

114TH CONGRESS
2^D SESSION

S. 3346

AN ACT

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

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

★(Star Print)

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 Transi-
 4 tion Authorization Act of 2016”.

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

Sec. 1. Short title; table of contents.

Sec. 2. Definitions.

TITLE I—AUTHORIZATION OF APPROPRIATIONS

Sec. 101. Fiscal year 2017.

TITLE II—SUSTAINING NATIONAL SPACE COMMITMENTS

Sec. 201. Sense of Congress on sustaining national space commitments.

Sec. 202. Findings.

TITLE III—MAXIMIZING UTILIZATION OF THE ISS AND LOW-
 EARTH ORBIT

Sec. 301. Operation of the ISS.

Sec. 302. Transportation to ISS.

Sec. 303. ISS transition plan.

Sec. 304. Space communications.

Sec. 305. Indemnification; NASA launch services and reentry services.

TITLE IV—ADVANCING HUMAN DEEP SPACE EXPLORATION

Subtitle A—Human Space Flight and Exploration Goals and Objectives

Sec. 411. Human space flight and exploration long-term goals.

Sec. 412. Key objectives.

Sec. 413. Vision for space exploration.

Sec. 414. Stepping stone approach to exploration.

Sec. 415. Update of exploration plan and programs.

Sec. 416. Repeals.

Sec. 417. Assured access to space.

Subtitle B—Assuring Core Capabilities for Exploration

Sec. 421. Space Launch System, Orion, and Exploration Ground Systems.

Subtitle C—Journey to Mars

Sec. 431. Findings on human space exploration.

Sec. 432. Human exploration roadmap.

Sec. 433. Advanced space suit capability.

Sec. 434. Asteroid robotic redirect mission.

Sec. 435. Mars 2033 report.

Subtitle D—TREAT Astronauts Act

- Sec. 441. Short title.
- Sec. 442. Findings; sense of Congress.
- Sec. 443. Medical monitoring and research relating to human space flight.

TITLE V—ADVANCING SPACE SCIENCE

- Sec. 501. Maintaining a balanced space science portfolio.
- Sec. 502. Planetary science.
- Sec. 503. James Webb Space Telescope.
- Sec. 504. Wide-Field Infrared Survey Telescope.
- Sec. 505. Mars 2020 rover.
- Sec. 506. Europa.
- Sec. 507. Congressional declaration of policy and purpose.
- Sec. 508. Extrasolar planet exploration strategy.
- Sec. 509. Astrobiology strategy.
- Sec. 510. Astrobiology public-private partnerships.
- Sec. 511. Near-earth objects.
- Sec. 512. Near-Earth objects public-private partnerships.
- Sec. 513. Assessment of science mission extensions.
- Sec. 514. Stratospheric observatory for infrared astronomy.
- Sec. 515. Radioisotope power systems.
- Sec. 516. Assessment of Mars architecture.
- Sec. 517. Collaboration.

TITLE VI—AERONAUTICS

- Sec. 601. Sense of Congress on aeronautics.
- Sec. 602. Transformative aeronautics research.
- Sec. 603. Hypersonic research.
- Sec. 604. Supersonic research.
- Sec. 605. Rotorcraft research.

TITLE VII—SPACE TECHNOLOGY

- Sec. 701. Space technology infusion.
- Sec. 702. Space technology program.

TITLE VIII—MAXIMIZING EFFICIENCY

Subtitle A—Agency Information Technology and Cybersecurity

- Sec. 811. Information technology governance.
- Sec. 812. Information technology strategic plan.
- Sec. 813. Cybersecurity.
- Sec. 814. Security management of foreign national access.
- Sec. 815. Cybersecurity of web applications.

Subtitle B—Collaboration Among Mission Directorates and Other Matters

- Sec. 821. Collaboration among mission directorates.
- Sec. 822. NASA launch capabilities collaboration.
- Sec. 823. Detection and avoidance of counterfeit parts.
- Sec. 824. Education and outreach.
- Sec. 825. Leveraging commercial satellite servicing capabilities across mission directorates.
- Sec. 826. Flight opportunities.
- Sec. 827. Sense of Congress on small class launch missions.
- Sec. 828. Baseline and cost controls.

- Sec. 829. Commercial technology transfer program.
 Sec. 830. Avoiding organizational conflicts of interest in major administration acquisition programs.
 Sec. 831. Protection of Apollo landing sites.
 Sec. 832. NASA lease of non-excess property.
 Sec. 833. Termination liability.
 Sec. 834. Independent reviews.
 Sec. 835. NASA Advisory Council.
 Sec. 836. Cost estimation.
 Sec. 837. Facilities and infrastructure.
 Sec. 838. Human space flight accident investigations.
 Sec. 839. Orbital debris.
 Sec. 840. Review of orbital debris removal concepts.

1 **SEC. 2. DEFINITIONS.**

2 In this Act:

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

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

9 (3) APPROPRIATE COMMITTEES OF CON-
 10 GRESS.—The term “appropriate committees of Con-
 11 gress” means—

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

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

16 (4) CIS-LUNAR SPACE.—The term “cis-lunar
 17 space” means the region of space from the Earth
 18 out to and including the region around the surface
 19 of the Moon.

1 (5) DEEP SPACE.—The term “deep space”
2 means the region of space beyond low-Earth orbit,
3 to include cis-lunar space.

4 (6) GOVERNMENT ASTRONAUT.—The term
5 “government astronaut” has the meaning given the
6 term in section 50902 of title 51, United States
7 Code.

