

**AMENDMENT IN THE NATURE OF A SUBSTITUTE**  
**TO H.R. \_\_\_\_\_**  
**OFFERED BY Ms. EDDIE BERNICE JOHNSON OF**  
**TEXAS**

Strike all after the enacting clause and insert the following:

**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 for 2016 and 2017”.

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

Sec. 1. Short title; table of contents.

Sec. 2. Definitions.

TITLE I—AUTHORIZATION OF APPROPRIATIONS

Sec. 101. Fiscal year 2016.

Sec. 102. Fiscal year 2017.

TITLE II—HUMAN SPACE FLIGHT

Subtitle A—Exploration

Sec. 201. Space exploration policy.

Sec. 202. Stepping stone approach to exploration.

Sec. 203. Space Launch System.

Sec. 204. Orion crew vehicle.

Sec. 205. Space radiation.

Sec. 206. Planetary protection for human exploration missions.

Subtitle B—Space Operations

Sec. 211. International Space Station.

Sec. 212. Barriers impeding enhanced utilization of the ISS’s National Laboratory by commercial companies.

Sec. 213. Utilization of International Space Station for science missions.

- Sec. 214. International Space Station cargo resupply services lessons learned.
- Sec. 215. Commercial crew program.
- Sec. 216. Space communications.

TITLE III—SCIENCE

Subtitle A—General

- Sec. 301. Science portfolio.
- Sec. 302. Radioisotope power systems.
- Sec. 303. Congressional declaration of policy and purpose.
- Sec. 304. University class science missions.
- Sec. 305. Assessment of science mission extensions.

Subtitle B—Astrophysics

- Sec. 311. Decadal cadence.
- Sec. 312. Extrasolar planet exploration strategy.
- Sec. 313. James Webb Space Telescope.
- Sec. 314. National Reconnaissance Office telescope donation.
- Sec. 315. Wide-Field Infrared Survey Telescope.
- Sec. 316. Stratospheric Observatory for Infrared Astronomy.

Subtitle C—Planetary Science

- Sec. 321. Decadal cadence.
- Sec. 322. Near-Earth objects.
- Sec. 323. Near-Earth objects public-private partnerships.
- Sec. 324. Research on near-Earth object tsunami effects.
- Sec. 325. Astrobiology strategy.
- Sec. 326. Astrobiology public-private partnerships.
- Sec. 327. Assessment of Mars architecture.

Subtitle D—Heliophysics

- Sec. 331. Decadal cadence.
- Sec. 332. Review of space weather.

Subtitle E—Earth Science

- Sec. 341. Goal.
- Sec. 342. Decadal cadence.
- Sec. 343. Venture class missions.
- Sec. 344. Assessment.

TITLE IV—AERONAUTICS

- Sec. 401. Sense of Congress.
- Sec. 402. Aeronautics research goals.
- Sec. 403. Unmanned aerial systems research and development.
- Sec. 404. Research program on composite materials used in aeronautics.
- Sec. 405. Hypersonic research.
- Sec. 406. Supersonic research.
- Sec. 407. Research on NextGen airspace management concepts and tools.
- Sec. 408. Rotorcraft research.
- Sec. 409. Transformative aeronautics research.
- Sec. 410. Study of United States leadership in aeronautics research.

## TITLE V—SPACE TECHNOLOGY

- Sec. 501. Sense of Congress.
- Sec. 502. Space Technology Program.
- Sec. 503. Utilization of the International Space Station for technology demonstrations.

## TITLE VI—EDUCATION

- Sec. 601. Education.
- Sec. 602. Independent review of the National Space Grant College and Fellowship Program.
- Sec. 603. Sense of Congress.

## TITLE VII—POLICY PROVISIONS

- Sec. 701. Asteroid Retrieval Mission.
- Sec. 702. Termination liability sense of Congress.
- Sec. 703. Baseline and cost controls.
- Sec. 704. Project and program reserves.
- Sec. 705. Independent reviews.
- Sec. 706. Commercial technology transfer program.
- Sec. 707. National Aeronautics and Space Administration Advisory Council.
- Sec. 708. Cost estimation.
- Sec. 709. Avoiding organizational conflicts of interest in major Administration acquisition programs.
- Sec. 710. Facilities and infrastructure.
- Sec. 711. Detection and avoidance of counterfeit electronic parts.
- Sec. 712. Space Act Agreements.
- Sec. 713. Human spaceflight accident investigations.
- Sec. 714. Fullest commercial use of space.
- Sec. 715. Orbital debris.
- Sec. 716. Review of orbital debris removal concepts.
- Sec. 717. Use of operational commercial suborbital vehicles for research, development, and education.
- Sec. 718. Fundamental space life and physical sciences research.
- Sec. 719. Restoring commitment to engineering research.
- Sec. 720. Liquid rocket engine development program.
- Sec. 721. Remote satellite servicing demonstrations.
- Sec. 722. Information technology governance.
- Sec. 723. Strengthening Administration security.
- Sec. 724. Prohibition on use of funds for contractors that have committed fraud or other crimes.
- Sec. 725. Protection of Apollo landing sites.
- Sec. 726. Astronaut occupational healthcare.
- Sec. 727. Sense of Congress on access to observational data sets.

**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 Administra-  
6           tion.

7           (3) ORION CREW VEHICLE.—The term “Orion  
8           crew vehicle” means the multipurpose crew vehicle  
9           described in section 303 of the National Aeronautics  
10          and Space Administration Authorization Act of 2010  
11          (42 U.S.C. 18323).

12          (4) SPACE ACT AGREEMENT.—The term “Space  
13          Act Agreement” means an agreement created under  
14          the authority to enter into “other transactions”  
15          under section 20113(e) of title 51, United States  
16          Code.

17          (5) SPACE LAUNCH SYSTEM.—The term “Space  
18          Launch System” means the follow-on Government-  
19          owned civil launch system developed, managed, and  
20          operated by the Administration to serve as a key  
21          component to expand human presence beyond low-  
22          Earth orbit, as described in section 302 of the Na-  
23          tional Aeronautics and Space Administration Au-  
24          thorization Act of 2010 (42 U.S.C. 18322).

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

3       **SEC. 101. FISCAL YEAR 2016.**

4           Except as provided in section 103, there are author-  
5 ized to be appropriated to the Administration for fiscal  
6 year 2016 \$19,584,800,000 as follows:

7           (1) For Space Exploration, \$5,303,100,000, of  
8 which—

9                   (A) \$1,900,000,000 shall be for the Space  
10           Launch System;

11                   (B) \$410,100,000 shall be for Exploration  
12           Ground Systems;

13                   (C) \$1,350,000,000 shall be for the Orion  
14           crew vehicle;

15                   (D) \$399,200,000 shall be for Exploration  
16           Research and Development; and

17                   (E) \$1,243,800,000 shall be for Commer-  
18           cial Crew Development activities.

19           (2) For Space Operations, \$3,992,500,000.

20           (3) For Science, \$5,449,000,000, of which—

21                   (A) \$1,947,300,000 shall be for Earth  
22           Science;

23                   (B) \$1,500,000,000 shall be for Planetary  
24           Science, with up to \$30,000,000 for the  
25           Astrobiology Institute;

1 (C) \$730,700,000 shall be for Astro-  
2 physics;

3 (D) \$620,000,000 shall be for the James  
4 Webb Space Telescope; and

5 (E) \$651,000,000 shall be for  
6 Heliophysics.

7 (4) For Aeronautics, \$651,000,000.

8 (5) For Space Technology, \$724,800,000.

9 (6) For Education, \$119,000,000.

10 (7) For Safety, Security, and Mission Services,  
11 \$2,843,100,000.

12 (8) For Construction and Environmental Com-  
13 pliance and Restoration, \$465,300,000.

14 (9) For Inspector General, \$37,000,000.

15 **SEC. 102. FISCAL YEAR 2017.**

16 Except as provided in section 103, there are author-  
17 ized to be appropriated to the Administration for fiscal  
18 year 2017 \$19,587,800,000 as follows:

19 (1) For Space Exploration, \$5,268,800,000, of  
20 which—

21 (A) \$1,900,000,000 shall be for the Space  
22 Launch System;

23 (B) \$432,300,000 shall be for Exploration  
24 Ground Systems;

1 (C) \$1,350,000,000 shall be for the Orion  
2 crew vehicle;

3 (D) \$401,700,000 shall be for Exploration  
4 Research and Development; and

5 (E) \$1,184,800,000 shall be for Commer-  
6 cial Crew Development activities.

7 (2) For Space Operations, \$3,992,500,000.

8 (3) For Science, \$5,452,000,000, of which—

9 (A) \$1,966,700,000 shall be for Earth  
10 Science;

11 (B) \$1,500,000,000 shall be for Planetary  
12 Science, with up to \$30,000,000 for the  
13 Astrobiology Institute;

14 (C) \$730,700,000 shall be for Astro-  
15 physics;

16 (D) \$569,400,000 shall be for the James  
17 Webb Space Telescope; and

18 (E) \$685,200,000 shall be for  
19 Heliophysics.

20 (4) For Aeronautics, \$661,000,000.

21 (5) For Space Technology, \$735,700,000.

22 (6) For Education, \$119,000,000.

23 (7) For Safety, Security, and Mission Services,  
24 \$2,885,700,000.

1           (8) For Construction and Environmental Com-  
2           pliance and Restoration, \$436,100,000.

3           (9) For Inspector General, \$37,000,000.

4           **TITLE II—HUMAN SPACE FLIGHT**  
5                           **Subtitle A—Exploration**

6           **SEC. 201. SPACE EXPLORATION POLICY.**

7           (a) **POLICY.**—Human exploration deeper into the  
8           Solar System shall be a core mission of the Administra-  
9           tion. It is the policy of the United States that the goal  
10          of the Administration’s exploration program shall be to  
11          successfully conduct a crewed mission to the surface of  
12          Mars to begin human exploration of that planet. The use  
13          of the surface of the Moon, cis-lunar space, near-Earth  
14          asteroids, Lagrangian points, and Martian moons may be  
15          pursued provided they are properly incorporated into the  
16          Human Exploration Roadmap described in section 70504  
17          of title 51, United States Code.

18          (b) **VISION FOR SPACE EXPLORATION.**—Section  
19          20302 of title 51, United States Code, is amended by add-  
20          ing at the end the following:

21               “(c) **DEFINITIONS.**—In this section:

22                       “(1) **ORION CREW VEHICLE.**—The term ‘Orion  
23                       crew vehicle’ means the multipurpose crew vehicle  
24                       described in section 303 of the National Aeronautics

1 and Space Administration Authorization Act of 2010  
2 (42 U.S.C. 18323).

3 “(2) SPACE LAUNCH SYSTEM.—The term  
4 ‘Space Launch System’ means the follow-on Govern-  
5 ment-owned civil launch system developed, managed,  
6 and operated by the Administration to serve as a  
7 key component to expand human presence beyond  
8 low-Earth orbit, as described in section 302 of the  
9 National Aeronautics and Space Administration Au-  
10 thorization Act of 2010 (42 U.S.C. 18322).”.

11 (c) KEY OBJECTIVES.—Section 202(b) of the Na-  
12 tional Aeronautics and Space Administration Authoriza-  
13 tion Act of 2010 (42 U.S.C. 18312(b)) is amended—

14 (1) in paragraph (3), by striking “and” after  
15 the semicolon;

16 (2) in paragraph (4), by striking the period at  
17 the end and inserting “; and”; and

18 (3) by adding at the end the following:

19 “(5) to accelerate the development of capabili-  
20 ties to enable a human exploration mission to the  
21 surface of Mars and beyond through the  
22 prioritization of those technologies and capabilities  
23 best suited for such a mission in accordance with the  
24 Human Exploration Roadmap under section 70504  
25 of title 51, United States Code.”.

1 (d) USE OF NON-UNITED STATES HUMAN SPACE  
2 FLIGHT TRANSPORTATION CAPABILITIES.—Section  
3 201(a) of the National Aeronautics and Space Administra-  
4 tion Authorization Act of 2010 (42 U.S.C. 18311(a)) is  
5 amended to read as follows:

6 “(a) USE OF NON-UNITED STATES HUMAN SPACE  
7 FLIGHT TRANSPORTATION CAPABILITIES.—

8 “(1) IN GENERAL.—NASA may not obtain non-  
9 United States human space flight capabilities unless  
10 no domestic commercial or public-private partnership  
11 provider that the Administrator has determined to  
12 meet safety and affordability requirements estab-  
13 lished by NASA for the transport of its astronauts  
14 is available to provide such capabilities.

15 “(2) DEFINITION.—For purposes of this sub-  
16 section, the term ‘domestic commercial provider’  
17 means a person providing space transportation serv-  
18 ices or other space-related activities, the majority  
19 control of which is held by persons other than a  
20 Federal, State, local, or foreign government, foreign  
21 company, or foreign national.”.

22 (e) REPEAL OF SPACE SHUTTLE CAPABILITY ASSUR-  
23 ANCE.—Section 203 of the National Aeronautics and  
24 Space Administration Authorization Act of 2010 (42  
25 U.S.C. 18313) is amended—

- 1 (1) by striking subsection (b);
- 2 (2) in subsection (d), by striking “subsection
- 3 (c)” and inserting “subsection (b)”; and
- 4 (3) by redesignating subsections (c) and (d) as
- 5 subsections (b) and (c), respectively.

6 **SEC. 202. STEPPING STONE APPROACH TO EXPLORATION.**

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

9 **“§ 70504. Stepping stone approach to exploration**

10 “(a) IN GENERAL.—In order to maximize the cost  
11 effectiveness of the long-term space exploration and utili-  
12 zation activities of the United States, the Administrator  
13 shall direct the Human Exploration and Operations Mis-  
14 sion Directorate, or its successor division, to develop a  
15 Human Exploration Roadmap to define the specific capa-  
16 bilities and technologies necessary to extend human pres-  
17 ence to the surface of Mars and the sets and sequences  
18 of missions required to demonstrate such capabilities and  
19 technologies.

20 “(b) INTERNATIONAL PARTICIPATION.—The Presi-  
21 dent should invite the United States partners in the Inter-  
22 national Space Station program and other nations, as ap-  
23 propriate, to participate in an international initiative  
24 under the leadership of the United States to achieve the

1 goal of successfully conducting a crewed mission to the  
2 surface of Mars.

3 “(c) ROADMAP REQUIREMENTS.—In developing the  
4 Human Exploration Roadmap, the Administrator shall—

5 “(1) include the specific set of capabilities and  
6 technologies that contribute to extending human  
7 presence to the surface of Mars and the sets and se-  
8 quences of missions necessary to demonstrate the  
9 proficiency of these capabilities and technologies  
10 with an emphasis on using or not using the Inter-  
11 national Space Station, lunar landings, cis-lunar  
12 space, trans-lunar space, Lagrangian points, and the  
13 natural satellites of Mars, Phobos and Deimos, as  
14 testbeds, as necessary, and shall include the most  
15 appropriate process for developing such capabilities  
16 and technologies;

17 “(2) include information on the phasing of  
18 planned intermediate destinations, Mars mission risk  
19 areas and potential risk mitigation approaches, tech-  
20 nology requirements and phasing of required tech-  
21 nology development activities, the management strat-  
22 egy to be followed, related International Space Sta-  
23 tion activities, and planned international collabo-  
24 rative activities, potential commercial contributions,  
25 and other activities relevant to the achievement of

1 the goal established in section 201(a) of the Na-  
2 tional Aeronautics and Space Administration Au-  
3 thorization Act for 2016 and 2017;

4 “(3) describe those technologies already under  
5 development across the Federal Government or by  
6 nongovernment entities which meet or exceed the  
7 needs described in paragraph (1);

8 “(4) provide a specific process for the evolution  
9 of the capabilities of the fully integrated Orion crew  
10 vehicle with the Space Launch System and how  
11 these systems demonstrate the capabilities and tech-  
12 nologies described in paragraph (1);

13 “(5) provide a description of the capabilities  
14 and technologies that need to be demonstrated or re-  
15 search data that could be gained through the utiliza-  
16 tion of the International Space Station and the sta-  
17 tus of the development of such capabilities and tech-  
18 nologies;

19 “(6) describe a framework for international co-  
20 operation in the development of all technologies and  
21 capabilities required in this section, as well as an as-  
22 sessment of the risks posed by relying on inter-  
23 national partners for capabilities and technologies on  
24 the critical path of development;

1           “(7) describe a process for utilizing nongovern-  
2           mental entities for future human exploration beyond  
3           lunar landings and cis-lunar space and specify what,  
4           if any, synergy could be gained from—

5                   “(A) partnerships using Space Act Agree-  
6                   ments (as defined in section 2 of the National  
7                   Aeronautics and Space Administration Author-  
8                   ization Act for 2016 and 2017); or

9                   “(B) other acquisition instruments;

10           “(8) include in the Human Exploration Road-  
11           map an addendum from the National Aeronautics  
12           and Space Administration Advisory Council, and an  
13           addendum from the Aerospace Safety Advisory  
14           Panel, each with a statement of review of the  
15           Human Exploration Roadmap that shall include—

16                   “(A) subjects of agreement;

17                   “(B) areas of concern; and

18                   “(C) recommendations; and

19           “(9) include in the Human Exploration Road-  
20           map an examination of the benefits of utilizing cur-  
21           rent Administration launch facilities for trans-lunar  
22           missions.

23           “(d) UPDATES.—The Administrator shall update  
24           such Human Exploration Roadmap as needed but no less  
25           frequently than every 2 years and include it in the budget

1 for that fiscal year transmitted to Congress under section  
2 1105(a) of title 31, and describe—

3 “(1) the achievements and goals reached in the  
4 process of developing such capabilities and tech-  
5 nologies during the 2-year period prior to the sub-  
6 mission of the update to Congress; and

7 “(2) the expected goals and achievements in the  
8 following 2-year period.

9 “(e) DEFINITIONS.—In this section, the terms ‘Orion  
10 crew vehicle’ and ‘Space Launch System’ have the mean-  
11 ings given such terms in section 20302.”.

