S*
 7 *SPACE ADVISORY BOARD”; and*

8 *(2) by striking “Users’ Advisory Group” each*
 9 *place it appears and inserting “President’s Space Ad-*
 10 *visory Board.”*

11 **SEC. 817. INITIATIVE ON TECHNOLOGIES FOR NOISE AND**
 12 **EMISSIONS REDUCTIONS.**

13 *(a) INITIATIVE REQUIRED.—Section 40112 of title 51,*
 14 *United States Code, is amended—*

15 *(1) by redesignating subsections (b) through (f)*
 16 *as subsections (c) through (g), respectively; and*

17 *(2) by inserting after subsection (a) the following*
 18 *new subsection (b):*

19 *“(b) TECHNOLOGIES FOR NOISE AND EMISSIONS RE-*
 20 *DUCTION.—*

21 *“(1) INITIATIVE REQUIRED.—The Administrator*
 22 *shall establish an initiative to build upon and accel-*
 23 *erate previous or ongoing work to develop and dem-*
 24 *onstrate new technologies, including systems architec-*
 25 *ture, components, or integration of systems and air-*
 26 *frame structures, in electric aircraft propulsion con-*

1 *cepts that are capable of substantially reducing both*
2 *emissions and noise from aircraft.*

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

5 *“(A) Continue and expand work of the Ad-*
6 *ministration on research, development, and dem-*
7 *onstration of electric aircraft concepts, and the*
8 *integration of such concepts.*

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

13 *“(C) Provide guidance to the Federal Avia-*
14 *tion Administration on technologies developed*
15 *and tested pursuant to the initiative.”.*

16 *(b) REPORTS.—Not later than 180 days after the date*
17 *of the enactment of this Act, and annually thereafter as a*
18 *part of the Administration’s budget submission, the Admin-*
19 *istrator shall submit a report to the appropriate committee*
20 *of Congress on the progress of the work under the initiative*
21 *required by subsection (b) of section 40112 of title 51,*
22 *United States Code (as amended by subsection (a) of this*
23 *section), including an updated, anticipated timeframe for*
24 *aircraft entering into service that produce 50 percent less*

1 *noise and emissions than the highest performing aircraft*
 2 *in service as of December 31, 2019.*

3 **SEC. 818. REMEDIATION OF SITES CONTAMINATED WITH**
 4 **TRICHLOROETHYLENE.**

5 (a) *IDENTIFICATION OF SITES.*—Not later than 180
 6 days after the date of the enactment of this Act, the Admin-
 7 istrator shall identify sites of the Administration contami-
 8 nated with trichloroethylene.

9 (b) *REPORT REQUIRED.*—Not later than 1 year after
 10 the date of the enactment of this Act, the Administrator
 11 shall submit to the appropriate committees of Congress a
 12 report that includes—

13 (1) *the recommendations of the Administrator*
 14 *for remediating the sites identified under subsection*
 15 *(a) during the 5-year period beginning on the date of*
 16 *the report; and*

17 (2) *an estimate of the financial resources nec-*
 18 *essary to implement those recommendations.*

19 **SEC. 819. REPORT ON MERITS AND OPTIONS FOR ESTAB-**
 20 **LISHING AN INSTITUTE RELATING TO SPACE**
 21 **RESOURCES.**

22 (a) *REPORT.*—

23 (1) *IN GENERAL.*—Not later than 180 days after
 24 the date of the enactment of this Act, the Adminis-
 25 trator shall submit to the appropriate committees of

1 Congress a report on the merits of, and options for,
2 establishing an institute relating to space resources to
3 advance the objectives of NASA in maintaining
4 United States preeminence in space described in
5 paragraph (3).

6 (2) *MATTERS TO BE INCLUDED.*—The report re-
7 quired by paragraph (1) shall include an assessment
8 by the Administrator as to whether—

9 (A) a virtual or physical institute relating
10 to space resources is most cost effective and ap-
11 propriate; and

12 (B) partnering with institutions of higher
13 education and the aerospace industry, and the
14 extractive industry as appropriate, would be ef-
15 fective in increasing information available to
16 such an institute with respect to advancing the
17 objectives described in paragraph (3).

18 (3) *OBJECTIVES.*—The objectives described in
19 this paragraph are the following:

20 (A) Identifying, developing, and distrib-
21 uting space resources, including by encouraging
22 the development of foundational science and tech-
23 nology.

1 (B) *Reducing the technological risks associ-*
 2 *ated with identifying, developing, and distrib-*
 3 *uting space resources.*

4 (C) *Developing options for using space re-*
 5 *sources—*

6 (i) *to support current and future space*
 7 *architectures, programs, and missions; and*

8 (ii) *to enable architectures, programs,*
 9 *and missions that would not otherwise be*
 10 *possible.*

11 (4) *DEFINITIONS.—In this section:*

12 (A) *EXTRACTIVE INDUSTRY.—The term “ex-*
 13 *tractive industry” means a company or indi-*
 14 *vidual involved in the process of extracting (in-*
 15 *cluding mining, quarrying, drilling, and dredg-*
 16 *ing) space resources.*

17 (B) *INSTITUTION OF HIGHER EDUCATION.—*
 18 *The term “institution of higher education” has*
 19 *the meaning given the term in section 101(a) of*
 20 *the Higher Education Act of 1965 (20 U.S.C.*
 21 *1001(a)).*

22 (C) *SPACE RESOURCE.—*

23 (i) *IN GENERAL.—The term “space re-*
 24 *source” means an abiotic resource in situ in*
 25 *outer space.*

1 (ii) *INCLUSIONS.*—The term “space re-
 2 source” includes a raw material, a natural
 3 material, and an energy source.