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

10 (8) ISS MANAGEMENT ENTITY.—The term
11 “ISS management entity” means the organization
12 with which the Administrator has a cooperative
13 agreement under section 504(a) of the National Aer-
14 onautics and Space Administration Authorization
15 Act of 2010 (42 U.S.C. 18354(a)).

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

18 (10) ORION.—The term “Orion” means the
19 multipurpose crew vehicle described under section
20 303 of the National Aeronautics and Space Adminis-
21 tration Authorization Act of 2010 (42 U.S.C.
22 18323).

23 (11) SPACE LAUNCH SYSTEM.—The term
24 “Space Launch System” has the meaning given the
25 term in section 3 of the National Aeronautics and

1 Space Administration Authorization Act of 2010 (42
2 U.S.C. 18302).

3 (12) UNITED STATES GOVERNMENT ASTRO-
4 NAUT.—The term “United States government astro-
5 naut” has the meaning given the term “government
6 astronaut” in section 50902 of title 51, United
7 States Code, except it does not include an individual
8 who is an international partner astronaut.

9 **TITLE I—AUTHORIZATION OF**
10 **APPROPRIATIONS**

11 **SEC. 101. FISCAL YEAR 2017.**

12 There are authorized to be appropriated to NASA for
13 fiscal year 2017, \$19,508,000,000, as follows:

- 14 (1) For Exploration, \$4,330,000,000.
15 (2) For Space Operations, \$5,023,000,000.
16 (3) For Science, \$5,500,000,000.
17 (4) For Aeronautics, \$640,000,000.
18 (5) For Space Technology, \$686,000,000.
19 (6) For Education, \$115,000,000.
20 (7) For Safety, Security, and Mission Services,
21 \$2,788,600,000.
22 (8) For Construction and Environmental Com-
23 pliance and Restoration, \$388,000,000.
24 (9) For Inspector General, \$37,400,000.

1 **TITLE II—SUSTAINING NA-**
2 **TIONAL SPACE COMMIT-**
3 **MENTS**

4 **SEC. 201. SENSE OF CONGRESS ON SUSTAINING NATIONAL**
5 **SPACE COMMITMENTS.**

6 It is the sense of Congress that—

7 (1) honoring current national space commit-
8 ments and building upon investments in space across
9 successive Administrations demonstrates clear con-
10 tinuity of purpose by the United States, in collabora-
11 tion with its international, academic, and industry
12 partners, to extend humanity’s reach into deep
13 space, including cis-lunar space, the Moon, the sur-
14 face and moons of Mars, and beyond;

15 (2) NASA leaders can best leverage investments
16 in the United States space program by continuing to
17 develop a balanced portfolio for space exploration
18 and space science, including continued development
19 of the Space Launch System, Orion, Commercial
20 Crew Program, space and planetary science missions
21 such as the James Webb Space Telescope, Wide-
22 Field Infrared Survey Telescope, and Europa mis-
23 sion, and ongoing operations of the ISS and Com-
24 mercial Resupply Services Program;

1 (3) a national, government-led space program
2 that builds on current science and exploration pro-
3 grams, advances human knowledge and capabilities,
4 and opens the frontier beyond Earth for ourselves,
5 commercial enterprise, and science, and with our
6 international partners, is of critical importance to
7 our national destiny and to a future guided by
8 United States values and freedoms;

9 (4) continuity of purpose and effective execu-
10 tion of core NASA programs are essential for effi-
11 cient use of resources in pursuit of timely and tan-
12 gible accomplishments;

13 (5) NASA could improve its efficiency and ef-
14 fectiveness by working with industry to streamline
15 existing programs and requirements, procurement
16 practices, institutional footprint, and bureaucracy
17 while preserving effective program oversight, ac-
18 countability, and safety;

19 (6) it is imperative that the United States
20 maintain and enhance its leadership in space explo-
21 ration and space science, and continue to expand
22 freedom and economic opportunities in space for all
23 Americans that are consistent with the Constitution
24 of the United States; and

1 (7) NASA should be a multi-mission space
2 agency, and should have a balanced and robust set
3 of core missions in space science, space technology,
4 aeronautics, human space flight and exploration, and
5 education.

6 **SEC. 202. FINDINGS.**

7 Congress makes the following findings:

8 (1) Returns on the Nation's investments in
9 science, technology, and exploration accrue over dec-
10 ades-long timeframes, and a disruption of such in-
11 vestments could prevent returns from being fully re-
12 alized.

13 (2) Past challenges to the continuity of such in-
14 vestments, particularly threats regarding the can-
15 cellation of authorized programs with bipartisan and
16 bicameral support, have disrupted completion of
17 major space systems thereby—

18 (A) impeding planning and pursuit of na-
19 tional objectives in space science and human
20 space exploration;

21 (B) placing such investments in space
22 science and space exploration at risk; and

23 (C) degrading the aerospace industrial
24 base.

1 (3) The National Aeronautics and Space Ad-
2 ministration Authorization Act of 2005 (Public Law
3 109–155; 119 Stat. 2895), National Aeronautics
4 and Space Administration Authorization Act of 2008
5 (Public Law 110–422; 122 Stat. 4779), and Na-
6 tional Aeronautics and Space Administration Au-
7 thorization Act of 2010 (42 U.S.C. 18301 et seq.)
8 reflect a broad, bipartisan agreement on the path
9 forward for NASA’s core missions in science, space
10 technology, aeronautics, human space flight and ex-
11 ploration, and education, that serves as the founda-
12 tion for the policy updates by this Act.