12 (b) REPORT.—

13 (1) IN GENERAL.—Not later than 180 days  
14 after the date of enactment of this Act, the Adminis-  
15 trator shall transmit a copy of the Human Explo-  
16 ration Roadmap developed under section 70504 of  
17 title 51, United States Code, to the Committee on  
18 Science, Space, and Technology of the House of  
19 Representatives and the Committee on Commerce,  
20 Science, and Transportation of the Senate.

21 (2) UPDATES.—The Administrator shall trans-  
22 mit a copy of each updated Human Exploration  
23 Roadmap to the Committee on Science, Space, and  
24 Technology of the House of Representatives and the  
25 Committee on Commerce, Science, and Transpor-

1 tation of the Senate not later than 7 days after such  
2 Human Exploration Roadmap is updated.

3 **SEC. 203. SPACE LAUNCH SYSTEM.**

4 (a) FINDINGS.—Congress finds that—

5 (1) the Space Launch System is the most prac-  
6 tical approach to reaching the Moon, Mars, and be-  
7 yond, and Congress reaffirms the policy and min-  
8 imum capability requirements for the Space Launch  
9 System contained in section 302 of the National  
10 Aeronautics and Space Administration Authorization  
11 Act of 2010 (42 U.S.C. 18322);

12 (2) the primary goal for the design of the fully  
13 integrated Space Launch System, including an  
14 upper stage needed to go beyond low-Earth orbit, is  
15 to safely carry a total payload to enable human  
16 space exploration of the Moon, Mars, and beyond  
17 over the course of the next century as required in  
18 section 302(c) of the National Aeronautics and  
19 Space Administration Authorization Act of 2010 (42  
20 U.S.C. 18322(c)); and

21 (3) in order to promote safety and reduce pro-  
22 grammatic risk, the Administrator shall budget for  
23 and undertake a robust ground test and uncrewed  
24 and crewed flight test and demonstration program  
25 for the Space Launch System and the Orion crew

1 vehicle and shall budget for an operational flight  
2 rate sufficient to maintain safety and operational  
3 readiness.

4 (b) SENSE OF CONGRESS.—It is the sense of Con-  
5 gress that the President’s annual budget requests for the  
6 Space Launch System and Orion crew vehicle develop-  
7 ment, test, and operational phases should strive to accu-  
8 rately reflect the resource requirements of each of those  
9 phases, consistent with the policy established in section  
10 201(a) of this Act.

11 (c) IN GENERAL.—Given the critical importance of  
12 a heavy-lift launch vehicle and crewed spacecraft to enable  
13 the achievement of the goal established in section 201(a)  
14 of this Act, as well as the accomplishment of intermediate  
15 exploration milestones and the provision of a backup capa-  
16 bility to transfer crew and cargo to the International  
17 Space Station, the Administrator shall make the expedi-  
18 tious development, test, and achievement of operational  
19 readiness of the Space Launch System and the Orion crew  
20 vehicle the highest priority of the exploration program.

21 (d) GOVERNMENT ACCOUNTABILITY OFFICE RE-  
22 VIEW.—Not later than 270 days after the date of enact-  
23 ment of this Act, the Comptroller General shall transmit  
24 to the Committee on Science, Space, and Technology of  
25 the House of Representatives and the Committee on Com-

1 merce, Science, and Transportation of the Senate a report  
2 on the Administration's acquisition of ground systems in  
3 support of the Space Launch System. The report shall as-  
4 sess the extent to which ground systems acquired in sup-  
5 port of the Space Launch System are focused on the direct  
6 support of the Space Launch System and shall identify  
7 any ground support projects or activities that the Admin-  
8 istration is undertaking that do not solely or primarily  
9 support the Space Launch System.

10 (e) UTILIZATION REPORT.—The Administrator, in  
11 consultation with the Secretary of Defense and the Direc-  
12 tor of National Intelligence, shall prepare a report that  
13 addresses the effort and budget required to enable and  
14 utilize a cargo variant of the 130-ton Space Launch Sys-  
15 tem configuration described in section 302(c) of the Na-  
16 tional Aeronautics and Space Administration Authoriza-  
17 tion Act of 2010 (42 U.S.C. 18322(c)). This report shall  
18 also include consideration of the technical requirements of  
19 the scientific and national security communities related to  
20 such Space Launch System and shall directly assess the  
21 utility and estimated cost savings obtained by using such  
22 Space Launch System for national security and space  
23 science missions. The Administrator shall transmit such  
24 report to the Committee on Science, Space, and Tech-  
25 nology of the House of Representatives and the Committee

1 on Commerce, Science, and Transportation of the Senate  
2 not later than 180 days after the date of enactment of  
3 this Act.

4 (f) NAMING COMPETITION.—Beginning not later  
5 than 180 days after the date of enactment of this Act and  
6 concluding not later than 1 year after such date of enact-  
7 ment, the Administrator shall conduct a well-publicized  
8 competition among students in elementary and secondary  
9 schools to name the elements of the Administration’s ex-  
10 ploration program, including—

11 (1) a name for the deep space human explo-  
12 ration program as a whole, which includes the Space  
13 Launch System, the Orion crew vehicle, and future  
14 missions; and

15 (2) a name for the Space Launch System.

16 (g) ADVANCED BOOSTER COMPETITION.—

17 (1) REPORT.—Not later than 90 days after the  
18 date of enactment of this Act, the Associate Admin-  
19 istrator of the Administration shall transmit to the  
20 Committee on Science, Space, and Technology of the  
21 House of Representatives and the Committee on  
22 Commerce, Science, and Transportation of the Sen-  
23 ate a report that—

1 (A) describes the estimated total develop-  
2 ment cost of an advanced booster for the Space  
3 Launch System;

4 (B) details any reductions or increases to  
5 the development cost of the Space Launch Sys-  
6 tem which may result from conducting a com-  
7 petition for an advanced booster; and

8 (C) outlines any potential schedule delay to  
9 the Space Launch System 2018 Exploration  
10 Mission-1 launch as a result of increased costs  
11 associated with conducting a competition for an  
12 advanced booster.

13 (2) COMPETITION.—If the Associate Adminis-  
14 trator reports reductions pursuant to paragraph  
15 (1)(B), and no adverse schedule impact pursuant to  
16 paragraph (1)(C), then the Administration shall con-  
17 duct a full and open competition for an advanced  
18 booster for the Space Launch System to meet the  
19 requirements described in section 302(c) of the Na-  
20 tional Aeronautics and Space Administration Au-  
21 thorization Act of 2010 (42 U.S.C. 18322(c)), to  
22 begin as soon as practicable after the development of  
23 the upper stage has been initiated.

1 **SEC. 204. ORION CREW VEHICLE.**

2 (a) IN GENERAL.—The Orion crew vehicle shall meet  
3 the needs and the minimum capability requirements de-  
4 scribed in section 303 of the National Aeronautics and  
5 Space Administration Authorization Act of 2010 (42  
6 U.S.C. 18323).

7 (b) REPORT.—Not later than 60 days after the date  
8 of enactment of this Act, the Administrator shall transmit  
9 a report to the Committee on Science, Space, and Tech-  
10 nology of the House of Representatives and the Committee  
11 on Commerce, Science, and Transportation of the Sen-  
12 ate—

13 (1) detailing those components and systems of  
14 the Orion crew vehicle that ensure it is in compli-  
15 ance with section 303(b) of such Act (42 U.S.C.  
16 18323(b));

17 (2) detailing the expected date that the Orion  
18 crew vehicle will be available to transport crew and  
19 cargo to the International Space Station; and

20 (3) certifying that the requirements of section  
21 303(b)(3) of such Act (42 U.S.C. 18323(b)(3)) will  
22 be met by the Administration.

23 **SEC. 205. SPACE RADIATION.**

24 (a) STRATEGY AND PLAN.—

25 (1) IN GENERAL.—The Administrator shall de-  
26 velop a space radiation mitigation and management

1 strategy and implementation plan to enable the  
2 achievement of the goal established in section 201  
3 that includes key research and monitoring require-  
4 ments, milestones, a timetable, and an estimate of  
5 facility and budgetary requirements.

6 (2) COORDINATION.—The strategy shall include  
7 a mechanism for coordinating Administration re-  
8 search, technology, facilities, engineering, operations,  
9 and other functions required to support the strategy  
10 and plan.

11 (3) TRANSMITTAL.—Not later than 1 year after  
12 the date of enactment of this Act, the Administrator  
13 shall transmit the strategy and plan to the Com-  
14 mittee on Science, Space, and Technology of the  
15 House of Representatives and the Committee on  
16 Commerce, Science, and Transportation of the Sen-  
17 ate.

18 (b) SPACE RADIATION RESEARCH FACILITIES.—The  
19 Administrator, in consultation with the heads of other ap-  
20 propriate Federal agencies, shall assess the national capa-  
21 bilities for carrying out critical ground-based research on  
22 space radiation biology and shall identify any issues that  
23 could affect the ability to carry out that research.

1 **SEC. 206. PLANETARY PROTECTION FOR HUMAN EXPLO-**  
2 **RATION MISSIONS.**

3 (a) STUDY.—The Administrator shall enter into an  
4 arrangement with the National Academies for a study to  
5 explore the planetary protection ramifications of potential  
6 future missions by astronauts such as to the lunar polar  
7 regions, near-Earth asteroids, the moons of Mars, and the  
8 surface of Mars.

9 (b) SCOPE.—The study shall—

10 (1) collate and summarize what has been done  
11 to date with respect to planetary protection meas-  
12 ures to be applied to potential human missions such  
13 as to the lunar polar regions, near-Earth asteroids,  
14 the moons of Mars, and the surface of Mars;

15 (2) identify and document planetary protection  
16 concerns associated with potential human missions  
17 such as to the lunar polar regions, near-Earth aster-  
18 oids, the moons of Mars, and the surface of Mars;

19 (3) develop a methodology, if possible, for defin-  
20 ing and classifying the degree of concern associated  
21 with each likely destination;

22 (4) assess likely methodologies for addressing  
23 planetary protection concerns; and

24 (5) identify areas for future research to reduce  
25 current uncertainties.

1 (c) COMPLETION DATE.—Not later than 2 years  
2 after the date of enactment of this Act, the Administrator  
3 shall provide the results of the study to the Committee  
4 on Science, Space, and Technology of the House of Rep-  
5 resentatives and the Committee on Commerce, Science,  
6 and Transportation of the Senate.

## 7 **Subtitle B—Space Operations**

### 8 **SEC. 211. INTERNATIONAL SPACE STATION.**

9 (a) FINDINGS.—Congress finds the following:

10 (1) The International Space Station is an ideal  
11 testbed for future exploration systems development,  
12 including long-duration space travel.

13 (2) The use of the private market to provide  
14 cargo and crew transportation services is currently  
15 the most expeditious process to restore domestic ac-  
16 cess to the International Space Station and low-  
17 Earth orbit.

18 (3) Government access to low-Earth orbit is  
19 paramount to the continued success of the Inter-  
20 national Space Station and National Laboratory.

21 (b) IN GENERAL.—The following is the policy of the  
22 United States:

23 (1) The United States International Space Sta-  
24 tion program shall have two primary objectives: sup-  
25 porting achievement of the goal established in sec-

1       tion 201 of this Act and pursuing a research pro-  
2       gram that advances knowledge and provides benefits  
3       to the Nation. It shall continue to be the policy of  
4       the United States to, in consultation with its inter-  
5       national partners in the International Space Station  
6       program, support full and complete utilization of the  
7       International Space Station.

8               (2) The International Space Station shall be  
9       utilized to the maximum extent practicable for the  
10      development of capabilities and technologies needed  
11      for the future of human exploration beyond low-  
12      Earth orbit and shall be considered in the develop-  
13      ment of the Human Exploration Roadmap developed  
14      under section 70504 of title 51, United States Code.

15              (3) The Administrator shall, in consultation  
16      with the International Space Station partners—

17                      (A) take all necessary measures to support  
18      the operation and full utilization of the Inter-  
19      national Space Station; and

20                      (B) seek to minimize, to the extent prac-  
21      ticable, the operating costs of the International  
22      Space Station.

23              (4) Reliance on foreign carriers for crew trans-  
24      fer is unacceptable, and the Nation's human space  
25      flight program must acquire the capability to launch

1 United States astronauts on United States rockets  
2 from United States soil as soon as is safe and prac-  
3 tically possible, whether on Government-owned and  
4 operated space transportation systems or privately  
5 owned systems that have been certified for flight by  
6 the appropriate Federal agencies.

7 (c) REAFFIRMATION OF POLICY.—Congress reaf-  
8 firms—

9 (1) its commitment to the development of a  
10 commercially developed launch and delivery system  
11 to the International Space Station for crew missions  
12 as expressed in the National Aeronautics and Space  
13 Administration Authorization Act of 2005 (Public  
14 Law 109–155), the National Aeronautics and Space  
15 Administration Authorization Act of 2008 (Public  
16 Law 110–422), and the National Aeronautics and  
17 Space Administration Authorization Act of 2010  
18 (Public Law 111–267);

19 (2) that the Administration shall make use of  
20 United States commercially provided International  
21 Space Station crew transfer and crew rescue services  
22 to the maximum extent practicable;

23 (3) that the Orion crew vehicle shall provide an  
24 alternative means of delivery of crew and cargo to  
25 the International Space Station, in the event other

1 vehicles, whether commercial vehicles or partner-sup-  
2 plied vehicles, are unable to perform that function;  
3 and

4 (4) the policy stated in section 501(b) of the  
5 National Aeronautics and Space Administration Au-  
6 thorization Act of 2010 (42 U.S.C. 18351(b)) that  
7 the Administration shall pursue international, com-  
8 mercial, and intragovernmental means to maximize  
9 International Space Station logistics supply, mainte-  
10 nance, and operational capabilities, reduce risks to  
11 International Space Station systems sustainability,  
12 and offset and minimize United States operations  
13 costs relating to the International Space Station.

14 (d) ASSURED ACCESS TO LOW-EARTH ORBIT.—Sec-  
15 tion 70501(a) of title 51, United States Code, is amended  
16 to read as follows:

17 “(a) POLICY STATEMENT.—It is the policy of the  
18 United States to maintain an uninterrupted capability for  
19 human space flight and operations in low-Earth orbit, and  
20 beyond, as an essential instrument of national security  
21 and the capability to ensure continued United States par-  
22 ticipation and leadership in the exploration and utilization  
23 of space.”.

24 (e) REPEALS.—

1           (1) USE OF SPACE SHUTTLE OR ALTER-  
2           NATIVES.—Chapter 701 of title 51, United States  
3           Code, and the item relating to such chapter in the  
4           table of chapters for such title, are repealed.

5           (2) SHUTTLE PRICING POLICY FOR COMMER-  
6           CIAL AND FOREIGN USERS.—Chapter 703 of title  
7           51, United States Code, and the item relating to  
8           such chapter in the table of chapters for such title,  
9           are repealed.

10          (3) SHUTTLE PRIVATIZATION.—Section 50133  
11          of title 51, United States Code, and the item relat-  
12          ing to such section in the table of sections for chap-  
13          ter 501 of such title, are repealed.

14          (f) EXTENSION CRITERIA REPORT.—Not later than  
15          1 year after the date of enactment of this Act, the Admin-  
16          istrator shall submit to the Committee on Science, Space,  
17          and Technology of the House of Representatives and the  
18          Committee on Commerce, Science, and Transportation of  
19          the Senate a report on the feasibility of extending the op-  
20          eration of the International Space Station that includes—

21                 (1) criteria for defining the International Space  
22                 Station as a research success;

23                 (2) any necessary contributions to enabling exe-  
24                 cution of the Human Exploration Roadmap devel-

1       oped under section 70504 of title 51, United States  
2       Code;

3           (3) cost estimates for operating the Inter-  
4       national Space Station to achieve the criteria re-  
5       quired under paragraph (1);

6           (4) cost estimates for extending operations to  
7       2024 and 2030;

8           (5) an assessment of how the defined criteria  
9       under paragraph (1) respond to the National Acad-  
10      emies Decadal Survey on Biological and Physical  
11      Sciences in Space; and

12          (6) an identification of the actions and cost es-  
13      timate needed to deorbit the International Space  
14      Station once a decision is made to deorbit the lab-  
15      oratory.

16      (g) STRATEGIC PLAN FOR INTERNATIONAL SPACE  
17      STATION RESEARCH.—

18          (1) IN GENERAL.—The Director of the Office of  
19      Science and Technology Policy, in consultation with  
20      the Administrator, academia, other Federal agencies,  
21      the International Space Station National Laboratory  
22      Advisory Committee, and other potential stake-  
23      holders, shall develop and transmit to the Committee  
24      on Science, Space, and Technology of the House of  
25      Representatives and the Committee on Commerce,

1 Science, and Transportation of the Senate a stra-  
2 tegic plan for conducting competitive, peer-reviewed  
3 research in physical and life sciences and related  
4 technologies on the International Space Station  
5 through at least 2020.

6 (2) PLAN REQUIREMENTS.—The strategic plan  
7 shall—

8 (A) be consistent with the priorities and  
9 recommendations established by the National  
10 Academies in its Decadal Survey on Biological  
11 and Physical Sciences in Space;

12 (B) provide a research timeline and iden-  
13 tify resource requirements for its implementa-  
14 tion, including the facilities and instrumenta-  
15 tion necessary for the conduct of such research;  
16 and

17 (C) identify—

18 (i) criteria for the proposed research,  
19 including—

20 (I) a justification for the research  
21 to be carried out in the space micro-  
22 gravity environment;

23 (II) the use of model systems;

24 (III) the testing of flight hard-  
25 ware to understand and ensure its

1 functioning in the microgravity envi-  
2 ronment;

3 (IV) the use of controls to help  
4 distinguish among the direct and indi-  
5 rect effects of microgravity, among  
6 other effects of the flight or space en-  
7 vironment;

8 (V) approaches for facilitating  
9 data collection, analysis, and interpre-  
10 tation;

11 (VI) procedures to ensure repeti-  
12 tion of experiments, as needed;

13 (VII) support for timely presen-  
14 tation of the peer-reviewed results of  
15 the research;

16 (VIII) defined metrics for the  
17 success of each study; and

18 (IX) how these activities enable  
19 the Human Exploration Roadmap de-  
20 scribed in section 70504 of title 51,  
21 United States Code;

22 (ii) instrumentation required to sup-  
23 port the measurements and analysis of the  
24 research to be carried out under the stra-  
25 tegic plan;

1                   (iii) the capabilities needed to support  
2                   direct, real-time communications between  
3                   astronauts working on research experi-  
4                   ments onboard the International Space  
5                   Station and the principal investigator on  
6                   the ground;

7                   (iv) a process for involving the exter-  
8                   nal user community in research planning,  
9                   including planning for relevant flight hard-  
10                  ware and instrumentation, and for utiliza-  
11                  tion of the International Space Station,  
12                  free flyers, or other research platforms;

13                  (v) the acquisition strategy the Ad-  
14                  ministration plans to use to acquire any  
15                  new support capabilities which are not  
16                  operational on the International Space Sta-  
17                  tion as of the date of enactment of this  
18                  Act, and the criteria the Administration  
19                  will apply if less than full and open com-  
20                  petition is selected; and

21                  (vi) defined metrics for success of the  
22                  research plan.