4 **SEC. 820. REPORT ON ESTABLISHING CENTER OF EXCEL-**
 5 **LENCE FOR SPACE WEATHER TECHNOLOGY.**

6 (a) *IN GENERAL.*—Not later than 180 days after the
 7 date of the enactment of this Act, the Administrator shall
 8 submit to the appropriate committees of Congress a report
 9 assessing the potential benefits of establishing a NASA cen-
 10 ter of excellence for space weather technology.

11 (b) *GEOGRAPHIC CONSIDERATIONS.*—In the report re-
 12 quired by subsection (a), the Administrator shall consider
 13 the benefits of establishing the center of excellence described
 14 in that subsection in a geographic area—

15 (1) *in close proximity to—*

16 (A) *significant government-funded space*
 17 *weather research activities; and*

18 (B) *institutions of higher education; and*

19 (2) *where NASA may have been previously*
 20 *underrepresented.*

21 **SEC. 821. REVIEW ON PREFERENCE FOR DOMESTIC SUP-**
 22 **PLIERS.**

23 (a) *SENSE OF CONGRESS.*—It is the Sense of Congress
 24 that the Administration should, to the maximum extent

1 *practicable and with due consideration of foreign policy*
2 *goals and obligations under Federal law—*

3 *(1) use domestic suppliers of goods and services;*
4 *and*

5 *(2) ensure compliance with the Federal acquisi-*
6 *tion regulations, including subcontract flow-down*
7 *provisions.*

8 *(b) REVIEW.—*

9 *(1) IN GENERAL.—Not later than 180 days after*
10 *the date of the enactment of this Act, the Adminis-*
11 *trator shall undertake a comprehensive review of the*
12 *domestic supplier preferences of the Administration*
13 *and the obligations of the Administration under the*
14 *Federal acquisition regulations to ensure compliance,*
15 *particularly with respect to Federal acquisition regu-*
16 *lations provisions that apply to foreign-based sub-*
17 *contractors.*

18 *(2) ELEMENTS.—The review under paragraph*
19 *(1) shall include—*

20 *(A) an assessment as to whether the Admin-*
21 *istration has provided funding for infrastructure*
22 *of a foreign-owned company or State-sponsored*
23 *entity in recent years; and*

24 *(B) an analysis of the effects such funding*
25 *has had on domestic service providers.*

1 (c) *REPORT.*—*The Administrator shall submit to the*
2 *appropriate committees of Congress a report on the results*
3 *of the review.*

4 **SEC. 822. REPORT ON UTILIZATION OF COMMERCIAL SPACE**
5 **PORTS LICENSED BY FEDERAL AVIATION AD-**
6 **MINISTRATION.**

7 (a) *IN GENERAL.*—*Not later than 1 year after the date*
8 *of the enactment of this Act, the Administrator shall submit*
9 *to the appropriate committees of Congress a report on the*
10 *benefits of increased utilization of commercial space ports*
11 *licensed by the Federal Aviation Administration for NASA*
12 *civil space missions and operations.*

13 (b) *ELEMENTS.*—*The report required by subsection (a)*
14 *shall include the following:*

15 (1) *A description and assessment of current uti-*
16 *lization of commercial space ports licensed by the*
17 *Federal Aviation Administration for NASA civil*
18 *space missions and operations.*

19 (2) *A description and assessment of the benefits*
20 *of increased utilization of such space ports for such*
21 *missions and operations.*

22 (3) *A description and assessment of the steps*
23 *necessary to achieve increased utilization of such*
24 *space ports for such missions and operations.*

1 **SEC. 823. ACTIVE ORBITAL DEBRIS MITIGATION.**

2 (a) *SENSE OF CONGRESS.*—*It is the sense of Congress*
3 *that—*

4 (1) *orbital debris, particularly in low-Earth*
5 *orbit, poses a hazard to NASA missions, particularly*
6 *human spaceflight; and*

7 (2) *progress has been made on the development*
8 *of guidelines for long-term space sustainability*
9 *through the United Nations Committee on the Peace-*
10 *ful Uses of Outer Space.*

11 (b) *REQUIREMENTS.*—*The Administrator should—*

12 (1) *ensure the policies and standard practices of*
13 *NASA meet or exceed international guidelines for*
14 *spaceflight safety; and*

15 (2) *support the development of orbital debris*
16 *mitigation technologies through continued research*
17 *and development of concepts.*

18 (c) *REPORT TO CONGRESS.*—*Not later than 90 days*
19 *after the date of the enactment of this Act, the Adminis-*
20 *trator shall submit to the appropriate committees of Con-*
21 *gress a report on the status of implementing subsection (b).*

22 **SEC. 824. STUDY ON COMMERCIAL COMMUNICATIONS SERV-**
23 **ICES.**

24 (a) *SENSE OF CONGRESS.*—*It is the sense of Congress*
25 *that—*

1 (1) *enhancing the ability of researchers to con-*
2 *duct and interact with experiments while in flight*
3 *would make huge advancements in the overall profit-*
4 *ability of conducting research on suborbit and low-*
5 *Earth orbit payloads; and*

6 (2) *current NASA communications do not allow*
7 *for real-time data collection, observation, or trans-*
8 *mission of information.*

9 (b) *STUDY.*—*The Administrator shall conduct a study*
10 *on the feasibility, impact, and cost of using commercial*
11 *communications programs services for suborbital flight pro-*
12 *grams and low-Earth orbit research.*

13 (c) *REPORT.*—*Not later than 18 months after the date*
14 *of the enactment of this Act, the Administrator shall submit*
15 *to Congress and make publicly available a report that de-*
16 *scribes the results of the study conducted under subsection*
17 *(b).*

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[Report No. 116-262]

A BILL

To authorize programs of the National Aeronautics
and Space Administration, and for other purposes.

SEPTEMBER 8, 2020

Reported with an amendment