13 (4) Sufficient investment and maximum utiliza-
14 tion of the ISS and ISS National Laboratory with
15 our international and industry partners is—

16 (A) consistent with the goals and objectives
17 of the United States space program; and

18 (B) imperative to continuing United States
19 global leadership in human space exploration,
20 science, research, technology development, and
21 education opportunities that contribute to devel-
22 opment of the next generation of American sci-
23 entists, engineers, and leaders, and to creating
24 the opportunity for economic development of
25 low-Earth orbit.

1 (5) NASA has made measurable progress in the
2 development and testing of the Space Launch Sys-
3 tem and Orion exploration systems with the near-
4 term objectives of the initial integrated test flight
5 and launch in 2018, a human mission in 2021, and
6 continued missions with an annual cadence in cis-
7 lunar space and eventually to the surface of Mars.

8 (6) The Commercial Crew Program has made
9 measurable progress toward reestablishing the capa-
10 bility to launch United States government astro-
11 nauts from United States soil into low-Earth orbit
12 by the end of 2018.

13 (7) The Aerospace Safety Advisory Panel, in its
14 2015 Annual Report, urged continuity of purpose
15 noting concerns over the potential for cost overruns
16 and schedule slips that could accompany significant
17 changes to core NASA programs.

18 **TITLE III—MAXIMIZING UTILIZA-**
19 **TION OF THE ISS AND LOW-**
20 **EARTH ORBIT**

21 **SEC. 301. OPERATION OF THE ISS.**

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

1 (1) after 15 years of continuous human pres-
2 ence in low-Earth orbit, the ISS continues to over-
3 come challenges and operate safely;

4 (2) the ISS is a unique testbed for future space
5 exploration systems development, including long-du-
6 ration space travel;

7 (3) the expansion of partnerships, scientific re-
8 search, and commercial applications of the ISS is es-
9 sential to ensuring the greatest return on invest-
10 ments made by the United States and its inter-
11 national space partners in the development, assem-
12 bly, and operations of that unique facility;

13 (4) utilization of the ISS will sustain United
14 States leadership and progress in human space ex-
15 ploration by—

16 (A) facilitating the commercialization and
17 economic development of low-Earth orbit;

18 (B) serving as a testbed for technologies
19 and a platform for scientific research and devel-
20 opment; and

21 (C) serving as an orbital facility enabling
22 research upon—

23 (i) the health, well-being, and per-
24 formance of humans in space; and

1 (ii) the development of in-space sys-
2 tems enabling human space exploration be-
3 yond low-Earth orbit; and

4 (5) the ISS provides a platform for funda-
5 mental, microgravity, discovery-based space life and
6 physical sciences research that is critical for ena-
7 bling space exploration, protecting humans in space,
8 increasing pathways for commercial space develop-
9 ment that depend on advances in basic research, and
10 contributes to advancing science, technology, engi-
11 neering, and mathematics research.

12 (b) OBJECTIVES.—The primary objectives of the ISS
13 program shall be—

14 (1) to achieve the long term goal and objectives
15 under section 202 of the National Aeronautics and
16 Space Administration Authorization Act of 2010 (42
17 U.S.C. 18312); and

18 (2) to pursue a research program that advances
19 knowledge and provides other benefits to the Nation.

20 (c) CONTINUATION OF THE ISS.—Section 501 of the
21 National Aeronautics and Space Administration Author-
22 ization Act of 2010 (42 U.S.C. 18351) is amended to read
23 as follows:

1 **“SEC. 501. CONTINUATION OF THE INTERNATIONAL SPACE**
2 **STATION.**

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

7 “(b) **NASA ACTION.**—In furtherance of the policy set
8 forth in subsection (a), NASA shall—

9 “(1) pursue international, commercial, and
10 intragovernmental means to maximize ISS logistics
11 supply, maintenance, and operational capabilities,
12 reduce risks to ISS systems sustainability, and offset
13 and minimize United States operations costs relating
14 to the ISS;

15 “(2) utilize, to the extent practicable, the ISS
16 for the development of capabilities and technologies
17 needed for the future of human space exploration
18 beyond low-Earth orbit; and

19 “(3) utilize, if practical and cost effective, the
20 ISS for Science Mission Directorate missions in low-
21 Earth orbit.”.

22 **SEC. 302. TRANSPORTATION TO ISS.**

23 (a) **FINDINGS.**—Congress finds that reliance on for-
24 eign carriers for United States crew transfer is unaccept-
25 able, and the Nation’s human space flight program must
26 acquire the capability to launch United States government

1 astronauts on vehicles using United States rockets from
2 United States soil as soon as is safe, reliable, and afford-
3 able to do so.

4 (b) SENSE OF CONGRESS ON COMMERCIAL CREW
5 PROGRAM AND COMMERCIAL RESUPPLY SERVICES PRO-
6 GRAM.—It is the sense of Congress that—

7 (1) once developed and certified to meet the Ad-
8 ministration’s safety and reliability requirements,
9 United States commercially provided crew transpor-
10 tation systems offer the potential of serving as the
11 primary means of transporting United States gov-
12 ernment astronauts and international partner astro-
13 nauts to and from the ISS and serving as ISS crew
14 rescue vehicles;

15 (2) the budgetary assumptions used by the Ad-
16 ministration in its planning for the Commercial
17 Crew Program have consistently assumed signifi-
18 cantly higher funding levels than have been author-
19 ized and appropriated by Congress;

20 (3) credibility in the Administration’s budgetary
21 estimates for the Commercial Crew Program can be
22 enhanced by an independently developed cost esti-
23 mate;

24 (4) such credibility in budgetary estimates is an
25 important factor in understanding program risk;