1 **SEC. 212. BARRIERS IMPEDING ENHANCED UTILIZATION OF**  
2 **THE ISS'S NATIONAL LABORATORY BY COM-**  
3 **MERCIAL COMPANIES.**

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

6 (1) enhanced utilization of the International  
7 Space Station's National Laboratory requires a full  
8 understanding of the barriers impeding such utiliza-  
9 tion and actions needed to be taken to remove or  
10 mitigate them to the maximum extent practicable;  
11 and

12 (2) doing so will allow the Administration to en-  
13 courage commercial companies to invest in micro-  
14 gravity research using National Laboratory research  
15 facilities.

16 (b) ASSESSMENT.—The Administrator shall enter  
17 into an arrangement with the National Academies for an  
18 assessment to—

19 (1) identify barriers impeding enhanced utiliza-  
20 tion of the International Space Station's National  
21 Laboratory;

22 (2) recommend ways to encourage commercial  
23 companies to make greater use of the International  
24 Space Station's National Laboratory, including cor-  
25 porate investment in microgravity research; and

1           (3) identify any legislative changes that may be  
2           required.

3           (c) TRANSMITTAL.—Not later than 1 year after the  
4           date of enactment of this Act, the Administrator shall  
5           transmit to the Committee on Science, Space, and Tech-  
6           nology of the House of Representatives and the Committee  
7           on Commerce, Science, and Transportation of the Senate  
8           the results of the assessment described in subsection (b).

9           **SEC. 213. UTILIZATION OF INTERNATIONAL SPACE STA-**  
10           **TION FOR SCIENCE MISSIONS.**

11           The Administrator shall utilize the International  
12           Space Station for Science Mission Directorate missions in  
13           low-Earth orbit wherever it is practical and cost effective  
14           to do so.

15           **SEC. 214. INTERNATIONAL SPACE STATION CARGO RESUP-**  
16           **PLY SERVICES LESSONS LEARNED.**

17           Not later than 120 days after the date of enactment  
18           of this Act, the Administrator shall transmit a report to  
19           the Committee on Science, Space, and Technology of the  
20           House of Representatives and the Committee on Com-  
21           merce, Science, and Transportation of the Senate that—

22           (1) identifies the lessons learned to date from  
23           the Commercial Resupply Services contract;

24           (2) indicates whether changes are needed to the  
25           manner in which the Administration procures and

1 manages similar services upon the expiration of the  
2 existing Commercial Resupply Services contract; and  
3 (3) identifies any lessons learned from the Com-  
4 mercial Resupply Services contract that should be  
5 applied to the procurement and management of com-  
6 mercially provided crew transfer services to and  
7 from the International Space Station.

8 **SEC. 215. COMMERCIAL CREW PROGRAM.**

9 (a) SENSE OF CONGRESS.—It is the sense of Con-  
10 gress that once developed and certified to meet the Admin-  
11 istration’s safety and reliability requirements, United  
12 States commercially provided crew transportation systems  
13 offer the potential of serving as the primary means of  
14 transporting American astronauts and international part-  
15 ner astronauts to and from the International Space Sta-  
16 tion and serving as International Space Station emergency  
17 crew rescue vehicles. At the same time, the budgetary as-  
18 sumptions used by the Administration in its planning for  
19 the Commercial Crew Program have consistently assumed  
20 significantly higher funding levels than have been author-  
21 ized and appropriated by Congress. It is the sense of Con-  
22 gress that credibility in the Administration’s budgetary es-  
23 timates for the Commercial Crew Program can be en-  
24 hanced by an independently developed cost estimate. Such

1 credibility in budgetary estimates is an important factor  
2 in understanding program risk.

3 (b) OBJECTIVE.—The objective of the Administra-  
4 tion’s Commercial Crew Program shall be to assist the de-  
5 velopment of at least one crew transportation system to  
6 carry Administration astronauts safely, reliably, and  
7 affordably to and from the International Space Station  
8 and to serve as an emergency crew rescue vehicle as soon  
9 as practicable within the funding levels authorized. The  
10 Administration shall not use any considerations beyond  
11 this objective in the overall acquisition strategy.

12 (c) SAFETY.—Consistent with the findings and rec-  
13 ommendations of the Columbia Accident Investigation  
14 Board, the Administration shall ensure that safety and the  
15 minimization of the probability of loss of crew are the  
16 highest priorities of the commercial crew transportation  
17 program.

18 (d) COST MINIMIZATION.—The Administrator shall  
19 strive through the competitive selection process to mini-  
20 mize the life cycle cost to the Administration through the  
21 planned period of commercially provided crew transpor-  
22 tation services.

23 (e) TRANSPARENCY.—Transparency is the corner-  
24 stone of ensuring a safe and reliable commercial crew  
25 transportation service to the International Space Station.

1 The Administrator shall, to the greatest extent prac-  
2 ticable, ensure that every commercial crew transportation  
3 services provider has provided evidence-based support for  
4 their costs and schedule.

5 (f) INDEPENDENT COST AND SCHEDULE ESTI-  
6 MATE.—

7 (1) REQUIREMENT.—Not later than 60 days  
8 after the date of enactment of this Act, the Adminis-  
9 trator shall arrange for the initiation of an Inde-  
10 pendent Cost and Schedule Estimate for—

11 (A) all activities associated with the devel-  
12 opment, test, demonstration, and certification  
13 of commercial crew transportation systems;

14 (B) transportation and rescue services re-  
15 quired by the Administration for International  
16 Space Station operations through calendar year  
17 2020 or later if Administration requirements so  
18 dictate; and

19 (C) the estimated date of operational read-  
20 iness for the program.

21 (2) TRANSMITTAL.—Not later than 180 days  
22 after initiation of the Independent Cost and Sched-  
23 ule Estimate under paragraph (1), the Adminis-  
24 trator shall transmit the results of the Independent  
25 Cost and Schedule Estimate to the Committee on

1 Science, Space, and Technology of the House of  
2 Representatives and the Committee on Commerce,  
3 Science, and Transportation of the Senate.

4 **SEC. 216. SPACE COMMUNICATIONS.**

5 (a) PLAN.—The Administrator shall develop a plan,  
6 in consultation with relevant Federal agencies, for updat-  
7 ing the Administration’s space communications and navi-  
8 gation architecture for low-Earth orbital and deep space  
9 operations so that it is capable of meeting the Administra-  
10 tion’s communications needs over the next 20 years. The  
11 plan shall include lifecycle cost estimates, milestones, esti-  
12 mated performance capabilities, and 5-year funding pro-  
13 files. The plan shall also include an estimate of the  
14 amounts of any reimbursements the Administration is  
15 likely to receive from other Federal agencies during the  
16 expected life of the upgrades described in the plan. At a  
17 minimum, the plan shall include a description of the fol-  
18 lowing:

19 (1) Steps to sustain the existing space commu-  
20 nications and navigation network and infrastructure  
21 and priorities for how resources will be applied and  
22 cost estimates for the maintenance of existing space  
23 communications network capabilities.

24 (2) Upgrades needed to support space commu-  
25 nications and navigation network and infrastructure

1 requirements, including cost estimates and schedules  
2 and an assessment of the impact on missions if re-  
3 sources are not secured at the level needed.

4 (3) Projected space communications and navi-  
5 gation network requirements for the next 20 years,  
6 including those in support of human space explo-  
7 ration missions.

8 (4) Projected Tracking and Data Relay Sat-  
9 ellite System requirements for the next 20 years, in-  
10 cluding those in support of other relevant Federal  
11 agencies, and cost and schedule estimates to main-  
12 tain and upgrade the Tracking and Data Relay Sat-  
13 ellite System to meet projected requirements.

14 (5) Steps the Administration is taking to meet  
15 future space communications requirements after all  
16 Tracking and Data Relay Satellite System third-gen-  
17 eration communications satellites are operational.

18 (6) Steps the Administration is taking to miti-  
19 gate threats to electromagnetic spectrum use.

20 (b) SCHEDULE.—The Administrator shall transmit  
21 the plan developed under this section to the Committee  
22 on Science, Space, and Technology of the House of Rep-  
23 resentatives and the Committee on Commerce, Science,  
24 and Transportation of the Senate not later than 1 year  
25 after the date of enactment of this Act.

1                   **TITLE III—SCIENCE**  
2                   **Subtitle A—General**

3 **SEC. 301. SCIENCE PORTFOLIO.**

4           (a) BALANCED AND ADEQUATELY FUNDED ACTIVI-  
5 TIES.—Section 803 of the National Aeronautics and Space  
6 Administration Authorization Act of 2010 (124 Stat.  
7 2832) is amended to read as follows:

8 **“SEC. 803. OVERALL SCIENCE PORTFOLIO—SENSE OF THE**  
9                   **CONGRESS.**

10           “Congress reaffirms its sense, expressed in the Na-  
11 tional Aeronautics and Space Administration Authoriza-  
12 tion Act of 2010, that a balanced and adequately funded  
13 set of activities, consisting of research and analysis grants  
14 programs, technology development, small, medium, and  
15 large space missions, and suborbital research activities,  
16 contributes to a robust and productive science program  
17 and serves as a catalyst for innovation and discovery.”.

18           (b) DECADAL SURVEYS.—In proposing the funding  
19 of programs and activities for the Administration for each  
20 fiscal year, the Administrator shall, to the greatest extent  
21 practicable, follow guidance provided in the current  
22 decadal surveys from the National Academies’ Space  
23 Studies Board.

1 **SEC. 302. RADIOISOTOPE POWER SYSTEMS.**

2 (a) SENSE OF CONGRESS.—It is the sense of Con-  
3 gress that conducting deep space exploration requires ra-  
4 dioisotope power systems, and establishing continuity in  
5 the production of the material needed to power these sys-  
6 tems is paramount to the success of these future deep  
7 space missions. It is further the sense of Congress that  
8 Federal agencies supporting the Administration through  
9 the production of such material should do so in a cost ef-  
10 fective manner so as not to impose excessive reimburse-  
11 ment requirements on the Administration.

12 (b) ANALYSIS OF REQUIREMENTS AND RISKS.—The  
13 Director of the Office of Science and Technology Policy  
14 and the Administrator, in consultation with other Federal  
15 agencies, shall conduct an analysis of—

16 (1) the requirements of the Administration for  
17 radioisotope power system material that is needed to  
18 carry out planned, high priority robotic missions in  
19 the solar system and other surface exploration activi-  
20 ties beyond low-Earth orbit; and

21 (2) the risks to missions of the Administration  
22 in meeting those requirements, or any additional re-  
23 quirements, due to a lack of adequate radioisotope  
24 power system material.

25 (c) CONTENTS OF ANALYSIS.—The analysis con-  
26 ducted under subsection (b) shall—

1           (1) detail the Administration's current pro-  
2           jected mission requirements and associated time-  
3           frames for radioisotope power system material;

4           (2) explain the assumptions used to determine  
5           the Administration's requirements for the material,  
6           including—

7                   (A) the planned use of advanced thermal  
8                   conversion technology such as advanced  
9                   thermocouples and Stirling generators and con-  
10                  verters; and

11                   (B) the risks and implications of, and con-  
12                   tingencies for, any delays or unanticipated tech-  
13                   nical challenges affecting or related to the Ad-  
14                   ministration's mission plans for the anticipated  
15                   use of advanced thermal conversion technology;

16           (3) assess the risk to the Administration's pro-  
17           grams of any potential delays in achieving the sched-  
18           ule and milestones for planned domestic production  
19           of radioisotope power system material;

20           (4) outline a process for meeting any additional  
21           Administration requirements for the material;

22           (5) estimate the incremental costs required to  
23           increase the amount of material produced each year,  
24           if such an increase is needed to support additional  
25           Administration requirements for the material;

1           (6) detail how the Administration and other  
2       Federal agencies will manage, operate, and fund  
3       production facilities and the design and development  
4       of all radioisotope power systems used by the Ad-  
5       ministration and other Federal agencies as nec-  
6       essary;

7           (7) specify the steps the Administration will  
8       take, in consultation with the Department of En-  
9       ergy, to preserve the infrastructure and workforce  
10      necessary for production of radioisotope power sys-  
11      tems and ensure that its reimbursements to the De-  
12      partment of Energy associated with such preserva-  
13      tion are equitable and justified; and

14          (8) detail how the Administration has imple-  
15      mented or rejected the recommendations from the  
16      National Research Council's 2009 report titled "Ra-  
17      dioisotope Power Systems: An Imperative for Main-  
18      taining U.S. Leadership in Space Exploration".

19      (d) TRANSMITTAL.—Not later than 180 days after  
20      the date of enactment of this Act, the Administrator shall  
21      transmit the results of the analysis to the Committee on  
22      Science, Space, and Technology of the House of Rep-  
23      resentatives and the Committee on Commerce, Science,  
24      and Transportation of the Senate.

1 **SEC. 303. CONGRESSIONAL DECLARATION OF POLICY AND**  
2 **PURPOSE.**

3 Section 20102(d) of title 51, United States Code, is  
4 amended by adding at the end the following new para-  
5 graph:

6 “(10) The direction of the unique competence  
7 of the Administration to the search for life’s origin,  
8 evolution, distribution, and future in the Universe.  
9 In carrying out this objective, the Administration  
10 may use any practicable ground-based, airborne, or  
11 space-based technical means and spectra of electro-  
12 magnetic radiation.”.

13 **SEC. 304. UNIVERSITY CLASS SCIENCE MISSIONS.**

14 (a) SENSE OF CONGRESS.—It is the sense of Con-  
15 gress that principal investigator-led small orbital science  
16 missions, including CubeSat class, University Explorer  
17 (UNEX) class, Small Explorer (SMEX) class, and Ven-  
18 ture class, offer valuable opportunities to advance science  
19 at low cost, train the next generation of scientists and en-  
20 gineers, and enable participants in the program to acquire  
21 skills in systems engineering and systems integration that  
22 are critical to maintaining the Nation’s leadership in space  
23 and to enhancing the United States innovation and com-  
24 petitiveness abroad.

25 (b) REVIEW OF PRINCIPAL INVESTIGATOR-LED  
26 SMALL ORBITAL SCIENCE MISSIONS.—The Administrator

1 shall conduct a review of the science missions described  
2 in subsection (a). The review shall include—

3           (1) the status, capability, and availability of ex-  
4           isting small orbital science mission programs and  
5           the extent to which each program enables the par-  
6           ticipation of university scientists and students;

7           (2) the opportunities such mission programs  
8           provide for scientific research;

9           (3) the opportunities such mission programs  
10          provide for training and education, including sci-  
11          entific and engineering workforce development, in-  
12          cluding for the Administration's scientific and engi-  
13          neering workforce; and

14          (4) the extent to which commercial applications  
15          such as hosted payloads, free flyers, and data buys  
16          could provide measurable benefits for such mission  
17          programs, while preserving the principle of inde-  
18          pendent peer review as the basis for mission selec-  
19          tion.

20          (c) REPORT.—Not later than 270 days after the date  
21          of enactment of this Act, the Administrator shall transmit  
22          to the Committee on Science, Space, and Technology of  
23          the House of Representatives and the Committee on Com-  
24          merce, Science, and Transportation of the Senate a report  
25          on the review required under subsection (b) and on rec-

1 ommendations to enhance principal investigator-led small  
2 orbital science missions conducted by the Administration  
3 in accordance with the results of the review required by  
4 subsection (b).

5 **SEC. 305. ASSESSMENT OF SCIENCE MISSION EXTENSIONS.**

6 Section 30504 of title 51, United States Code, is  
7 amended to read as follows:

8 **“§ 30504. Assessment of science mission extensions**

9 “(a) ASSESSMENT.—The Administrator shall carry  
10 out biennial reviews within each of the Science divisions  
11 to assess the cost and benefits of extending the date of  
12 the termination of data collection for those missions that  
13 exceed their planned missions’ lifetime. The assessment  
14 shall take into consideration how extending missions im-  
15 pacts the start of future missions.

16 “(b) CONSULTATION AND CONSIDERATION OF PO-  
17 TENTIAL BENEFITS OF INSTRUMENTS ON MISSIONS.—

18 When deciding whether to extend a mission that has an  
19 operational component, the Administrator shall consult  
20 with any affected Federal agency and shall take into ac-  
21 count the potential benefits of instruments on missions  
22 that are beyond their planned mission lifetime.

23 “(c) REPORT.—The Administrator shall transmit to  
24 the Committee on Science, Space, and Technology of the  
25 House of Representatives and the Committee on Com-

1 merce, Science, and Transportation of the Senate, at the  
2 same time as the submission to Congress of the Adminis-  
3 tration’s annual budget request for each fiscal year, a re-  
4 port detailing any assessment required by subsection (a)  
5 that was carried out during the previous year.”.

## 6 **Subtitle B—Astrophysics**

### 7 **SEC. 311. DECADAL CADENCE.**

8 In carrying out section 301(b), the Administrator  
9 shall seek to ensure to the extent practicable a steady ca-  
10 dence of large, medium, and small astrophysics missions.