1 (5) United States access to low-Earth orbit is
2 paramount to the continued success of the ISS and
3 ISS National Laboratory;

4 (6) a stable and successful Commercial Resup-
5 ply Services Program and Commercial Crew Pro-
6 gram are critical to ensuring timely provisioning of
7 the ISS and to reestablishing the capability to
8 launch United States government astronauts from
9 United States soil into orbit, ending reliance upon
10 Russian transport of United States government as-
11 tronauts to the ISS which has not been possible
12 since the retirement of the Space Shuttle program in
13 2011;

14 (7) NASA should build upon the success of the
15 Commercial Orbital Transportation Services Pro-
16 gram and Commercial Resupply Services Program
17 that have allowed private sector companies to part-
18 ner with NASA to deliver cargo and scientific experi-
19 ments to the ISS since 2012;

20 (8) the 21st Century Launch Complex Program
21 has enabled significant modernization and infra-
22 structure improvements at launch sites across the
23 United States to support NASA's Commercial Re-
24 supply Services Program and other civil and com-
25 mercial space flight missions; and

1 (9) the 21st Century Launch Complex Program
2 should be continued in a manner that leverages
3 State and private investments to achieve the goals of
4 that program.

5 (c) REAFFIRMATION.—Congress reaffirms—

6 (1) its commitment to the use of a commercially
7 developed, private sector launch and delivery system
8 to the ISS for crew missions as expressed in the Na-
9 tional Aeronautics and Space Administration Au-
10 thorization Act of 2005 (Public Law 109–155; 119
11 Stat. 2895), the National Aeronautics and Space
12 Administration Authorization Act of 2008 (Public
13 Law 110–422; 122 Stat. 4779), and the National
14 Aeronautics and Space Administration Authorization
15 Act of 2010 (42 U.S.C. 18301 et seq.); and

16 (2) the requirement under section
17 50111(b)(1)(A) of title 51, United States Code, that
18 the Administration shall make use of United States
19 commercially provided ISS crew transfer and crew
20 rescue services to the maximum extent practicable.

21 (d) USE OF NON-UNITED STATES HUMAN SPACE
22 FLIGHT TRANSPORTATION CAPABILITIES.—Section
23 201(a) of the National Aeronautics and Space Administra-
24 tion Authorization Act of 2010 (42 U.S.C. 18311(a)) is
25 amended to read as follows:

1 “(a) USE OF NON-UNITED STATES HUMAN SPACE
2 FLIGHT TRANSPORTATION SERVICES.—

3 “(1) IN GENERAL.—The Federal Government
4 may not acquire human space flight transportation
5 services from a foreign entity unless—

6 “(A) no United States Government-oper-
7 ated human space flight capability is available;

8 “(B) no United States commercial provider
9 is available; and

10 “(C) it is a qualified foreign entity.

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

12 “(A) COMMERCIAL PROVIDER.—The term
13 ‘commercial provider’ means any person pro-
14 viding human space flight transportation serv-
15 ices, primary control of which is held by persons
16 other than the Federal Government, a State or
17 local government, or a foreign government.

18 “(B) QUALIFIED FOREIGN ENTITY.—The
19 term ‘qualified foreign entity’ means a foreign
20 entity that is in compliance with all applicable
21 safety standards and is not prohibited from
22 providing space transportation services under
23 other law.

24 “(C) UNITED STATES COMMERCIAL PRO-
25 VIDER.—The term ‘United States commercial

1 provider' means a commercial provider, orga-
2 nized under the laws of the United States or of
3 a State, that is more than 50 percent owned by
4 United States nationals.

5 “(3) ARRANGEMENTS WITH FOREIGN ENTI-
6 TIES.—Nothing in this subsection shall prevent the
7 Administrator from negotiating or entering into
8 human space flight transportation arrangements
9 with foreign entities to ensure safety of flight and
10 continued ISS operations.”.

11 (e) COMMERCIAL CREW PROGRAM.—

12 (1) SAFETY.—

13 (A) IN GENERAL.—The Administrator
14 shall protect the safety of government astro-
15 nauts by ensuring that each commercially pro-
16 vided transportation system under this sub-
17 section meets all applicable human rating re-
18 quirements in accordance with section
19 403(b)(1) of the National Aeronautics and
20 Space Administration Authorization Act of
21 2010 (42 U.S.C. 18342(b)(1)).

22 (B) LESSONS LEARNED.—Consistent with
23 the findings and recommendations of the Co-
24 lumbia Accident Investigation Board, the Ad-
25 ministration shall ensure that safety and the

1 minimization of the probability of loss of crew
2 are the critical priorities of the Commercial
3 Crew Program.

4 (2) COST MINIMIZATION.—The Administrator
5 shall strive through the competitive selection process
6 to minimize the life cycle cost to the Administration
7 through the planned period of commercially provided
8 crew transportation services.

9 (f) COMMERCIAL CARGO PROGRAM.—Section 401 of
10 the National Aeronautics and Space Administration Au-
11 thorization Act of 2010 (42 U.S.C. 18341) is amended
12 by striking “Commercial Orbital Transportation Services”
13 and inserting “Commercial Resupply Services”.

14 (g) COMPETITION.—It is the policy of the United
15 States that, to foster the competitive development, oper-
16 ation, improvement, and commercial availability of space
17 transportation services, and to minimize the life cycle cost
18 to the Administration, the Administrator shall procure
19 services for Federal Government access to and return from
20 the ISS, whenever practicable, via fair and open competi-
21 tion for well-defined, milestone-based, Federal Acquisition
22 Regulation-based contracts under section 201(a) of the
23 National Aeronautics and Space Administration Author-
24 ization Act of 2010 (42 U.S.C. 18311(a)).