### 11 **SEC. 312. EXTRASOLAR PLANET EXPLORATION STRATEGY.**

12 (a) STRATEGY.—The Administrator shall enter into  
13 an arrangement with the National Academies to develop  
14 a science strategy for the study and exploration of  
15 extrasolar planets, including the use of the Transiting  
16 Exoplanet Survey Satellite, the James Webb Space Tele-  
17 scope, a potential Wide-Field Infrared Survey Telescope  
18 mission, or any other telescope, spacecraft, or instrument  
19 as appropriate. Such strategy shall—

20 (1) outline key scientific questions;

21 (2) identify the most promising research in the  
22 field;

23 (3) indicate the extent to which the mission pri-  
24 orities in existing decadal surveys address the key  
25 extrasolar planet research goals;

1           (4) identify opportunities for coordination with  
2 international partners, commercial partners, and  
3 other not-for-profit partners; and

4           (5) make recommendations on the above as ap-  
5 propriate.

6           (b) **USE OF STRATEGY.**—The Administrator shall use  
7 the strategy to—

8           (1) inform roadmaps, strategic plans, and other  
9 activities of the Administration as they relate to  
10 extrasolar planet research and exploration; and

11           (2) provide a foundation for future activities  
12 and initiatives.

13           (c) **REPORT TO CONGRESS.**—Not later than 18  
14 months after the date of enactment of this Act, the Na-  
15 tional Academies shall transmit a report to the Adminis-  
16 trator, and to the Committee on Science, Space, and Tech-  
17 nology of the House of Representatives and the Committee  
18 on Commerce, Science, and Transportation of the Senate,  
19 containing the strategy developed under subsection (a).

20 **SEC. 313. JAMES WEBB SPACE TELESCOPE.**

21           It is the sense of Congress that—

22           (1) the James Webb Space Telescope will revo-  
23 lutionize our understanding of star and planet for-  
24 mation and how galaxies evolved, and advance the  
25 search for the origins of the universe;

1           (2) the James Webb Space Telescope will en-  
2           able American scientists to maintain their leadership  
3           in astrophysics and other disciplines;

4           (3) the James Webb Space Telescope program  
5           is making steady progress towards a launch in 2018;

6           (4) the on-time and on-budget delivery of the  
7           James Webb Space Telescope is a high congressional  
8           priority; and

9           (5) maintaining this progress will require the  
10          Administrator to ensure that integrated testing is  
11          appropriately timed and sufficiently comprehensive  
12          to enable potential issues to be identified and ad-  
13          dressed early enough to be handled within the James  
14          Webb Space Telescope's development schedule prior  
15          to launch.

16 **SEC. 314. NATIONAL RECONNAISSANCE OFFICE TELESCOPE**  
17 **DONATION.**

18          Not later than 90 days after the date of enactment  
19          of this Act, the Administrator shall transmit a report to  
20          the Committee on Science, Space, and Technology of the  
21          House of Representatives and the Committee on Com-  
22          merce, Science, and Transportation of the Senate out-  
23          lining the cost of the Administration's potential plan for  
24          developing the Wide-Field Infrared Survey Telescope as  
25          described in the 2010 National Academies' astronomy and

1 astrophysics decadal survey, including an alternative plan  
2 for the Wide-Field Infrared Survey Telescope 2.4, which  
3 includes the donated 2.4-meter aperture National Recon-  
4 naissance Office telescope. Due to the budget constraints  
5 on the Administration's science programs, this report shall  
6 include—

7 (1) an assessment of cost efficient approaches  
8 to develop the Wide-Field Infrared Survey Telescope;

9 (2) a comparison to the development of mission  
10 concepts that exclude the utilization of the donated  
11 asset;

12 (3) an assessment of how the Administration's  
13 existing science missions will be affected by the utili-  
14 zation of the donated asset described in this section;  
15 and

16 (4) a description of the cost associated with  
17 storing and maintaining the donated asset.

18 **SEC. 315. WIDE-FIELD INFRARED SURVEY TELESCOPE.**

19 (a) SENSE OF CONGRESS.—It is the sense of Con-  
20 gress that the Administrator, to the extent practicable,  
21 should make progress on the technologies and capabilities  
22 needed to position the Administration to meet the objec-  
23 tives of the Wide-Field Infrared Survey Telescope mission,  
24 as outlined in the 2010 National Academies' astronomy  
25 and astrophysics decadal survey, in a way that maximizes

1 the scientific productivity of meeting those objectives for  
2 the resources invested. It is further the sense of Congress  
3 that the Wide-Field Infrared Survey Telescope mission  
4 has the potential to enable scientific discoveries that will  
5 transform our understanding of the universe.

6 (b) CONTINUITY OF DEVELOPMENT.—The Adminis-  
7 trator shall ensure that the concept definition and pre-  
8 formulation activities of a Wide-Field Infrared Survey Tel-  
9 escope mission continue while the James Webb Space Tel-  
10 escope is being completed.

11 **SEC. 316. STRATOSPHERIC OBSERVATORY FOR INFRARED**  
12 **ASTRONOMY.**

13 The Administrator shall not use any funding appro-  
14 priated to the Administration for fiscal year 2016 for the  
15 shutdown of the Stratospheric Observatory for Infrared  
16 Astronomy or for the preparation therefor.

17 **Subtitle C—Planetary Science**

18 **SEC. 321. DECADAL CADENCE.**

19 In carrying out section 301(b), the Administrator  
20 shall seek to ensure, to the greatest extent practicable,  
21 that the Administration carries out a balanced set of plan-  
22 etary science programs in accordance with the priorities  
23 established in the most recent decadal survey for planetary  
24 science. Such programs shall include, at a minimum—

1           (1) a Discovery-class mission at least once every  
2           24 months;

3           (2) a New Frontiers-class mission at least once  
4           every 60 months; and

5           (3) at least one Flagship-class mission per  
6           decadal survey period, including a Europa mission  
7           with a goal of launching by 2021.

8   **SEC. 322. NEAR-EARTH OBJECTS.**

9           (a) FINDINGS.—Congress makes the following find-  
10          ings:

11           (1) Near-Earth objects pose a serious and cred-  
12           ible threat to humankind, as many scientists believe  
13           that a major asteroid or comet was responsible for  
14           the mass extinction of the majority of the Earth's  
15           species, including the dinosaurs, approximately 65  
16           million years ago.

17           (2) Similar objects have struck the Earth or  
18           passed through the Earth's atmosphere several times  
19           in the Earth's history and pose a similar threat in  
20           the future.

21           (3) Several such near-Earth objects have only  
22           been discovered within days of the objects' closest  
23           approach to Earth, and recent discoveries of such  
24           large objects indicate that many large near-Earth  
25           objects remain to be discovered.

1           (4) The efforts undertaken by the Administra-  
2           tion for detecting and characterizing the hazards of  
3           near-Earth objects should continue to seek to fully  
4           determine the threat posed by such objects to cause  
5           widespread destruction and loss of life.

6           (b) DEFINITION.—For purposes of this section, the  
7           term “near-Earth object” means an asteroid or comet with  
8           a perihelion distance of less than 1.3 Astronomical Units  
9           from the Sun.

10          (c) NEAR-EARTH OBJECT SURVEY.—The Adminis-  
11          trator shall continue to detect, track, catalogue, and char-  
12          acterize the physical characteristics of near-Earth objects  
13          equal to or greater than 140 meters in diameter in order  
14          to assess the threat of such near-Earth objects to the  
15          Earth, pursuant to the George E. Brown, Jr. Near-Earth  
16          Object Survey Act (42 U.S.C. 16691). It shall be the goal  
17          of the Survey program to achieve 90 percent completion  
18          of its near-Earth object catalogue (based on statistically  
19          predicted populations of near-Earth objects) by 2020.

20          (d) WARNING AND MITIGATION OF POTENTIAL HAZ-  
21          ARDS OF NEAR-EARTH OBJECTS.—Congress reaffirms  
22          the policy set forth in section 20102(g) of title 51, United  
23          States Code (relating to detecting, tracking, cataloguing,  
24          and characterizing asteroids and comets).

1 (e) PROGRAM REPORT.—The Director of the Office  
2 of Science and Technology Policy and the Administrator  
3 shall transmit to the Committee on Science, Space, and  
4 Technology of the House of Representatives and the Com-  
5 mittee on Commerce, Science, and Transportation of the  
6 Senate, not later than 1 year after the date of enactment  
7 of this Act, an initial report that provides—

8 (1) recommendations for carrying out the Sur-  
9 vey program and an associated proposed budget;

10 (2) analysis of possible options that the Admin-  
11 istration could employ to divert an object on a likely  
12 collision course with Earth; and

13 (3) a description of the status of efforts to co-  
14 ordinate and cooperate with other countries to dis-  
15 cover hazardous asteroids and comets, plan a mitiga-  
16 tion strategy, and implement that strategy in the  
17 event of the discovery of an object on a likely colli-  
18 sion course with Earth.

19 (f) ANNUAL REPORTS.—Subsequent to the initial re-  
20 port the Administrator shall annually transmit to the  
21 Committee on Science, Space, and Technology of the  
22 House of Representatives and the Committee on Com-  
23 merce, Science, and Transportation of the Senate a report  
24 that provides—

1           (1) a summary of all activities carried out pur-  
2           suant to subsection (c) since the date of enactment  
3           of this Act, including the progress toward achieving  
4           90 percent completion of the survey described in  
5           subsection (c); and

6           (2) a summary of expenditures for all activities  
7           carried out pursuant to subsection (c) since the date  
8           of enactment of this Act.

9           (g) STUDY.—The Administrator, in collaboration  
10          with other relevant Federal agencies, shall carry out a  
11          technical and scientific assessment of the capabilities and  
12          resources to—

13           (1) accelerate the survey described in subsection  
14           (c); and

15           (2) expand the Administration’s Near-Earth  
16          Object Program to include the detection, tracking,  
17          cataloguing, and characterization of potentially haz-  
18          ardous near-Earth objects less than 140 meters in  
19          diameter.

20          (h) TRANSMITTAL.—Not later than 270 days after  
21          the date of enactment of this Act, the Administrator shall  
22          transmit the results of the assessment carried out under  
23          subsection (g) to the Committee on Science, Space, and  
24          Technology of the House of Representatives and the Com-

1 mittee on Commerce, Science, and Transportation of the  
2 Senate.

3 **SEC. 323. NEAR-EARTH OBJECTS PUBLIC-PRIVATE PART-**  
4 **NERSHIPS.**

5 (a) SENSE OF CONGRESS.—It is the sense of Con-  
6 gress that the Administration should seek to leverage the  
7 capabilities of the private sector and philanthropic organi-  
8 zations to the maximum extent practicable in carrying out  
9 the Near-Earth Object Survey program in order to meet  
10 the goal of the Survey program.

11 (b) REPORT.—Not later than 180 days after the date  
12 of enactment of this Act, the Administrator shall transmit  
13 to the Committee on Science, Space, and Technology of  
14 the House of Representatives and the Committee on Com-  
15 merce, Science, and Transportation of the Senate a report  
16 describing how the Administration can expand collabo-  
17 rative partnerships to detect, track, catalogue, and cat-  
18 egorize near-Earth objects.

19 **SEC. 324. RESEARCH ON NEAR-EARTH OBJECT TSUNAMI**  
20 **EFFECTS.**

21 (a) REPORT ON POTENTIAL TSUNAMI EFFECTS  
22 FROM NEAR-EARTH OBJECT IMPACT.—The Adminis-  
23 trator, in collaboration with the Administrator of the Na-  
24 tional Oceanic and Atmospheric Administration and other  
25 relevant agencies, shall prepare a report identifying and

1 describing existing research activities and further research  
2 objectives that would increase our understanding of the  
3 nature of the effects of potential tsunamis that could occur  
4 if a near-Earth object were to impact an ocean of Earth.

5 (b) TRANSMITTAL.—Not later than 180 days after  
6 the date of enactment of this Act, the Administrator shall  
7 transmit the report required and prepared under sub-  
8 section (a) to the Committee on Science, Space, and Tech-  
9 nology of the House of Representatives and the Committee  
10 on Commerce, Science, and Transportation of the Senate.

11 **SEC. 325. ASTROBIOLOGY STRATEGY.**

12 (a) STRATEGY.—The Administrator shall enter into  
13 an arrangement with the National Academies to develop  
14 a science strategy for astrobiology that would outline key  
15 scientific questions, identify the most promising research  
16 in the field, and indicate the extent to which the mission  
17 priorities in existing decadal surveys address the search  
18 for life's origin, evolution, distribution, and future in the  
19 Universe. The strategy shall include recommendations for  
20 coordination with international partners.

21 (b) USE OF STRATEGY.—The Administrator shall use  
22 the strategy developed under subsection (a) in planning  
23 and funding research and other activities and initiatives  
24 in the field of astrobiology.

1 (c) REPORT TO CONGRESS.—Not later than 18  
2 months after the date of enactment of this Act, the Na-  
3 tional Academies shall transmit a report to the Adminis-  
4 trator, and to the Committee on Science, Space, and Tech-  
5 nology of the House of Representatives and the Committee  
6 on Commerce, Science, and Transportation of the Senate,  
7 containing the strategy developed under subsection (a).

8 **SEC. 326. ASTROBIOLOGY PUBLIC-PRIVATE PARTNERSHIPS.**

9 Not later than 180 days after the date of enactment  
10 of this Act, the Administrator shall transmit to the Com-  
11 mittee on Science, Space, and Technology of the House  
12 of Representatives and the Committee on Commerce,  
13 Science, and Transportation of the Senate a report de-  
14 scribing how the Administration can expand collaborative  
15 partnerships to study life’s origin, evolution, distribution,  
16 and future in the Universe.

17 **SEC. 327. ASSESSMENT OF MARS ARCHITECTURE.**

18 (a) ASSESSMENT.—The Administrator shall enter  
19 into an arrangement with the National Academies to as-  
20 sess—

21 (1) the Administration’s revised post-2016  
22 Mars exploration architecture and its responsiveness  
23 to the strategies, priorities, and guidelines put for-  
24 ward by the National Academies’ planetary science

1       decadal surveys and other relevant National Acad-  
2       emies Mars-related reports;

3               (2) the long-term goals of the Administration's  
4       Mars Exploration Program and such program's abil-  
5       ity to optimize the science return, given the current  
6       fiscal posture of the program;

7               (3) the Mars architecture's relationship to  
8       Mars-related activities to be undertaken by agencies  
9       and organizations outside of the United States; and

10              (4) the extent to which the Mars architecture  
11       represents a reasonably balanced mission portfolio.

12       (b) TRANSMITTAL.—Not later than 18 months after  
13       the date of enactment of this Act, the Administrator shall  
14       transmit the results of the assessment to the Committee  
15       on Science, Space, and Technology of the House of Rep-  
16       resentatives and the Committee on Commerce, Science,  
17       and Transportation of the Senate.

## 18                   **Subtitle D—Heliophysics**

### 19       **SEC. 331. DECADAL CADENCE.**

20       In carrying out section 301(b), the Administrator  
21       shall seek to ensure to the extent practicable a steady ca-  
22       dence of large, medium, and small heliophysics missions.

### 23       **SEC. 332. REVIEW OF SPACE WEATHER.**

24       (a) REVIEW.—The Director of the Office of Science  
25       and Technology Policy, in consultation with the Adminis-

1 trator, the Administrator of the National Oceanic and At-  
2 mospheric Administration, the Director of the National  
3 Science Foundation, and heads of other relevant Federal  
4 agencies, shall enter into an arrangement with the Na-  
5 tional Academies to provide a comprehensive study that  
6 reviews current and planned ground-based and space-  
7 based space weather monitoring requirements and capa-  
8 bilities, identifies gaps, and identifies options for a robust  
9 and resilient capability. The study shall inform the process  
10 of identifying national needs for future space weather  
11 monitoring, forecasts, and mitigation. The National Acad-  
12 emies shall give consideration to international and private  
13 sector efforts and collaboration that could potentially con-  
14 tribute to national space weather needs. The study shall  
15 also review the current state of research capabilities in ob-  
16 serving, modeling, and prediction and provide rec-  
17 ommendations to ensure future advancement of predictive  
18 capability.

19 (b) REPORT TO CONGRESS.—Not later than 14  
20 months after the date of enactment of this Act, the Na-  
21 tional Academies shall transmit a report containing the  
22 results of the study provided under subsection (a) to the  
23 Director of the Office of Science and Technology Policy,  
24 and to the Committee on Science, Space, and Technology

1 of the House of Representatives and the Committee on  
2 Commerce, Science, and Transportation of the Senate.

3 **Subtitle E—Earth Science**

4 **SEC. 341. GOAL.**

5 (a) SENSE OF CONGRESS.—It is the sense of Con-  
6 gress that the Administration is being asked to undertake  
7 important Earth science activities in an environment of  
8 increasingly constrained fiscal resources, and that any  
9 transfer of additional responsibilities to the Administra-  
10 tion, such as climate instrument development and meas-  
11 urements that are currently part of the portfolio of the  
12 National Oceanic and Atmospheric Administration, should  
13 be accompanied by the provision of additional resources  
14 to allow the Administration to carry out the increased re-  
15 sponsibilities without adversely impacting its implementa-  
16 tion of its existing Earth science programs and priorities.

17 (b) GENERAL.—The Administrator shall continue to  
18 carry out a balanced Earth science program that includes  
19 Earth science research, Earth systematic missions, com-  
20 petitive Venture class missions, other missions and data  
21 analysis, mission operations, technology development, and  
22 applied sciences, consistent with the recommendations and  
23 priorities established in the National Academies' Earth  
24 Science Decadal Survey.

1 (c) COLLABORATION.—The Administrator shall col-  
2 laborate with other Federal agencies, including the Na-  
3 tional Oceanic and Atmospheric Administration, non-gov-  
4 ernment entities, and international partners, as appro-  
5 priate, in carrying out the Administration’s Earth science  
6 program. The Administration shall continue to develop  
7 first-of-a-kind instruments that, once proved, can be  
8 transitioned to other agencies for operations.

9 (d) REIMBURSEMENT.—Whenever responsibilities for  
10 the development of sensors or for measurements are trans-  
11 ferred to the Administration from another agency, the Ad-  
12 ministration shall seek, to the extent possible, to be reim-  
13 bursed for the assumption of such responsibilities.

14 **SEC. 342. DECADAL CADENCE.**

15 In carrying out section 341(b), the Administrator  
16 shall seek to ensure to the extent practicable a steady ca-  
17 dence of large, medium, and small Earth science missions.