25 (h) TRANSPARENCY.—

1 (1) SENSE OF CONGRESS.—It is the sense of
2 Congress that cost transparency and schedule trans-
3 parency aid in effective program management and
4 risk assessment.

5 (2) IN GENERAL.—The Administrator shall, to
6 the greatest extent practicable and in a manner that
7 does not add costs or schedule delays to the pro-
8 gram, ensure all Commercial Crew Program and
9 Commercial Resupply Services Program providers
10 provide evidence-based support for their costs and
11 schedules.

12 (i) ISS CARGO RESUPPLY SERVICES LESSONS
13 LEARNED.—Not later than 120 days after the date of en-
14 actment of this Act, the Administrator shall submit to the
15 appropriate committees of Congress a report that—

16 (1) identifies the lessons learned to date from
17 previous and existing Commercial Resupply Services
18 contracts;

19 (2) indicates whether changes are needed to the
20 manner in which the Administration procures and
21 manages similar services prior to the issuance of fu-
22 ture Commercial Resupply Services procurement op-
23 portunities; and

24 (3) identifies any lessons learned from the Com-
25 mercial Resupply Services contracts that should be

1 applied to the procurement and management of com-
2 mercially provided crew transfer services to and
3 from the ISS or to other future procurements.

4 **SEC. 303. ISS TRANSITION PLAN.**

5 (a) FINDINGS.—Congress finds that—

6 (1) NASA has been both the primary supplier
7 and consumer of human space flight capabilities and
8 services of the ISS and in low-Earth orbit; and

9 (2) according to the National Research Council
10 report “Pathways to Exploration: Rationales and
11 Approaches for a U.S. Program of Human Space
12 Exploration” extending ISS beyond 2020 to 2024 or
13 2028 will have significant negative impacts on the
14 schedule of crewed missions to Mars, without signifi-
15 cant increases in funding.

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

18 (1) an orderly transition for United States
19 human space flight activities in low-Earth orbit from
20 the current regime, that relies heavily on NASA
21 sponsorship, to a regime where NASA is one of
22 many customers of a low-Earth orbit commercial
23 human space flight enterprise may be necessary; and

24 (2) decisions about the long-term future of the
25 ISS impact the ability to conduct future deep space

1 exploration activities, and that such decisions re-
2 garding the ISS should be considered in the context
3 of the Human Exploration Roadmap under section
4 432 of this Act.

5 (c) REPORTS.—Section 50111 of title 51, United
6 States Code, is amended by adding at the end the fol-
7 lowing:

8 “(c) ISS TRANSITION PLAN.—

9 “(1) IN GENERAL.—The Administrator, in co-
10 ordination with the ISS management entity (as de-
11 fined in section 2 of the National Aeronautics and
12 Space Administration Transition Authorization Act
13 of 2016), ISS partners, the scientific user commu-
14 nity, and the commercial space sector, shall develop
15 a plan to transition in a step-wise approach from the
16 current regime that relies heavily on NASA sponsor-
17 ship to a regime where NASA could be one of many
18 customers of a low-Earth orbit non-governmental
19 human space flight enterprise.

20 “(2) REPORTS.—Not later than December 1,
21 2017, and biennially thereafter until 2023, the Ad-
22 ministrator shall submit to the Committee on Com-
23 merce, Science, and Transportation of the Senate
24 and the Committee on Science, Space, and Tech-

1 nology of the House of Representatives a report that
2 includes—

3 “(A) a description of the progress in
4 achieving the Administration’s deep space
5 human exploration objectives on ISS and pros-
6 pects for accomplishing future mission require-
7 ments, space exploration objectives, and other
8 research objectives on future commercially sup-
9 plied low-Earth orbit platforms or migration of
10 those objectives to cis-lunar space;

11 “(B) steps NASA is taking and will take,
12 including demonstrations that could be con-
13 ducted on the ISS, to stimulate and facilitate
14 commercial demand and supply of products and
15 services in low-Earth orbit;

16 “(C) an identification of barriers pre-
17 venting the commercialization of low-Earth
18 orbit, including issues relating to policy, regula-
19 tions, commercial intellectual property, data,
20 and confidentiality, that could inhibit the use of
21 the ISS as a commercial incubator;

22 “(D) the criteria for defining the ISS as a
23 research success;

24 “(E) the criteria used to determine wheth-
25 er the ISS is meeting the objective under sec-

1 tion 301(b)(2) of the National Aeronautics and
2 Space Administration Transition Authorization
3 Act of 2016;

4 “(F) an assessment of whether the criteria
5 under subparagraphs (D) and (E) are con-
6 sistent with the research areas defined in, and
7 recommendations and schedules under, the cur-
8 rent National Academies of Sciences, Engineer-
9 ing, and Medicine Decadal Survey on Biological
10 and Physical Sciences in Space;

11 “(G) any necessary contributions that ISS
12 extension would make to enabling execution of
13 the Human Exploration Roadmap under section
14 432 of the National Aeronautics and Space Ad-
15 ministration Transition Authorization Act of
16 2016;

17 “(H) the cost estimates for operating the
18 ISS to achieve the criteria required under sub-
19 paragraphs (D) and (E) and the contributions
20 identified under subparagraph (G);

21 “(I) the cost estimates for extending oper-
22 ations of the ISS to 2024, 2028, and 2030;

23 “(J) an evaluation of the feasible and pre-
24 ferred service life of the ISS beyond the period
25 described in section 503 of the National Aero-

1 nautics and Space Administration Authorization
2 Act of 2010 (42 U.S.C. 18353), through at
3 least 2028, as a unique scientific, commercial,
4 and space exploration-related facility, includ-
5 ing—

6 “(i) a general discussion of inter-
7 national partner capabilities and prospects
8 for extending the partnership;

9 “(ii) the cost associated with extend-
10 ing the service life;

11 “(iii) an assessment on the technical
12 limiting factors of the service life of the
13 ISS, including a list of critical components
14 and their expected service life and avail-
15 ability; and

16 “(iv) such other information as may
17 be necessary to fully describe the justifica-
18 tion for and feasibility of extending the
19 service life of the ISS, including the poten-
20 tial scientific or technological benefits to
21 the Federal Government, public, or to aca-
22 demic or commercial entities;

23 “(K) an identification of the necessary ac-
24 tions and an estimate of the costs to deorbit the

1 ISS once it has reached the end of its service
2 life;

3 “(L) the impact on deep space exploration
4 capabilities, including a crewed mission to Mars
5 in the 2030s, if the preferred service life of the
6 ISS is extended beyond 2024 and NASA main-
7 tains a flat budget profile; and

8 “(M) an evaluation of the functions, roles,
9 and responsibilities for management and oper-
10 ation of the ISS and a determination of—

11 “(i) those functions, roles, and re-
12 sponsibilities the Federal Government
13 should retain during the lifecycle of the
14 ISS;

15 “(ii) those functions, roles, and re-
16 sponsibilities that could be transferred to
17 the commercial space sector;

18 “(iii) the metrics that would indicate
19 the commercial space sector’s readiness
20 and ability to assume the functions, roles,
21 and responsibilities described in clause (ii);
22 and

23 “(iv) any necessary changes to any
24 agreements or other documents and the

1 law to enable the activities described in
2 subparagraphs (A) and (B).

3 “(3) DEMONSTRATIONS.—If additional Govern-
4 ment crew, power, and transportation resources are
5 available after meeting the Administration’s require-
6 ments for ISS activities defined in the Human Ex-
7 ploration Roadmap and related research, demonstra-
8 tions identified under paragraph (2) may—

9 “(A) test the capabilities needed to meet
10 future mission requirements, space exploration
11 objectives, and other research objectives de-
12 scribed in paragraph (2)(A); and

13 “(B) demonstrate or test capabilities, in-
14 cluding commercial modules or deep space habi-
15 tats, Environmental Control and Life Support
16 Systems, orbital satellite assembly, exploration
17 space suits, a node that enables a wide variety
18 of activity, including multiple commercial mod-
19 ules and airlocks, additional docking or berth-
20 ing ports for commercial crew and cargo, oppor-
21 tunities for the commercial space sector to cost
22 share for transportation and other services on
23 the ISS, other commercial activities, or services
24 obtained through alternate acquisition ap-
25 proaches.”.

1 **SEC. 304. SPACE COMMUNICATIONS.**

2 (a) PLAN.—The Administrator shall develop a plan,
3 in consultation with relevant Federal agencies, to meet the
4 Administration’s projected space communication and navi-
5 gation needs for low-Earth orbit and deep space oper-
6 ations in the 20-year period following the date of enact-
7 ment of this Act.

8 (b) CONTENTS.—The plan shall include—

9 (1) the lifecycle cost estimates and a 5-year
10 funding profile;

11 (2) the performance capabilities required to
12 meet the Administration’s projected space commu-
13 nication and navigation needs;

14 (3) the measures the Administration will take
15 to sustain the existing space communications and
16 navigation architecture;

17 (4) an identification of the projected space com-
18 munications and navigation network and infrastruc-
19 ture needs;

20 (5) a description of the necessary upgrades to
21 meet the needs identified in paragraph (4), includ-
22 ing—

23 (A) an estimate of the cost of the up-
24 grades;

25 (B) a schedule for implementing the up-
26 grades; and

1 (C) an assessment of whether and how any
2 related missions will be impacted if resources
3 are not secured at the level needed;

4 (6) the cost estimates for the maintenance of
5 existing space communications network capabilities
6 necessary to meet the needs identified in paragraph
7 (4);

8 (7) the criteria for prioritizing resources for the
9 upgrades described in paragraph (5) and the mainte-
10 nance described in paragraph (6);

11 (8) an estimate of any reimbursement amounts
12 the Administration may receive from other Federal
13 agencies;

14 (9) an identification of the projected Tracking
15 and Data Relay Satellite System needs in the 20-
16 year period following the date of enactment of this
17 Act, including in support of relevant Federal agen-
18 cies, and cost and schedule estimates to maintain
19 and upgrade the Tracking and Data Relay Satellite
20 System to meet the projected needs;

21 (10) the measures the Administration is taking
22 to meet space communications needs after all Track-
23 ing and Data Relay Satellite System third-genera-
24 tion communications satellites are operational; and

1 (11) the measures the Administration is taking
2 to mitigate threats to electromagnetic spectrum use.

3 (c) SCHEDULE.—Not later than 1 year after the date
4 of enactment of this Act, the Administrator shall submit
5 the plan to the appropriate committees of Congress.