18 **SEC. 343. VENTURE CLASS MISSIONS.**

19 It is the sense of Congress that the Administration’s  
20 Venture class missions provide opportunities for innova-  
21 tion in the Earth science program, offer low-cost ap-  
22 proaches for high-quality competitive science investiga-  
23 tions, enable frequent flight opportunities to engage the  
24 Earth science and applications community, and serve as  
25 a training ground for students and young scientists. It is

1 further the sense of Congress that the Administration  
2 should seek to increase the number of Venture class  
3 projects to the extent practicable as part of a balanced  
4 Earth science program.

5 **SEC. 344. ASSESSMENT.**

6       The Administrator shall carry out a scientific assess-  
7 ment of the Administration’s Earth science global datasets  
8 for the purpose of identifying those datasets that are use-  
9 ful for understanding regional changes and variability, and  
10 for informing applied science research. The Administrator  
11 shall complete and transmit the assessment to the Com-  
12 mittee on Science, Space, and Technology of the House  
13 of Representatives and the Committee on Commerce,  
14 Science, and Transportation of the Senate not later than  
15 180 days after the date of enactment of this Act.

16                   **TITLE IV—AERONAUTICS**

17 **SEC. 401. SENSE OF CONGRESS.**

18       It is the sense of Congress that—

19               (1) a robust aeronautics research portfolio will  
20 help maintain the United States status as a leader  
21 in aviation, enhance the competitiveness of the  
22 United States in the world economy and improve the  
23 quality of life of all citizens;

24               (2) aeronautics research is essential to the Ad-  
25 ministration’s mission, continues to be an important

1 core element of the Administration's mission and  
2 should be supported;

3 (3) the Administrator should coordinate and  
4 consult with relevant Federal agencies and the pri-  
5 vate sector to minimize duplication and leverage re-  
6 sources; and

7 (4) carrying aeronautics research to a level of  
8 maturity that allows the Administration's research  
9 results to be transitioned to the users, whether pri-  
10 vate or public sector, is critical to their eventual  
11 adoption.

12 **SEC. 402. AERONAUTICS RESEARCH GOALS.**

13 The Administrator shall ensure that the Administra-  
14 tion maintains a strong aeronautics research portfolio  
15 ranging from fundamental research through integrated  
16 systems research with specific research goals, including  
17 the following:

18 (1) ENHANCE AIRSPACE OPERATIONS AND  
19 SAFETY.—The Administration's Aeronautics Re-  
20 search Mission Directorate shall address research  
21 needs of the Next Generation Air Transportation  
22 System and identify critical gaps in technology  
23 which must be bridged to enable the implementation  
24 of the Next Generation Air Transportation System

1 so that safety and productivity improvements can be  
2 achieved as soon as possible.

3 (2) IMPROVE AIR VEHICLE PERFORMANCE.—

4 The Administration's Aeronautics Research Mission  
5 Directorate shall conduct research to improve air-  
6 craft performance and minimize environmental im-  
7 pacts. The Associate Administrator for the Aero-  
8 nautics Research Mission Directorate shall consider  
9 and pursue concepts to reduce noise, emissions, and  
10 fuel consumption while maintaining high safety  
11 standards, and shall conduct research related to the  
12 impact of alternative fuels on the safety, reliability  
13 and maintainability of current and new air vehicles.

14 (3) STRENGTHEN AVIATION SAFETY.—The Ad-

15 ministration's Aeronautics Research Mission Direc-  
16 torate shall proactively address safety challenges as-  
17 sociated with current and new air vehicles and with  
18 operations in the Nation's current and future air  
19 transportation system.

20 (4) DEMONSTRATE CONCEPTS AT THE SYSTEM

21 LEVEL.—The Administration's Aeronautics Research  
22 Mission Directorate shall mature the most promising  
23 technologies to the point at which they can be dem-  
24 onstrated in a relevant environment and shall inte-  
25 grate individual components and technologies as ap-



1 is amended by inserting “Operational flight data derived  
2 from these cooperative agreements shall be made available,  
3 in appropriate and usable formats, to the Administration  
4 and the Federal Aviation Administration for the develop-  
5 ment of regulatory standards.” after “in remote areas.”.

6 **SEC. 404. RESEARCH PROGRAM ON COMPOSITE MATERIALS**

7 **USED IN AERONAUTICS.**

8 (a) **PURPOSE OF RESEARCH.**—The Administrator  
9 shall continue the Administration’s cooperative research  
10 program with industry to identify and demonstrate more  
11 effective and safe ways of developing, manufacturing, and  
12 maintaining composite materials for use in airframes, sub-  
13 systems, and propulsion components.

14 (b) **EXPOSURE OF RESEARCH TO NEXT GENERATION**  
15 **OF ENGINEERS AND TECHNICIANS.**—To the extent prac-  
16 ticable, the Administration’s cooperative research program  
17 with industry on composite materials shall provide timely  
18 access to that research to the next generation of engineers  
19 and technicians at universities, community colleges, and  
20 vocational schools, thereby helping to develop a workforce  
21 ready to take on the development, manufacture, and main-  
22 tenance of components reliant on advanced composite ma-  
23 terials.

24 (c) **CONSULTATION.**—The Administrator, in over-  
25 seeing the Administration’s work on composite materials,

1 shall consult with relevant Federal agencies and partners  
2 in industry to accelerate safe development and certifi-  
3 cation processes for new composite materials and design  
4 methods while maintaining rigorous inspection of new  
5 composite materials.

6 (d) REPORT.—Not later than 1 year after the date  
7 of enactment of this Act, the Administrator shall transmit  
8 a report to the Committee on Science, Space, and Tech-  
9 nology of the House of Representatives and the Committee  
10 on Commerce, Science, and Transportation of the Senate  
11 detailing the Administration’s work on new composite ma-  
12 terials and the coordination efforts among Federal agen-  
13 cies and industry partners.

14 **SEC. 405. HYPERSONIC RESEARCH.**

15 Not later than 1 year after the date of enactment  
16 of this Act, the Administrator, in consultation with other  
17 Federal agencies, shall develop and transmit to the Com-  
18 mittee on Science, Space, and Technology of the House  
19 of Representatives and the Committee on Commerce,  
20 Science, and Transportation of the Senate a research and  
21 development roadmap for hypersonic aircraft research  
22 with the objective of exploring hypersonic science and  
23 technology using air-breathing propulsion concepts,  
24 through a mix of theoretical work, basic and applied re-  
25 search, and development of flight research demonstration

1 vehicles. The roadmap shall prescribe appropriate agency  
2 contributions, coordination efforts, and technology mile-  
3 stones.

4 **SEC. 406. SUPERSONIC RESEARCH.**

5 (a) FINDINGS.—Congress finds that—

6 (1) the ability to fly commercial aircraft over  
7 land at supersonic speeds without adverse impacts  
8 on the environment or on local communities could  
9 open new global markets and enable new transpor-  
10 tation capabilities; and

11 (2) continuing the Administration’s research  
12 program is necessary to assess the impact in a rel-  
13 evant environment of commercial supersonic flight  
14 operations and provide the basis for establishing ap-  
15 propriate sonic boom standards for such flight oper-  
16 ations.

17 (b) ROADMAP FOR SUPERSONIC RESEARCH.—Not  
18 later than 1 year after the date of enactment of this Act,  
19 the Administrator shall develop and transmit to the Com-  
20 mittee on Science, Space, and Technology of the House  
21 of Representatives and the Committee on Commerce,  
22 Science, and Transportation of the Senate a roadmap that  
23 allows for flexible funding profiles for supersonic aero-  
24 nautics research and development with the objective of de-  
25 veloping and demonstrating, in a relevant environment,

1 airframe and propulsion technologies to minimize the envi-  
2 ronmental impact, including noise, of supersonic overland  
3 flight in an efficient and economical manner. The roadmap  
4 shall include—

5 (1) the baseline research as embodied by the  
6 Administration’s existing research on supersonic  
7 flight;

8 (2) a list of specific technological, environ-  
9 mental, and other challenges that must be overcome  
10 to minimize the environmental impact, including  
11 noise, of supersonic overland flight;

12 (3) a research plan to address such challenges,  
13 as well as a project timeline for accomplishing rel-  
14 evant research goals;

15 (4) a plan for coordination with stakeholders,  
16 including relevant government agencies and indus-  
17 try; and

18 (5) a plan for how the Administration will en-  
19 sure that sonic boom research is coordinated as ap-  
20 propriate with relevant Federal agencies.

21 **SEC. 407. RESEARCH ON NEXTGEN AIRSPACE MANAGE-**  
22 **MENT CONCEPTS AND TOOLS.**

23 (a) IN GENERAL.—The Administrator shall, in con-  
24 sultation with other Federal agencies, review at least an-  
25 nually the alignment and timing of the Administration’s

1 research and development activities in support of the  
2 NextGen airspace management modernization initiative,  
3 and shall make any necessary adjustments by  
4 reprioritizing or retargeting the Administration's research  
5 and development activities in support of the NextGen ini-  
6 tiative.

7 (b) ANNUAL REPORTS.—The Administrator shall re-  
8 port to the Committee on Science, Space, and Technology  
9 of the House of Representatives and the Committee on  
10 Commerce, Science, and Transportation of the Senate an-  
11 nually regarding the progress of the Administration's re-  
12 search and development activities in support of the  
13 NextGen airspace management modernization initiative,  
14 including details of technologies transferred to relevant  
15 Federal agencies for eventual operation implementation,  
16 consultation with other Federal agencies, and any adjust-  
17 ments made to research activities.

18 **SEC. 408. ROTORCRAFT RESEARCH.**

19 Not later than 1 year after the date of enactment  
20 of this Act, the Administrator, in consultation with other  
21 Federal agencies, shall prepare and transmit to the Com-  
22 mittee on Science, Space, and Technology of the House  
23 of Representatives and the Committee on Commerce,  
24 Science, and Transportation of the Senate a roadmap for  
25 research relating to rotorcraft and other runway-inde-

1 pendent air vehicles, with the objective of developing and  
2 demonstrating improved safety, noise, and environmental  
3 impact in a relevant environment. The roadmap shall in-  
4 clude specific goals for the research, a timeline for imple-  
5 mentation, metrics for success, and guidelines for collabo-  
6 ration and coordination with industry and other Federal  
7 agencies.

8 **SEC. 409. TRANSFORMATIVE AERONAUTICS RESEARCH.**

9 It is the sense of Congress that the Administrator,  
10 in looking strategically into the future and ensuring that  
11 the Administration's Center personnel are at the leading  
12 edge of aeronautics research, should encourage investiga-  
13 tions into the early-stage advancement of new processes,  
14 novel concepts, and innovative technologies that have the  
15 potential to meet national aeronautics needs. The Admin-  
16 istrator shall continue to ensure that awards for the inves-  
17 tigation of these concepts and technologies are open for  
18 competition among Administration civil servants at its  
19 Centers, separate from other awards open only to non-Ad-  
20 ministration sources.

21 **SEC. 410. STUDY OF UNITED STATES LEADERSHIP IN AERO-**  
22 **NAUTICS RESEARCH.**

23 (a) STUDY.—The Administrator shall enter into an  
24 arrangement with the National Academies for a study to  
25 benchmark the position of the United States in civil aero-

1 nautics research compared to the rest of the world. The  
2 study shall—

3 (1) seek to define metrics by which relative  
4 leadership in civil aeronautics research can be deter-  
5 mined;

6 (2) ascertain how the United States compares  
7 to other countries in the field of civil aeronautics re-  
8 search and any relevant trends; and

9 (3) provide recommendations on what can be  
10 done to regain or retain global leadership, includ-  
11 ing—

12 (A) identifying research areas where  
13 United States expertise has been or is at risk  
14 of being overtaken;

15 (B) defining appropriate roles for the Ad-  
16 ministration;

17 (C) identifying public-private partnerships  
18 that could be formed; and

19 (D) estimating the impact on the Adminis-  
20 tration's budget should such recommendations  
21 be implemented.

22 (b) REPORT.—Not later than 18 months after the  
23 date of enactment of this Act, the Administrator shall pro-  
24 vide the results of the study to the Committee on Science,  
25 Space, and Technology of the House of Representatives

1 and the Committee on Commerce, Science, and Transpor-  
2 tation of the Senate.

### 3 **TITLE V—SPACE TECHNOLOGY**

#### 4 **SEC. 501. SENSE OF CONGRESS.**

5 It is the sense of Congress that space technology is  
6 critical to—

7 (1) enabling a new class of Administration mis-  
8 sions beyond low-Earth orbit;

9 (2) developing technologies and capabilities that  
10 will make the Administration’s missions more afford-  
11 able and more reliable; and

12 (3) improving technological capabilities and pro-  
13 moting innovation for the Administration and the  
14 Nation.

#### 15 **SEC. 502. SPACE TECHNOLOGY PROGRAM.**

16 (a) AMENDMENT.—Section 70507 of title 51, United  
17 States Code, is amended to read as follows:

#### 18 **“§ 70507. Space Technology Program authorized**

19 “(a) PROGRAM AUTHORIZED.—The Administrator  
20 shall establish a Space Technology Program to pursue the  
21 research and development of advanced space technologies  
22 that have the potential of delivering innovative solutions  
23 and to support human exploration of the solar system or  
24 advanced space science. The program established by the  
25 Administrator shall take into consideration the rec-

1 ommendations of the National Academies’ review of the  
2 Administration’s Space Technology roadmaps and prior-  
3 ities, as well as applicable enabling aspects of the Human  
4 Exploration Roadmap specified in section 70504. In con-  
5 ducting the space technology program established under  
6 this section, the Administrator shall—

7           “(1) to the maximum extent practicable, use a  
8           competitive process to select projects to be supported  
9           as part of the program;

10           “(2) make use of small satellites and the Ad-  
11           ministration’s suborbital and ground-based plat-  
12           forms, to the extent practicable and appropriate, to  
13           demonstrate space technology concepts and develop-  
14           ments; and

15           “(3) undertake partnerships with other Federal  
16           agencies, universities, private industry, and other  
17           spacefaring nations, as appropriate.

18           “(b) **SMALL BUSINESS PROGRAMS.**—The Adminis-  
19           trator shall organize and manage the Administration’s  
20           Small Business Innovation Research program and Small  
21           Business Technology Transfer Program within the Space  
22           Technology Program.

23           “(c) **NONDUPLICATION CERTIFICATION.**—The Ad-  
24           ministrator shall include in the budget for each fiscal year,  
25           as transmitted to Congress under section 1105(a) of title

1 31, a certification that no project, program, or mission  
2 undertaken by the Space Technology Program is duplica-  
3 tive of any other project, program, or mission conducted  
4 by another office or directorate of the Administration.”.

5 (b) COLLABORATION, COORDINATION, AND ALIGN-  
6 MENT.—The Administrator shall ensure that the Adminis-  
7 tration’s projects, programs, and activities in support of  
8 technology research and development of advanced space  
9 technologies are fully coordinated and aligned and that re-  
10 sults from such work are shared and leveraged within the  
11 Administration. Projects, programs, and activities being  
12 conducted by the Human Exploration and Operations Mis-  
13 sion Directorate in support of research and development  
14 of advanced space technologies and systems focusing on  
15 human space exploration should continue in that Direc-  
16 torate. The Administrator shall ensure that organizational  
17 responsibility for research and development activities in  
18 support of human space exploration not initiated as of the  
19 date of enactment of this Act is established on the basis  
20 of a sound rationale. The Administrator shall provide the  
21 rationale in the report specified in subsection (d).

22 (c) REPORT.—Not later than 180 days after the date  
23 of enactment of this Act, the Administrator shall provide  
24 to the Committee on Science, Space, and Technology of  
25 the House of Representatives and the Committee on Com-

1 merce, Science, and Transportation of the Senate a report  
2 comparing the Administration's space technology invest-  
3 ments with the high-priority technology areas identified by  
4 the National Academies in the National Research Coun-  
5 cil's report on the Administration's Space Technology  
6 Roadmaps. The Administrator shall identify how the Ad-  
7 ministration will address any gaps between the agency's  
8 investments and the recommended technology areas, in-  
9 cluding a projection of funding requirements.

10 (d) ANNUAL REPORT.—The Administrator shall in-  
11 clude in the Administration's annual budget request for  
12 each fiscal year the rationale for assigning organizational  
13 responsibility for, in the year prior to the budget fiscal  
14 year, each initiated project, program, and mission focused  
15 on research and development of advanced technologies for  
16 human space exploration.

17 (e) TABLE OF SECTIONS AMENDMENT.—The item  
18 relating to section 70507 in the table of sections for chap-  
19 ter 705 of title 51, United States Code, is amended to  
20 read as follows:

“70507. Space Technology Program authorized.”.

21 **SEC. 503. UTILIZATION OF THE INTERNATIONAL SPACE**  
22 **STATION FOR TECHNOLOGY DEMONSTRA-**  
23 **TIONS.**

24 The Administrator shall utilize the International  
25 Space Station and commercial services for space tech-

1 nology demonstration missions in low-Earth orbit when-  
2 ever it is practical and cost effective to do so.

## 3 **TITLE VI—EDUCATION**

### 4 **SEC. 601. EDUCATION.**

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

7 (1) the Administration’s missions are an inspi-  
8 ration for Americans and in particular for the next  
9 generation, and that this inspiration has a powerful  
10 effect in stimulating interest in science, technology,  
11 engineering, and mathematics (in this section re-  
12 ferred to as “STEM”) education and careers;

13 (2) the Administration’s Office of Education  
14 and mission directorates have been effective in deliv-  
15 ering Administration educational content because of  
16 the strong engagement of Administration scientists  
17 and engineers in the Administration’s education and  
18 outreach activities; and

19 (3) the Administration should be a central part-  
20 ner in contributing to the goals of the National  
21 Science and Technology Council’s Federal Science,  
22 Technology, Engineering, and Mathematics (STEM)  
23 Education 5-Year Strategic Plan.

24 (b) IN GENERAL.—The Administration shall continue  
25 its education and outreach efforts to—

1           (1) increase student interest and participation  
2           in STEM education;

3           (2) improve public literacy in STEM;

4           (3) employ proven strategies for improving stu-  
5           dent learning and teaching;

6           (4) provide curriculum support materials; and

7           (5) create and support opportunities for profes-  
8           sional development for STEM teachers.

9           (c) ORGANIZATION.—In order to ensure the inspira-  
10          tion and engagement of children and the general public,  
11          the Administration shall continue its STEM education and  
12          outreach activities within the Science, Aeronautics Re-  
13          search, Space Operations, and Exploration Mission Direc-  
14          torates.

15          (d) CONTINUATION OF EDUCATION AND OUTREACH  
16          ACTIVITIES AND PROGRAMS.—The Administrator shall  
17          continue to carry out education and outreach programs  
18          and activities through the Office of Education and the Ad-  
19          ministration mission directorates and shall continue to en-  
20          gage, to the maximum extent practicable, Administration  
21          and Administration-supported researchers and engineers  
22          in carrying out those programs and activities.

23          (e) CONTINUATION OF SPACE GRANT PROGRAM.—  
24          The Administrator shall continue to operate the National  
25          Space Grant College and Fellowship program through a

1 national network consisting of a State-based consortium  
2 in each State that provides flexibility to the States, with  
3 the objective of providing hands-on research, training, and  
4 education programs, with measurable outcomes, to en-  
5 hance America's STEM education and workforce.

6 (f) REAFFIRMATION OF POLICY.—Congress reaffirms  
7 its commitment to informal science education at science  
8 centers and planetariums as set forth in section 616 of  
9 the National Aeronautics and Space Administration Au-  
10 thorization Act of 2005 (51 U.S.C. 40907).

11 **SEC. 602. INDEPENDENT REVIEW OF THE NATIONAL SPACE**  
12 **GRANT COLLEGE AND FELLOWSHIP PRO-**  
13 **GRAM.**

14 (a) SENSE OF CONGRESS.—It is the sense of Con-  
15 gress that the National Space Grant College and Fellow-  
16 ship Program, which was established in the National Aero-  
17 nautics and Space Administration Authorization Act of  
18 1988 (42 U.S.C. 2486 et seq.), has been an important  
19 program by which the Federal Government has partnered  
20 with State and local governments, universities, private in-  
21 dustry, and other organizations to enhance the under-  
22 standing and use of space and aeronautics activities and  
23 their benefits through education, fostering of interdiscipli-  
24 nary and multidisciplinary space research and training,

1 and supporting Federal funding for graduate fellowships  
2 in space-related fields, among other purposes.

3 (b) REVIEW.—The Administrator shall enter into an  
4 arrangement with the National Academies for—

5 (1) a review of the National Space Grant Col-  
6 lege and Fellowship Program, including its structure  
7 and capabilities for supporting science, technology,  
8 engineering, and mathematics education and train-  
9 ing consistent with the National Science and Tech-  
10 nology Council’s Federal Science, Technology, Engi-  
11 neering, and Mathematics (STEM) Education 5-  
12 Year Strategic Plan; and

13 (2) recommendations on measures, if needed, to  
14 enhance the Program’s effectiveness and mecha-  
15 nisms by which any increases in funding appro-  
16 priated by Congress can be applied.

17 (c) NATIONAL SPACE GRANT COLLEGE AND FEL-  
18 LOWSHIP PROGRAM AMENDMENTS.—

19 (1) PURPOSES.—Section 40301 of title 51,  
20 United States Code, is amended—

21 (A) by striking “and” at the end of para-  
22 graph (5);

23 (B) by striking the period at the end of  
24 paragraph (6) and inserting “; and”; and

1 (C) by adding at the end the following new  
2 paragraph:

3 “(7) support outreach to primary and sec-  
4 ondary schools to help support STEM engagement  
5 and learning at the K–12 level and to encourage K–  
6 12 students to pursue postsecondary degrees in  
7 fields related to space.”.

8 (2) REGIONAL CONSORTIUM.—Section 40306 of  
9 title 51, United States Code, is amended—

10 (A) in subsection (a)—

11 (i) by redesignating paragraphs (2)  
12 and (3) as paragraphs (3) and (4), respec-  
13 tively; and

14 (ii) by inserting after paragraph (1)  
15 the following new paragraph:

16 “(2) INCLUSION OF 2-YEAR INSTITUTIONS.—A  
17 space grant regional consortium designated in para-  
18 graph (1)(B) may include one or more 2-year insti-  
19 tutions of higher education.”; and

20 (B) in subsection (b)(1), by striking “para-  
21 graphs (2)(C) and (3)(D)” and inserting “para-  
22 graphs (3)(C) and (4)(D)”.

23 **SEC. 603. SENSE OF CONGRESS.**

24 It is the sense of Congress that the Administrator  
25 should make the continuation of the Administration’s Mi-

1 nority University Research and Education Program a pri-  
2 ority in order to further STEM education for underrep-  
3 resented students.

## 4 **TITLE VII—POLICY PROVISIONS**

### 5 **SEC. 701. ASTEROID RETRIEVAL MISSION.**

6 (a) ASTEROID RETRIEVAL REPORT.—Not later than  
7 180 days after the date of enactment of this Act, the Ad-  
8 ministrator shall provide to the Committee on Science,  
9 Space, and Technology of the House of Representatives  
10 and the Committee on Commerce, Science, and Transpor-  
11 tation of the Senate a report on the proposed Asteroid  
12 Retrieval Mission. Such report shall include—

13 (1) a detailed budget profile, including cost esti-  
14 mates for the development of all necessary tech-  
15 nologies and spacecraft required for the mission;

16 (2) a detailed technical plan that includes mile-  
17 stones and a specific schedule;

18 (3) a description of the technologies and capa-  
19 bilities anticipated to be gained from the proposed  
20 mission that will enable future human missions to  
21 Mars which could not be gained by lunar missions;

22 (4) a description of the technologies and capa-  
23 bilities anticipated to be gained from the proposed  
24 mission that will enable future planetary defense  
25 missions, against impact threats from near-Earth

1 objects equal to or greater than 140 meters in di-  
2 ameter, which could not be gained by robotic mis-  
3 sions; and

4 (5) a complete assessment by the Small Bodies  
5 Assessment Group and the National Aeronautics and  
6 Space Administration Advisory Council of how the  
7 proposed mission is or is not in the strategic inter-  
8 ests of the United States in space exploration.

9 (b) MARS FLYBY REPORT.—Not later than 60 days  
10 after the date of enactment of this Act, an independent,  
11 private systems engineering and technical assistance orga-  
12 nization contracted by the Human Exploration Operations  
13 Mission Directorate shall transmit to the Administrator,  
14 the Committee on Science, Space, and Technology of the  
15 House of Representatives, and the Committee on Com-  
16 merce, Science, and Transportation of the Senate a report  
17 analyzing the proposal for a Mars Flyby human  
18 spaceflight mission to be launched in 2021. Such report  
19 shall include—

20 (1) a technical development, test, fielding, and  
21 operations plan using the Space Launch System and  
22 other systems to successfully mount a Mars Flyby  
23 mission by 2021;

24 (2) a description of the benefits in scientific  
25 knowledge and technologies demonstrated by a Mars

1 Flyby mission to be launched in 2021 suitable for  
2 future Mars missions; and

3 (3) an annual budget profile, including cost es-  
4 timates, for the development test, fielding, and oper-  
5 ations plan to carry out a Mars Flyby mission  
6 through 2021 and comparison of that budget profile  
7 to the 5-year budget profile contained in the Presi-  
8 dent's Budget request for fiscal year 2017.

9 (c) ASSESSMENT.—Not later than 60 days after  
10 transmittal of the report specified in subsection (b), the  
11 Administrator shall transmit to the Committee on Science,  
12 Space, and Technology of the House of Representatives  
13 and the Committee on Commerce, Science, and Transpor-  
14 tation of the Senate an assessment by the National Aero-  
15 nautics and Space Administration Advisory Council of  
16 whether the proposal for a Mars Flyby Mission to be  
17 launched in 2021 is in the strategic interests of the United  
18 States in space exploration.

19 (d) CREWED MISSION.—The report transmitted  
20 under subsection (b) may consider a crewed mission with  
21 the Space Launch System in cis-lunar space prior to the  
22 Mars Flyby mission in 2021.

23 **SEC. 702. TERMINATION LIABILITY SENSE OF CONGRESS.**

24 It is the sense of Congress that:

1           (1) The International Space Station, the Space  
2           Launch System, and the Orion crew vehicle will en-  
3           able the Nation to continue operations in low-Earth  
4           orbit and to send its astronauts to deep space. The  
5           James Webb Space Telescope will revolutionize our  
6           understanding of star and planet formation and how  
7           galaxies evolved and advance the search for the ori-  
8           gins of our universe. As a result of their unique ca-  
9           pabilities and their critical contribution to the future  
10          of space exploration, these systems have been des-  
11          ignated by Congress and the Administration as pri-  
12          ority investments.

13          (2) In addition, contractors are currently hold-  
14          ing program funding, estimated to be in the hun-  
15          dreds of millions of dollars, to cover the potential  
16          termination liability should the Government choose  
17          to terminate a program for convenience. As a result,  
18          hundreds of millions of taxpayer dollars are unavail-  
19          able for meaningful work on these programs.

20          (3) According to the Government Accountability  
21          Office, the Administration procures most of its  
22          goods and services through contracts, and it termi-  
23          nates very few of them. In fiscal year 2010, the Ad-  
24          ministration terminated 28 of 16,343 active con-

1       tracts and orders—a termination rate of about 0.17  
2       percent.

3           (4) The Administration should vigorously pur-  
4       sue a policy on termination liability that maximizes  
5       the utilization of its appropriated funds to make  
6       maximum progress in meeting established technical  
7       goals and schedule milestones on these high-priority  
8       programs.

9       **SEC. 703. BASELINE AND COST CONTROLS.**

10       Section 30104 of title 51, United States Code, is  
11       amended—

12           (1) in subsection (a)(1), by striking “Proce-  
13       dural Requirements 7120.5c, dated March 22,  
14       2005” and inserting “Procedural Requirements  
15       7120.5E, dated August 14, 2012”; and

16           (2) in subsection (f), by striking “beginning 18  
17       months after the date the Administrator transmits a  
18       report under subsection (e)(1)(A)” and inserting  
19       “beginning 18 months after the Administrator  
20       makes such determination”.

21       **SEC. 704. PROJECT AND PROGRAM RESERVES.**

22       (a) SENSE OF CONGRESS.—It is the sense of Con-  
23       gress that the judicious use of program and project re-  
24       serves provides the Administration’s project and program  
25       managers with the flexibility needed to manage projects

1 and programs to ensure that the impacts of contingencies  
2 can be mitigated.

3 (b) REPORT.—Not later than 180 days after the date  
4 of enactment of this Act the Administrator shall transmit  
5 to the Committee on Science, Space, and Technology of  
6 the House of Representatives and the Committee on Com-  
7 merce, Science, and Transportation of the Senate a report  
8 describing—

9 (1) the Administration’s criteria for establishing  
10 the amount of reserves held at the project and pro-  
11 gram levels;

12 (2) how such criteria relate to the agency’s pol-  
13 icy of budgeting at a 70-percent confidence level;  
14 and

15 (3) the Administration’s criteria for waiving the  
16 policy of budgeting at a 70-percent confidence level  
17 and alternative strategies and mechanisms aimed at  
18 controlling program and project costs when a waiver  
19 is granted.

20 **SEC. 705. INDEPENDENT REVIEWS.**

21 Not later than 270 days after the date of enactment  
22 of this Act, the Administrator shall transmit to the Com-  
23 mittee on Science, Space, and Technology of the House  
24 of Representatives and the Committee on Commerce,

1 Science, and Transportation of the Senate a report de-  
2 scribing—

3 (1) the Administration's procedures for con-  
4 ducting independent reviews of projects and pro-  
5 grams at lifecycle milestones and how the Adminis-  
6 tration ensures the independence of the individuals  
7 who conduct those reviews prior to their assignment;

8 (2) the internal and external entities inde-  
9 pendent of project and program management that  
10 conduct reviews of projects and programs at life  
11 cycle milestones; and

12 (3) how the Administration ensures the inde-  
13 pendence of such entities and their members.

14 **SEC. 706. COMMERCIAL TECHNOLOGY TRANSFER PRO-**  
15 **GRAM.**

16 Section 50116(a) of title 51, United States Code, is  
17 amended by inserting “, while protecting national secu-  
18 rity” after “research community”.

19 **SEC. 707. NATIONAL AERONAUTICS AND SPACE ADMINIS-**  
20 **TRATION ADVISORY COUNCIL.**

21 (a) STUDY.—The Administrator shall enter into an  
22 arrangement with the National Academy of Public Admin-  
23 istration to assess the effectiveness of the NASA Advisory  
24 Council and to make recommendations to Congress for  
25 any change to—

- 1 (1) the functions of the Council;
- 2 (2) the appointment of members to the Council;
- 3 (3) qualifications for members of the Council;
- 4 (4) duration of terms of office for members of
- 5 the Council;
- 6 (5) frequency of meetings of the Council;
- 7 (6) the structure of leadership and Committees
- 8 of the Council; and
- 9 (7) levels of professional staffing for the Coun-
- 10 cil.

11 In carrying out the assessment, the Academy shall also  
12 assess the impacts of broadening the Council's role to ad-  
13 vising Congress, and any other issues that the Academy  
14 determines could potentially impact the effectiveness of  
15 the Council. The Academy shall consider the past activities  
16 of the NASA Advisory Council, as well as the activities  
17 of other analogous Federal advisory bodies in conducting  
18 its assessment. The results of the assessment, including  
19 any recommendations, shall be transmitted to the Com-  
20 mittee on Science, Space, and Technology of the House  
21 of Representatives and the Committee on Commerce,  
22 Science, and Transportation of the Senate.

23 (b) CONSULTATION AND ADVICE.—Section 20113(g)  
24 of title 51, United States Code, is amended by inserting  
25 “and Congress” after “advice to the Administration”.

1 (c) SUNSET.—Effective on September 30, 2016, sec-  
2 tion 20113(g) of title 51, United States Code, is amended  
3 by striking “and Congress”.

4 **SEC. 708. COST ESTIMATION.**

5 (a) SENSE OF CONGRESS.—It is the sense of Con-  
6 gress that realistic cost estimating is critically important  
7 to the ultimate success of major space development  
8 projects. The Administration has devoted significant ef-  
9 forts over the past 5 years to improving its cost estimating  
10 capabilities, but it is important that the Administration  
11 continue its efforts to develop and implement guidance in  
12 establishing realistic cost estimates.

13 (b) GUIDANCE AND CRITERIA.—The Administrator  
14 shall provide to programs and projects, and in a manner  
15 consistent with the Administration’s Space Flight Pro-  
16 gram and Project Management Requirements—

17 (1) guidance on when an Independent Cost Es-  
18 timate and Independent Cost Assessment should be  
19 used; and

20 (2) the criteria to be used to make such a de-  
21 termination.

22 (c) REPORT.—Not later than 270 days after the date  
23 of enactment of this Act, the Administrator shall transmit  
24 to the Committee on Science, Space, and Technology of  
25 the House of Representatives and the Committee on Com-

1 merce, Science, and Transportation of the Senate a re-  
2 port—

3 (1) describing efforts to enhance internal cost  
4 estimation and assessment expertise;

5 (2) describing the mechanisms the Administra-  
6 tion is using and will continue to use to ensure that  
7 adequate resources are dedicated to cost estimation;

8 (3) listing the steps the Administration is un-  
9 dertaking to advance consistent implementation of  
10 the joint cost and schedule process;

11 (4) identifying criteria used by programs and  
12 projects in determining when to conduct an Inde-  
13 pendent Cost Estimate and Independent Cost As-  
14 sessment; and

15 (5) listing—

16 (A) the costs of each individual Inde-  
17 pendent Cost Estimate or Independent Cost As-  
18 sessment activity conducted in fiscal year 2012,  
19 fiscal year 2013, fiscal year 2014, and fiscal  
20 year 2015;

21 (B) the purpose of the activity;

22 (C) identification of the primary Adminis-  
23 tration unit or outside body that conducted the  
24 activity; and

25 (D) key findings and recommendations.

1 (d) UPDATED REPORT.—Subsequent to submission  
2 of the report under subsection (c), for each subsequent  
3 year, the Administrator shall provide an update of listed  
4 elements in conjunction with subsequent congressional  
5 budget justifications.

6 **SEC. 709. AVOIDING ORGANIZATIONAL CONFLICTS OF IN-**  
7 **TEREST IN MAJOR ADMINISTRATION ACQUI-**  
8 **SITION PROGRAMS.**

9 (a) REVISED REGULATIONS REQUIRED.—Not later  
10 than 270 days after the date of enactment of this Act,  
11 the Administrator shall revise the Administration Supple-  
12 ment to the Federal Acquisition Regulation to provide uni-  
13 form guidance and recommend revised requirements for  
14 organizational conflicts of interest by contractors in major  
15 acquisition programs in order to address elements identi-  
16 fied in subsection (b).

17 (b) ELEMENTS.—The revised regulations required by  
18 subsection (a) shall, at a minimum—

19 (1) address organizational conflicts of interest  
20 that could potentially arise as a result of—

21 (A) lead system integrator contracts on  
22 major acquisition programs and contracts that  
23 follow lead system integrator contracts on such  
24 programs, particularly contracts for production;

1 (B) the ownership of business units per-  
2 forming systems engineering and technical as-  
3 sistance functions, professional services, or  
4 management support services in relation to  
5 major acquisition programs by contractors who  
6 simultaneously own business units competing to  
7 perform as either the prime contractor or the  
8 supplier of a major subsystem or component for  
9 such programs;

10 (C) the award of major subsystem con-  
11 tracts by a prime contractor for a major acqui-  
12 sition program to business units or other affili-  
13 ates of the same parent corporate entity, and  
14 particularly the award of subcontracts for soft-  
15 ware integration or the development of a pro-  
16 prietary software system architecture; or

17 (D) the performance by, or assistance of,  
18 contractors in technical evaluations on major  
19 acquisition programs;

20 (2) ensure that the Administration receives ad-  
21 vice on systems architecture and systems engineer-  
22 ing matters with respect to major acquisition pro-  
23 grams from objective sources independent of the  
24 prime contractor;

1           (3) require that a contract for the performance  
2 of systems engineering and technical assistance  
3 functions for a major acquisition program contains  
4 a provision prohibiting the contractor or any affiliate  
5 of the contractor from participating as a prime con-  
6 tractor or a major subcontractor in the development  
7 of a system under the program; and

8           (4) establish such limited exceptions to the re-  
9 quirement in paragraphs (2) and (3) as may be nec-  
10 essary to ensure that the Administration has contin-  
11 ued access to advice on systems architecture and  
12 systems engineering matters from highly qualified  
13 contractors with domain experience and expertise,  
14 while ensuring that such advice comes from sources  
15 that are objective and unbiased.