6 **SEC. 305. INDEMNIFICATION; NASA LAUNCH SERVICES AND**
7 **REENTRY SERVICES.**

8 (a) IN GENERAL.—Subchapter III of chapter 201 of
9 title 51, United States Code, is amended by adding at the
10 end the following:

11 **“§ 20148. Indemnification; NASA launch services and**
12 **reentry services**

13 “(a) IN GENERAL.—Under such regulations in con-
14 formity with this section as the Administrator shall pre-
15 scribe taking into account the availability, cost, and terms
16 of liability insurance, any contract between the Adminis-
17 tration and a provider may provide that the United States
18 will indemnify the provider against successful claims (in-
19 cluding reasonable expenses of litigation or settlement) by
20 third parties for death, bodily injury, or loss of or damage
21 to property resulting from launch services and reentry
22 services carried out under the contract that the contract
23 defines as unusually hazardous or nuclear in nature, but
24 only to the extent the total amount of successful claims
25 related to the activities under the contract—

1 “(1) is more than the amount of insurance or
2 demonstration of financial responsibility described in
3 subsection (c)(3); and

4 “(2) is not more than the amount specified in
5 section 50915(a)(1)(B).

6 “(b) TERMS OF INDEMNIFICATION.—A contract
7 made under subsection (a) that provides indemnification
8 shall provide for—

9 “(1) notice to the United States of any claim or
10 suit against the provider for death, bodily injury, or
11 loss of or damage to property; and

12 “(2) control of or assistance in the defense by
13 the United States, at its election, of that claim or
14 suit and approval of any settlement.

15 “(c) LIABILITY INSURANCE OF THE PROVIDER.—

16 “(1) IN GENERAL.—The provider under sub-
17 section (a) shall obtain liability insurance or dem-
18 onstrate financial responsibility in amounts to com-
19 pensate for the maximum probable loss from claims
20 by—

21 “(A) a third party for death, bodily injury,
22 or property damage or loss resulting from a
23 launch service or reentry service carried out
24 under the contract; and

1 “(B) the United States Government for
2 damage or loss to Government property result-
3 ing from a launch service or reentry service car-
4 ried out under the contract.

5 “(2) MAXIMUM PROBABLE LOSSES.—

6 “(A) IN GENERAL.—The Administrator
7 shall determine the maximum probable losses
8 under subparagraphs (A) and (B) of paragraph
9 (1) not later than 90 days after the date that
10 the provider requests such a determination and
11 submits all information the Administrator re-
12 quires.

13 “(B) REVISIONS.—The Administrator may
14 revise a determination under subparagraph (A)
15 of this paragraph if the Administrator deter-
16 mines the revision is warranted based on new
17 information.

18 “(3) AMOUNT OF INSURANCE.—For the total
19 claims related to one launch or reentry, a provider
20 shall not be required to obtain insurance or dem-
21 onstrate financial responsibility of more than—

22 “(A)(i) \$500,000,000 under paragraph
23 (1)(A); or

24 “(ii) \$100,000,000 under paragraph
25 (1)(B); or

1 “(B) the maximum liability insurance
2 available on the world market at reasonable
3 cost.

4 “(4) COVERAGE.—An insurance policy or dem-
5 onstration of financial responsibility under this sub-
6 section shall protect the following, to the extent of
7 their potential liability for involvement in launch
8 services or reentry services:

9 “(A) The Government.

10 “(B) Personnel of the Government.

11 “(C) Related entities of the Government.

12 “(D) Related entities of the provider.

13 “(E) Government astronauts.

14 “(d) NO INDEMNIFICATION WITHOUT CROSS-WAIV-
15 ER.—Notwithstanding subsection (a), the Administrator
16 may not indemnify a provider under this section unless
17 there is a cross-waiver between the Administration and the
18 provider as described in subsection (e).

19 “(e) CROSS-WAIVERS.—

20 “(1) IN GENERAL.—The Administrator, on be-
21 half of the United States and its departments, agen-
22 cies, and instrumentalities, shall reciprocally waive
23 claims with a provider under which each party to the
24 waiver agrees to be responsible, and agrees to ensure
25 that its related entities are responsible, for damage

1 or loss to its property, or for losses resulting from
2 any injury or death sustained by its employees or
3 agents, as a result of activities arising out of the
4 performance of the contract.

5 “(2) LIMITATION.—The waiver made by the
6 Government under paragraph (1) shall apply only to
7 the extent that the claims are more than the amount
8 of insurance or demonstration of financial responsi-
9 bility required under subsection (c)(1)(B).

10 “(f) WILLFUL MISCONDUCT.—Indemnification under
11 subsection (a) may exclude claims resulting from the will-
12 ful misconduct of the provider or its related entities.

13 “(g) CERTIFICATION OF JUST AND REASONABLE
14 AMOUNT.—No payment may be made under subsection
15 (a) unless the Administrator or the Administrator’s des-
16 ignee certifies that the amount is just and reasonable.

17 “(h) PAYMENTS.—

18 “(1) IN GENERAL.—Upon the approval by the
19 Administrator, payments under subsection (a) may
20 be made from funds appropriated for such pay-
21 ments.

22 “(2) LIMITATION.—The Administrator shall not
23 approve payments under paragraph (1), except to
24 the extent provided in an appropriation law or to the

1 extent additional legislative authority is enacted pro-
2 viding for such payments.

3 “(3) ADDITIONAL APPROPRIATIONS.—If the
4 Administrator requests additional appropriations to
5 make payments under this subsection, then the re-
6 quest for those appropriations shall be made in ac-
7 cordance with the procedures established under sec-
8 tion 50915.

9 “(i) RULES OF CONSTRUCTION.—

10 “(1) IN GENERAL.—The authority to indemnify
11 under this section shall not create any rights in
12 third persons that would not otherwise exist by law.