16 **SEC. 710. FACILITIES AND INFRASTRUCTURE.**

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

19           (1) the Administration must reverse the deterio-  
20 rating condition of its facilities and infrastructure,  
21 as this condition is hampering the effectiveness and  
22 efficiency of research performed by both the Admin-  
23 istration and industry participants making use of  
24 Administration facilities, thus reducing the competi-  
25 tiveness of the United States aerospace industry;

1           (2) the Administration has a role in providing  
2           laboratory capabilities that are not available else-  
3           where to industry participants that are economically  
4           viable as commercial entities;

5           (3) to ensure continued access to reliable and  
6           efficient world-class facilities by researchers, the Ad-  
7           ministration should seek to establish strategic part-  
8           nerships with other Federal agencies, academic insti-  
9           tutions, and industry, as appropriate; and

10          (4) decisions on whether to dispose of, main-  
11          tain, or modernize existing facilities must be made  
12          in the context of meeting future Administration and  
13          other Federal agencies' laboratory needs, including  
14          those required to meet the activities supporting the  
15          Human Exploration Roadmap required by section  
16          70504 of title 51, United States Code, as added by  
17          section 202 of this Act.

18          (b) **POLICY.**—It is the policy of the United States  
19          that the Administration maintain reliable and efficient fa-  
20          cilities and that decisions on whether to dispose of, main-  
21          tain, or modernize existing facilities be made in the con-  
22          text of meeting future Administration needs.

23          (c) **PLAN.**—The Administrator shall develop a plan  
24          that has the goal of positioning the Administration to have  
25          the facilities, laboratories, tools, and approaches necessary

1 to address future Administration requirements. Such plan  
2 shall identify—

3 (1) future Administration research and develop-  
4 ment and testing needs;

5 (2) a strategy for identifying facilities that are  
6 candidates for disposal, that is consistent with the  
7 national strategic direction set forth in—

8 (A) the National Space Policy;

9 (B) the National Aeronautics Research,  
10 Development, Test, and Evaluation Infrastruc-  
11 ture Plan;

12 (C) National Aeronautics and Space Ad-  
13 ministration Authorization Acts; and

14 (D) the Human Exploration Roadmap  
15 specified in section 70504 of title 51, United  
16 States Code, as added by section 202 of this  
17 Act;

18 (3) a strategy for the maintenance, repair, up-  
19 grading, and modernization of the Administration's  
20 laboratories, facilities, and equipment;

21 (4) criteria for prioritizing deferred mainte-  
22 nance tasks and also for upgrading or modernizing  
23 laboratories, facilities, and equipment and imple-  
24 menting processes, plans, and policies for guiding  
25 the Administration's Centers on whether to main-

1       tain, repair, upgrade, or modernize a facility and for  
2       determining the type of instrument to be used;

3           (5) an assessment of modifications needed to  
4       maximize usage of facilities that offer unique and  
5       highly specialized benefits to the aerospace industry  
6       and the American public;

7           (6) barriers, if any, to the application of exist-  
8       ing Working Capital Fund authorities that would  
9       enable to the maximum extent practicable that all fi-  
10      nancial savings achieved by closing outdated or sur-  
11      plus facilities at an Administration Center be made  
12      available to that Center for the purpose of modern-  
13      izing the Center's facilities and laboratories and for  
14      upgrading the infrastructure at the Center; and

15          (7) implementation steps, including a timeline,  
16      milestones, and an estimate of resources, required  
17      for carrying out the plan.

18      (d) **POLICY.**—Not later than 180 days after the date  
19      of enactment of this Act, the Administrator shall establish  
20      and make publically available a policy that guides the Ad-  
21      ministration's use of existing authorities to out-grant,  
22      lease, excess to the General Services Administration, sell,  
23      decommission, demolish, or otherwise transfer property,  
24      facilities, or infrastructure. This policy shall establish cri-  
25      teria for the use of authorities, best practices, standard-

1 ized procedures, and guidelines for how to appropriately  
2 manage property, infrastructure, and facilities.

3 (e) TRANSMITTAL.—Not later than one year after the  
4 date of enactment of this Act, the Administrator shall  
5 transmit the plan developed under subsection (c) to the  
6 Committee on Science, Space, and Technology of the  
7 House of Representatives and the Committee on Com-  
8 merce, Science, and Transportation of the Senate.

9 **SEC. 711. DETECTION AND AVOIDANCE OF COUNTERFEIT**  
10 **ELECTRONIC PARTS.**

11 (a) REGULATIONS.—

12 (1) IN GENERAL.—Not later than 270 days  
13 after the date of enactment of this Act, the Adminis-  
14 trator shall revise the National Aeronautics and  
15 Space Administration Supplement to the Federal  
16 Acquisition Regulation to address the detection and  
17 avoidance of counterfeit electronic parts.

18 (2) CONTRACTOR RESPONSIBILITIES.—The re-  
19 vised regulations issued pursuant to paragraph (1)  
20 shall provide that—

21 (A) Administration contractors who supply  
22 electronic parts or products that include elec-  
23 tronic parts are responsible for detecting and  
24 avoiding the use or inclusion of counterfeit elec-  
25 tronic parts or suspect counterfeit electronic

1 parts in such products and for any rework or  
2 corrective action that may be required to rem-  
3 edy the use or inclusion of such parts; and

4 (B) the cost of counterfeit electronic parts  
5 and suspect counterfeit electronic parts and the  
6 cost of rework or corrective action that may be  
7 required to remedy the use or inclusion of such  
8 parts are not allowable costs under Administra-  
9 tion contracts, unless—

10 (i) the covered contractor has an oper-  
11 ational system to detect and avoid counter-  
12 feit parts and suspect counterfeit electronic  
13 parts that has been reviewed and approved  
14 by the Administration or the Department  
15 of Defense;

16 (ii) the covered contractor provides  
17 timely notice to the Administration pursu-  
18 ant to paragraph (4); or

19 (iii) the counterfeit electronic parts or  
20 suspect counterfeit electronic parts were  
21 provided to the contractor as Government  
22 property in accordance with part 45 of the  
23 Federal Acquisition Regulation.

1           (3) SUPPLIERS OF ELECTRONIC PARTS.—The  
2 revised regulations issued pursuant to paragraph (1)  
3 shall—

4           (A) require that the Administration and  
5 Administration contractors and subcontractors  
6 at all tiers—

7           (i) obtain electronic parts that are in  
8 production or currently available in stock  
9 from the original manufacturers of the  
10 parts or their authorized dealers, or from  
11 suppliers who obtain such parts exclusively  
12 from the original manufacturers of the  
13 parts or their authorized dealers; and

14           (ii) obtain electronic parts that are  
15 not in production or currently available in  
16 stock from suppliers that meet qualifica-  
17 tion requirements established pursuant to  
18 subparagraph (C);

19           (B) establish documented requirements  
20 consistent with published industry standards or  
21 Government contract requirements for—

22           (i) notification of the Administration;  
23 and

24           (ii) inspection, testing, and authen-  
25 tication of electronic parts that the Admin-

1                   istration or an Administration contractor  
2                   or subcontractor obtains from any source  
3                   other than a source described in subpara-  
4                   graph (A);

5                   (C) establish qualification requirements,  
6                   consistent with the requirements of section  
7                   2319 of title 10, United States Code, pursuant  
8                   to which the Administration may identify sup-  
9                   pliers that have appropriate policies and proce-  
10                  dures in place to detect and avoid counterfeit  
11                  electronic parts and suspect counterfeit elec-  
12                  tronic parts; and

13                  (D) authorize Administration contractors  
14                  and subcontractors to identify and use addi-  
15                  tional suppliers beyond those identified pursu-  
16                  ant to subparagraph (C) provided that—

17                         (i) the standards and processes for  
18                         identifying such suppliers comply with es-  
19                         tablished industry standards;

20                         (ii) the contractor or subcontractor  
21                         assumes responsibility for the authenticity  
22                         of parts provided by such suppliers as pro-  
23                         vided in paragraph (2); and

1 (iii) the selection of such suppliers is  
2 subject to review and audit by appropriate  
3 Administration officials.

4 (4) **TIMELY NOTIFICATION.**—The revised regu-  
5 lations issued pursuant to paragraph (1) shall re-  
6 quire that any Administration contractor or subcon-  
7 tractor who becomes aware, or has reason to sus-  
8 pect, that any end item, component, part, or mate-  
9 rial contained in supplies purchased by the Adminis-  
10 tration, or purchased by a contractor or subcon-  
11 tractor for delivery to, or on behalf of, the Adminis-  
12 tration, contains counterfeit electronic parts or sus-  
13 pect counterfeit electronic parts, shall provide notifi-  
14 cation to the applicable Administration contracting  
15 officer within 30 calendar days.

16 (b) **REPORT.**—Not later than 120 days after the re-  
17 vised regulations specified in subsection (a) have been im-  
18 plemented, the Administrator shall submit to the Com-  
19 mittee on Science, Space, and Technology of the House  
20 of Representatives and the Committee on Commerce,  
21 Science, and Transportation of the Senate a report updat-  
22 ing the Administration’s actions to prevent counterfeit  
23 electronic parts from entering the supply chain as de-  
24 scribed in its October 2011 report pursuant to section

1 1206(d) of the National Aeronautics and Space Adminis-  
2 tration Authorization Act of 2010 (42 U.S.C. 18444(d)).

3 (c) DEFINITION.—In this section, the term “elec-  
4 tronic part” means a discrete electronic component, in-  
5 cluding a microcircuit, transistor, capacitor, resistor, or  
6 diode that is intended for use in a safety or mission critical  
7 application.

8 **SEC. 712. SPACE ACT AGREEMENTS.**

9 (a) COST SHARING.—To the extent that the Adminis-  
10 trator determines practicable, the funds provided by the  
11 Government under a funded Space Act Agreement shall  
12 not exceed the total amount provided by other parties to  
13 the Space Act Agreement.

14 (b) NEED.—A funded Space Act Agreement may be  
15 used only when the use of a standard contract, grant, or  
16 cooperative agreement is not feasible or appropriate, as  
17 determined by the Associate Administrator for Procure-  
18 ment.

19 (c) PUBLIC NOTICE AND COMMENT.—The Adminis-  
20 trator shall make available for public notice and comment  
21 each proposed Space Act Agreement at least 30 days be-  
22 fore entering into such agreement, with appropriate  
23 redactions for proprietary, sensitive, or classified informa-  
24 tion.

1 (d) TRANSPARENCY.—The Administrator shall pub-  
2 licly disclose on the Administration’s website and make  
3 available in a searchable format each Space Act Agree-  
4 ment, with appropriate redactions for proprietary, sen-  
5 sitive, or classified information, not later than 60 days  
6 after such agreement is signed.

7 (e) ANNUAL REPORT.—

8 (1) REQUIREMENT.—Not later than 90 days  
9 after the end of each fiscal year, the Administrator  
10 shall submit to the Committee on Science, Space,  
11 and Technology of the House of Representatives and  
12 the Committee on Commerce, Science, and Trans-  
13 portation of the Senate a report on the use of Space  
14 Act Agreement authority by the Administration dur-  
15 ing the previous fiscal year.

16 (2) CONTENTS.—The report shall include for  
17 each Space Act Agreement in effect at the time of  
18 the report—

19 (A) an indication of whether the agreement  
20 is a reimbursable, nonreimbursable, or funded  
21 Space Act Agreement;

22 (B) a description of—

23 (i) the subject and terms;

24 (ii) the parties;

25 (iii) the responsible—

- 1 (I) mission directorate;
- 2 (II) center; or
- 3 (III) headquarters element;
- 4 (iv) the value;
- 5 (v) the extent of the cost sharing
- 6 among Federal Government and non-Fed-
- 7 eral sources;
- 8 (vi) the time period or schedule; and
- 9 (vii) all milestones; and
- 10 (C) an indication of whether the agreement
- 11 was renewed during the previous fiscal year.

12 (3) ANTICIPATED AGREEMENTS.—The report

13 shall also include a list of all anticipated reimburs-

14 able, nonreimbursable, and funded Space Act Agree-

15 ments for the upcoming fiscal year.

16 (4) CUMULATIVE PROGRAM BENEFITS.—The

17 report shall also include, with respect to the Space

18 Act Agreements covered by the report, a summary

19 of—

20 (A) the technology areas in which research

21 projects were conducted under such agreements;

22 (B) the extent to which the use of the

23 Space Act Agreements—

1 (i) has contributed to a broadening of  
2 the technology and industrial base avail-  
3 able for meeting Administration needs; and

4 (ii) has fostered within the technology  
5 and industrial base new relationships and  
6 practices that support the United States;  
7 and

8 (C) the total amount of value received by  
9 the Federal Government during the fiscal year  
10 pursuant to such Space Act Agreements.

11 **SEC. 713. HUMAN SPACEFLIGHT ACCIDENT INVESTIGA-**  
12 **TIONS.**

13 Section 70702(a) of title 51, United States Code, is  
14 amended by striking paragraph (3) and inserting the fol-  
15 lowing:

16 “(3) any other orbital or suborbital space vehi-  
17 cle carrying humans—

18 “(A) that is owned by the Federal Govern-  
19 ment; or

20 “(B) that is being used pursuant to a con-  
21 tract or Space Act Agreement, as defined in  
22 section 2 of the National Aeronautics and  
23 Space Administration Authorization Act for  
24 2016 and 2017, with the Federal Government

1           for carrying a researcher or payload funded by  
2           the Federal Government; or”.

3 **SEC. 714. FULLEST COMMERCIAL USE OF SPACE.**

4           (a) REPORT.—Not later than 90 days after the date  
5 of enactment of this Act, the Administrator shall transmit  
6 to the Committee on Science, Space, and Technology of  
7 the House of Representatives and the Committee on Com-  
8 merce, Science, and Transportation of the Senate a report  
9 on current and continuing efforts by the Administration  
10 to “seek and encourage, to the maximum extent possible,  
11 the fullest commercial use of space,” as described in sec-  
12 tion 20102(c) of title 51, United States Code.

13           (b) ELEMENTS.—The report required under sub-  
14 section (a) shall include—

15               (1) an assessment of the Administration’s ef-  
16               forts to comply with the policy;

17               (2) an explanation of criteria used to define  
18               compliance;

19               (3) a description of programs, policies, and ac-  
20               tivities the Administration is using, and will continue  
21               to use, to ensure compliance;

22               (4) an explanation of how the Administration  
23               could expand on the efforts to comply; and

24               (5) a summary of all current and planned ac-  
25               tivities pursuant to this policy.

1           (c) BARRIERS TO FULLEST COMMERCIAL USE OF  
2 SPACE.—Not later than 90 days after the date of enact-  
3 ment of this Act, the Administrator shall transmit to the  
4 Committee on Science, Space, and Technology of the  
5 House of Representatives and the Committee on Com-  
6 merce, Science, and Transportation of the Senate a report  
7 on current and continuing efforts by the Administration  
8 to reduce impediments, bureaucracy, redundancy, and  
9 burdens to ensure the fullest commercial use of space as  
10 required by section 20102(c) of title 51, United States  
11 Code.

12 **SEC. 715. ORBITAL DEBRIS.**

13           (a) FINDINGS.—Congress finds that orbital debris  
14 poses serious risks to the operational space capabilities of  
15 the United States and that an international commitment  
16 and integrated strategic plan are needed to mitigate the  
17 growth of orbital debris wherever possible. Congress finds  
18 the delay in the Office of Science and Technology Policy’s  
19 submission of a report on the status of international co-  
20 ordination and development of mitigation strategies to be  
21 inconsistent with such risks.

22           (b) REPORTS.—

23               (1) COORDINATION.—Not later than 90 days  
24 after the date of enactment of this Act, the Adminis-  
25 trator shall provide the Committee on Science,

1 Space, and Technology of the House of Representa-  
2 tives and the Committee on Commerce, Science, and  
3 Transportation of the Senate with a report on the  
4 status of efforts to coordinate with countries within  
5 the Inter-Agency Space Debris Coordination Com-  
6 mittee to mitigate the effects and growth of orbital  
7 debris as required by section 1202(b)(1) of the Na-  
8 tional Aeronautics and Space Administration Au-  
9 thorization Act of 2010 (42 U.S.C. 18441(b)(1)).

10 (2) MITIGATION STRATEGY.—Not later than 90  
11 days after the date of enactment of this Act, the Di-  
12 rector of the Office of Science and Technology Policy  
13 shall provide the Committee on Science, Space, and  
14 Technology of the House of Representatives and the  
15 Committee on Commerce, Science, and Transpor-  
16 tation of the Senate with a report on the status of  
17 the orbital debris mitigation strategy required under  
18 section 1202(b)(2) of the National Aeronautics and  
19 Space Administration Authorization Act of 2010 (42  
20 U.S.C. 18441(b)(2)).

21 **SEC. 716. REVIEW OF ORBITAL DEBRIS REMOVAL CON-**  
22 **CEPTS.**

23 (a) SENSE OF CONGRESS.—It is the sense of Con-  
24 gress that the amount of orbital debris in low-Earth orbit  
25 poses risks for human activities and robotic spacecraft and

1 that this debris may increase due to collisions between ex-  
2 isting debris objects. Understanding options to address  
3 and remove orbital debris is important for ensuring safe  
4 and effective spacecraft operations in low-Earth orbit.

5 (b) REVIEW.—The Administrator, in collaboration  
6 with other relevant Federal agencies, shall solicit and re-  
7 view concepts and technological options for removing or-  
8 bital debris from low-Earth orbit. The solicitation and re-  
9 view shall also address the requirements for and feasibility  
10 of developing and implementing each of the options.

11 (c) TRANSMITTAL.—Not later than 270 days after  
12 the date of enactment of this Act, the Administrator shall  
13 provide a report to the Committee on Science, Space, and  
14 Technology of the House of Representatives and the Com-  
15 mittee on Commerce, Science, and Transportation of the  
16 Senate on the solicitation and review required under sub-  
17 section (b).

18 **SEC. 717. USE OF OPERATIONAL COMMERCIAL SUB-**  
19 **ORBITAL VEHICLES FOR RESEARCH, DEVEL-**  
20 **OPMENT, AND EDUCATION.**

21 (a) POLICY.—The Administrator shall develop a pol-  
22 icy on the use of operational commercial reusable sub-  
23 orbital flight vehicles for carrying out scientific and engi-  
24 neering investigations and educational activities.

1 (b) PLAN.—The Administrator shall prepare a plan  
2 on the Administration’s use of operational commercial re-  
3 usable suborbital flight vehicles for carrying out scientific  
4 and engineering investigations and educational activities.  
5 The plan shall—

6 (1) describe the purposes for which the Admin-  
7 istration intends to use such vehicles;

8 (2) describe the processes required to support  
9 such use, including the criteria used to determine  
10 which scientific and engineering investigations and  
11 educational activities are selected for a suborbital  
12 flight;

13 (3) describe Administration, space flight oper-  
14 ator, and supporting contractor responsibilities for  
15 developing standard payload interfaces and con-  
16 ducting payload safety analyses, payload integration  
17 and processing, payload operations, and safety as-  
18 surance for Administration-sponsored space flight  
19 participants, among other functions required to fly  
20 Administration-sponsored payloads and space flight  
21 participants on operational commercial suborbital ve-  
22 hicles;

23 (4) identify Administration-provided hardware,  
24 software, or services that may be provided to com-  
25 mercial reusable suborbital space flight operators on

1 a cost-reimbursable basis, through agreements or  
2 contracts entered into under section 20113(e) of  
3 title 51, United States Code; and

4 (5) describe the United States Government and  
5 space flight operator responsibilities for liability and  
6 indemnification with respect to commercial sub-  
7 orbital vehicle flights that involve Administration-  
8 sponsored payloads or activities, Administration-sup-  
9 ported space flight participants, or other Adminis-  
10 tration-related contributions.

11 (c) ASSESSMENT OF CAPABILITIES AND RISKS.—The  
12 Administrator shall assess and characterize the potential  
13 capabilities and performance of commercial reusable sub-  
14 orbital vehicles for addressing scientific research, includ-  
15 ing research requiring access to low-gravity and micro-  
16 gravity environments, for carrying out technology dem-  
17 onstrations related to science, exploration, or space oper-  
18 ations requirements, and for providing opportunities for  
19 educating and training space scientists and engineers,  
20 once those vehicles become operational. The assessment  
21 shall also characterize the risks of using potential commer-  
22 cial reusable suborbital flights to Administration-spon-  
23 sored researchers and scientific investigations and flight  
24 hardware.

1 (d) TRANSMITTAL.—Not later than 1 year after the  
2 date of enactment of this Act, the Administrator shall  
3 transmit the plan and assessment described in subsections  
4 (b) and (c) to the Committee on Science, Space, and Tech-  
5 nology of the House of Representatives and the Committee  
6 on Commerce, Science, and Transportation of the Senate.

7 (e) ANNUAL PROGRESS REPORTS.—In conjunction  
8 with the Administration’s annual budget request justifica-  
9 tion for each fiscal year, the Administrator shall transmit  
10 a report to the Committee on Science, Space, and Tech-  
11 nology of the House of Representatives and the Committee  
12 on Commerce, Science, and Transportation of the Senate  
13 describing progress in carrying out the Commercial Reus-  
14 able Suborbital Research Program, including the number  
15 and type of suborbital missions planned in each fiscal  
16 year.

17 (f) INDEMNIFICATION AND LIABILITY.—The Admin-  
18 istrator shall not proceed with a request for proposals,  
19 award any contract, commit any United States Govern-  
20 ment funds, or enter into any other agreement for the pro-  
21 vision of a commercial reusable suborbital vehicle launch  
22 service for an Administration-sponsored spaceflight partic-  
23 ipant until transmittal of the plan and assessment speci-  
24 fied in subsections (b) and (c), the liability issues associ-  
25 ated with the use of such systems by the United States

1 Government have been addressed, and the liability and in-  
2 demnification provisions that are planned to be included  
3 in such contracts or agreements have been provided to the  
4 Committee on Science, Space, and Technology of the  
5 House of Representatives and the Committee on Com-  
6 merce, Science, and Transportation of the Senate.

7 **SEC. 718. FUNDAMENTAL SPACE LIFE AND PHYSICAL**  
8 **SCIENCES RESEARCH.**

9 (a) SENSE OF CONGRESS.—It the sense of Congress  
10 that fundamental, discovery-based space life and physical  
11 sciences research is critical for enabling space exploration,  
12 protecting humans in space, and providing societal bene-  
13 fits, and that the space environment facilitates the ad-  
14 vancement of understanding of the life sciences and phys-  
15 ical sciences. Space life and physical science research con-  
16 tributes to advancing science, technology, engineering, and  
17 mathematics research, and provides careers and training  
18 opportunities in academia, Federal laboratories, and com-  
19 mercial industry. Congress encourages the Administrator  
20 to augment discovery-based fundamental research and to  
21 establish requirements reflecting the importance of such  
22 research in keeping with the priorities established in the  
23 National Academies’ decadal survey entitled “Recapturing  
24 a Future for Space Exploration: Life and Physical  
25 Sciences Research for a New Era”.

1           (b) BUDGET REQUEST.—The Administrator shall in-  
2 clude as part of the Administration’s annual budget re-  
3 quest for each fiscal year a budget line for fundamental  
4 space life and physical sciences research, devoted to com-  
5 petitive, peer-reviewed grants, that is separate from the  
6 International Space Station Operations account.

7           (c) STRATEGIC PLAN.—

8               (1) DEVELOPMENT.—The Administrator, in  
9 consultation with academia, other Federal agencies,  
10 and other potential stakeholders, shall develop a  
11 strategic plan for carrying out competitive, peer-re-  
12 viewed fundamental space life science and physical  
13 sciences and related technology research, among  
14 other activities, consistent with the priorities in the  
15 National Academies’ decadal survey described in  
16 subsection (a).

17               (2) TRANSMITTAL.—Not later than 270 days  
18 after the date of enactment of this Act, the Adminis-  
19 trator shall transmit the strategic plan developed  
20 under paragraph (1) to the Committee on Science,  
21 Space, and Technology of the House of Representa-  
22 tives and the Committee on Commerce, Science, and  
23 Transportation of the Senate.

1 **SEC. 719. RESTORING COMMITMENT TO ENGINEERING RE-**  
2 **SEARCH.**

3 (a) SENSE OF CONGRESS.—It is the sense of Con-  
4 gress that engineering excellence has long been a hallmark  
5 of the Administration’s ability to make significant ad-  
6 vances in aeronautics and space exploration. However, as  
7 has been noted in recent National Academies reports, in-  
8 creasingly constrained funding and competing priorities  
9 have led to an erosion of the Administration’s commitment  
10 to basic engineering research. This research provides the  
11 basis for the technology development that enables the Ad-  
12 ministration’s many challenging missions to succeed. If  
13 current trends continue, the Administration’s ability to at-  
14 tract and maintain the best and brightest engineering  
15 workforce at its Centers as well as its ability to remain  
16 on the cutting edge of aeronautical and space technology  
17 will continue to erode and will threaten the Administra-  
18 tion’s ability to be a world leader in aeronautics research  
19 and development and space exploration.

20 (b) PLAN.—The Administrator shall develop a plan  
21 for restoring a meaningful basic engineering research pro-  
22 gram at the Administration’s Centers, including, as appro-  
23 priate, collaborations with industry, universities, and other  
24 relevant organizations. The plan shall identify the organi-  
25 zational approach to be followed, an initial set of basic  
26 research priorities, and a proposed budget.

1 (c) REPORT.—Not later than 180 days after the date  
2 of enactment of this Act, the Administrator shall transmit  
3 the plan specified in subsection (b) to the Committee on  
4 Science, Space, and Technology of the House of Rep-  
5 resentatives and the Committee on Commerce, Science,  
6 and Transportation of the Senate.

7 **SEC. 720. LIQUID ROCKET ENGINE DEVELOPMENT PRO-**  
8 **GRAM.**

9 The Administrator shall consult with the Secretary  
10 of Defense to ensure that any next generation liquid rock-  
11 et engine made in the United States for national security  
12 space launch objectives can contribute, to the extent prac-  
13 ticable, to the space programs and missions carried out  
14 by the Administration.

15 **SEC. 721. REMOTE SATELLITE SERVICING DEMONSTRA-**  
16 **TIONS.**

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

19 (1) the Administration plays a key role in dem-  
20 onstrating the feasibility of using robotic tech-  
21 nologies for a spacecraft that could autonomously  
22 access, inspect, repair, and refuel satellites;

23 (2) demonstrating this feasibility would both as-  
24 sist the Administration in its future missions and  
25 provide other Federal agencies and private sector en-

1       tities with enhanced confidence in the feasibility to  
2       robotically refuel, inspect, repair, and maintain their  
3       satellites in both near and distant orbits; and

4             (3) the capability to refuel, inspect, repair, and  
5       maintain satellites robotically could add years of  
6       functional life to satellites.

7       (b) REPORT.—Not later than 120 days after the date  
8       of enactment of this Act, the Administrator shall transmit  
9       a report to the Committee on Science, Space, and Tech-  
10      nology of the House of Representatives and the Committee  
11      on Commerce, Science, and Transportation of the Senate  
12      describing the Administration’s—

13            (1) activities, tools, and techniques associated  
14      with the ultimate goal of autonomously servicing sat-  
15      ellites using robotic spacecraft;

16            (2) efforts to coordinate its technology develop-  
17      ment and demonstrations with other Federal agen-  
18      cies and private sector entities that conduct pro-  
19      grams, projects, or activities on on-orbit satellite in-  
20      spection and servicing capabilities;

21            (3) efforts to leverage the work of these Federal  
22      agencies and private sector entities into the Admin-  
23      istration’s plans;

24            (4) accomplishments to date in demonstrating  
25      various servicing technologies;

1           (5) major technical and operational challenges  
2           encountered and mitigation measures taken; and

3           (6) demonstrations needed to increase con-  
4           fidence in the use of the technologies for operational  
5           missions, and the timeframe for these demonstra-  
6           tions.

7   **SEC. 722. INFORMATION TECHNOLOGY GOVERNANCE.**

8           (a) SENSE OF CONGRESS.—It is the sense of Con-  
9           gress that information security is central to the Adminis-  
10          tration’s ability to protect information and information  
11          systems vital to its mission.

12          (b) STUDY.—The Comptroller General of the United  
13          States shall conduct a study to assess the effectiveness of  
14          the Administration’s Information Technology Governance.  
15          The study shall include an assessment of—

16               (1) the resources available for overseeing Ad-  
17               ministration-wide information technology operations,  
18               investments, and security measures and the Chief  
19               Information Officer’s visibility into and access to  
20               those resources;

21               (2) the effectiveness of the Administration’s de-  
22               centralized information technology structure, deci-  
23               sionmaking processes and authorities and its ability  
24               to enforce information security; and

1           (3) the impact of providing the Chief Informa-  
2           tion Officer approval authority over information  
3           technology investments that exceed a defined mone-  
4           tary threshold and any potential impacts of the  
5           Chief Information Officer having such authority on  
6           the Administration's missions, flights programs and  
7           projects, research activities, and Center operations.

8           (c) REPORT.—Not later than 1 year after the date  
9           of enactment of this Act, the Comptroller General shall  
10          transmit a report detailing the results of the study con-  
11          ducted under subsection (b) to the Committee on Science,  
12          Space, and Technology of the House of Representatives  
13          and the Committee on Commerce, Science, and Transpor-  
14          tation of the Senate.

15       **SEC. 723. STRENGTHENING ADMINISTRATION SECURITY.**

16          (a) FINDINGS.—Congress makes the following find-  
17          ings:

18               (1) Following the public disclosure of security  
19               and export control violations at its research centers,  
20               the Administration contracted with the National  
21               Academy of Public Administration to conduct an  
22               independent assessment of how the Administration  
23               carried out Foreign National Access Management  
24               practices and other security matters.

1           (2) The assessment by the National Academy of  
2           Public Administration concluded that “NASA net-  
3           works are compromised”, that the Administration  
4           lacked a standardized and systematic approach to  
5           export compliance, and that individuals within the  
6           Administration were not held accountable when  
7           making serious, preventable errors in carrying out  
8           Foreign National Access Management practices and  
9           other security matters.

10          (b) REPORT.—Not later than 90 days after the date  
11       of enactment of this Act, the Administration shall report  
12       to the Committee on Science, Space, and Technology of  
13       the House of Representatives and the Committee on Com-  
14       merce, Science, and Transportation of the Senate on how  
15       it plans to address each of the recommendations made in  
16       the security assessment by the National Academy of Pub-  
17       lic Administration and the recommendations made by the  
18       Government Accountability Office and the Administra-  
19       tion’s Office of the Inspector General regarding security  
20       and safeguarding export control information.

21          (c) REVIEW.—Not later than 1 year after the date  
22       of enactment of this Act, the Comptroller General of the  
23       United States shall report to the Committee on Science,  
24       Space, and Technology of the House of Representatives  
25       and the Committee on Commerce, Science, and Transpor-

1 tation of the Senate its assessment of how the Administra-  
2 tion has complied with the recommendations described in  
3 subsection (b).

4 **SEC. 724. PROHIBITION ON USE OF FUNDS FOR CONTRAC-**  
5 **TORS THAT HAVE COMMITTED FRAUD OR**  
6 **OTHER CRIMES.**

7 None of the funds authorized to be appropriated or  
8 otherwise made available for fiscal year 2016 or any fiscal  
9 year thereafter for the Administration may be used to  
10 enter into a contract with any offeror or any of its prin-  
11 cipals if the offeror certifies, pursuant to the Federal Ac-  
12 quisition Regulation, that the offeror or any of its prin-  
13 cipals—

14 (1) within a 3-year period preceding the offer  
15 has been convicted of or had a civil judgment ren-  
16 dered against it for—

17 (A) commission of fraud or a criminal of-  
18 fense in connection with obtaining, attempting  
19 to obtain, or performing a public (Federal,  
20 State, or local) contract or subcontract;

21 (B) violation of Federal or State antitrust  
22 statutes relating to the submission of offers; or

23 (C) commission of embezzlement, theft,  
24 forgery, bribery, falsification or destruction of  
25 records, making false statements, tax evasion,

1           violating Federal criminal tax laws, or receiving  
2           stolen property;

3           (2) are presently indicted for, or otherwise  
4           criminally or civilly charged by a governmental enti-  
5           ty with, commission of any of the offenses enumer-  
6           ated in paragraph (1); or

7           (3) within a 3-year period preceding the offer,  
8           has been notified of any delinquent Federal taxes in  
9           an amount that exceeds \$3,000 for which the liabil-  
10          ity remains unsatisfied.

11 **SEC. 725. PROTECTION OF APOLLO LANDING SITES.**

12          (a) ASSESSMENT.—The Director of the Office of  
13 Science and Technology Policy, in consultation with all rel-  
14 evant agencies of the Federal Government and other ap-  
15 propriate entities and individuals, shall carry out a review  
16 and assessment of the issues involved in protecting and  
17 preserving historically important Apollo Program lunar  
18 landing sites and Apollo program artifacts residing on the  
19 lunar surface, including those pertaining to Apollo 11 and  
20 Apollo 17. The review and assessment shall, at a min-  
21 imum, include determination of what risks to the protec-  
22 tion and preservation of those sites and artifacts exist or  
23 may exist in the future, what measures are required to  
24 ensure such protection and preservation, the extent to  
25 which additional domestic legislation or international trea-

1 ties or agreements will be required, and specific rec-  
2 ommendations for protecting and preserving those lunar  
3 landing sites and artifacts.

4 (b) REPORT.—Not later than 1 year after the date  
5 of enactment of this Act, the Director shall transmit to  
6 the Committee on Science, Space, and Technology of the  
7 House of Representatives and the Committee on Com-  
8 merce, Science, and Transportation of the Senate the re-  
9 sults of the assessment required under subsection (a).

10 **SEC. 726. ASTRONAUT OCCUPATIONAL HEALTHCARE.**

11 (a) IN GENERAL.—The National Academies’ Insti-  
12 tute of Medicine report “Health Standards for Long Du-  
13 ration and Exploration Spaceflight: Ethics Principles, Re-  
14 sponsibilities, and Decision Framework” found that the  
15 Administration has ethical responsibilities for and should  
16 adopt policies and processes related to health standards  
17 for long duration and exploration spaceflights that recog-  
18 nize those ethical responsibilities. In particular, the report  
19 recommended that the Administration “provide preventa-  
20 tive long-term health screening and surveillance of astro-  
21 nauts and lifetime health care to protect their health, sup-  
22 port ongoing evaluation of health standards, improve mis-  
23 sion safety, and reduce risks for current and future astro-  
24 nauts”.

1 (b) RESPONSE.—The Administration shall prepare a  
2 response to the National Academies report recommenda-  
3 tion described in subsection (a). The response shall include  
4 the estimated budgetary resources required for the imple-  
5 mentation of those recommendations, and any options that  
6 might be considered as part of the response.

7 (c) TRANSMITTAL.—The response required under  
8 subsection (b) shall be transmitted to the Committee on  
9 Science, Space, and Technology of the House of Rep-  
10 resentatives and the Committee on Commerce, Science,  
11 and Transportation of the Senate not later than 6 months  
12 after the date of enactment of this Act.

13 **SEC. 727. SENSE OF CONGRESS ON ACCESS TO OBSERVA-**  
14 **TIONAL DATA SETS.**

15 It is the sense of Congress that the Administration  
16 should prioritize the development of tools and interfaces  
17 that make publicly available observational data sets more  
18 easy to access, analyze, manipulate, and understand for  
19 students, teachers, and the American public at large, with  
20 a particular focus on K–12 and undergraduate STEM  
21 education settings.