13 “(2) OTHER AUTHORITY.—Nothing in this sec-
14 tion may be construed as prohibiting the Adminis-
15 trator from indemnifying a provider or any other
16 NASA contractor under other law, including under
17 Public Law 85–804 (50 U.S.C. 1431 et seq.).

18 “(3) ANTI-DEFICIENCY ACT.—Notwithstanding
19 any other provision of this section—

20 “(A) all obligations under this section are
21 subject to the availability of funds; and

22 “(B) nothing in this section may be con-
23 strued to require obligation or payment of
24 funds in violation of sections 1341, 1342, 1349
25 through 1351, and 1511 through 1519 of title

1 31, United States Code (commonly referred to
2 as the ‘Anti-Deficiency Act’).

3 “(j) RELATIONSHIP TO OTHER LAWS.—The Admin-
4 istrator may not provide indemnification under this sec-
5 tion for an activity that requires a license or permit under
6 chapter 509.

7 “(k) DEFINITIONS.—In this section:

8 “(1) GOVERNMENT ASTRONAUT.—The term
9 ‘government astronaut’ has the meaning given the
10 term in section 50902.

11 “(2) LAUNCH SERVICES.—The term ‘launch
12 services’ has the meaning given the term in section
13 50902.

14 “(3) PROVIDER.—The term ‘provider’ means a
15 person that provides domestic launch services or do-
16 mestic reentry services to the Government.

17 “(4) REENTRY SERVICES.—The term ‘reentry
18 services’ has the meaning given the term in section
19 50902.

20 “(5) RELATED ENTITY.—The term ‘related en-
21 tity’ means a contractor or subcontractor.

22 “(6) THIRD PARTY.—The term ‘third party’
23 means a person except—

24 “(A) the United States Government;

1 “(B) related entities of the Government in-
2 volved in launch services or reentry services;

3 “(C) a provider;

4 “(D) related entities of the provider in-
5 volved in launch services or reentry services; or

6 “(E) a government astronaut.”.

7 (b) CONFORMING AMENDMENT.—The table of con-
8 tents for subchapter III of chapter 201 of title 51, United
9 States Code, is amended by inserting after the item relat-
10 ing to section 20147 the following:

“20148. Indemnification; NASA launch services and reentry services.”.

11 **TITLE IV—ADVANCING HUMAN**
12 **DEEP SPACE EXPLORATION**
13 **Subtitle A—Human Space Flight**
14 **and Exploration Goals and Ob-**
15 **jectives**

16 **SEC. 411. HUMAN SPACE FLIGHT AND EXPLORATION LONG-**
17 **TERM GOALS.**

18 Section 202(a) of the National Aeronautics and
19 Space Administration Authorization Act of 2010 (42
20 U.S.C. 18312(a)) is amended to read as follows:

21 “(a) LONG-TERM GOALS.—The long-term goals of
22 the human space flight and exploration efforts of NASA
23 shall be—

24 “(1) to expand permanent human presence be-
25 yond low-Earth orbit and to do so, where practical,

1 in a manner involving international, academic, and
2 industry partners;

3 “(2) crewed missions and progress toward
4 achieving the goal in paragraph (1) to enable the po-
5 tential for subsequent human exploration and the ex-
6 tension of human presence throughout the solar sys-
7 tem; and

8 “(3) to enable a capability to extend human
9 presence, including potential human habitation on
10 another celestial body and a thriving space economy
11 in the 21st Century.”.

12 **SEC. 412. KEY OBJECTIVES.**

13 Section 202(b) of the National Aeronautics and
14 Space Administration Authorization Act of 2010 (42
15 U.S.C. 18312(b)) is amended—

16 (1) in paragraph (3), by striking “; and” and
17 inserting a semicolon;

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

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

21 “(5) to achieve human exploration of Mars and
22 beyond through the prioritization of those tech-
23 nologies and capabilities best suited for such a mis-
24 sion in accordance with the stepping stone approach

1 to exploration under section 70504 of title 51,
2 United States Code.”.

3 **SEC. 413. VISION FOR SPACE EXPLORATION.**

4 Section 20302 of title 51, United States Code, is
5 amended—

6 (1) in subsection (a), by inserting “in cis-lunar
7 space or” after “sustained human presence”;

8 (2) by amending subsection (b) to read as fol-
9 lows:

10 “(b) FUTURE EXPLORATION OF MARS.—The Admin-
11 istrator shall manage human space flight programs, in-
12 cluding the Space Launch System and Orion, to enable
13 humans to explore Mars and other destinations by defin-
14 ing a series of sustainable steps and conducting mission
15 planning, research, and technology development on a time-
16 table that is technically and fiscally possible, consistent
17 with section 70504.”; and

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

19 “(c) DEFINITIONS.—In this section:

20 “(1) ORION.—The term ‘Orion’ means the mul-
21 tipurpose crew vehicle described under section 303
22 of the National Aeronautics and Space Administra-
23 tion Authorization Act of 2010 (42 U.S.C. 18323).

24 “(2) SPACE LAUNCH SYSTEM.—The term
25 ‘Space Launch System’ means has the meaning

1 given the term in section 3 of the National Aero-
2 nautics and Space Administration Authorization Act
3 of 2010 (42 U.S.C. 18302).”.

4 **SEC. 414. STEPPING STONE APPROACH TO EXPLORATION.**

5 Section 70504 of title 51, United States Code, is
6 amended to read as follows:

7 **“§ 70504. Stepping stone approach to exploration**

8 “(a) IN GENERAL.—The Administration may con-
9 duct missions to intermediate destinations, including the
10 surface of the Moon, cis-lunar space, near-Earth asteroids,
11 Lagrangian points, and Martian moons, in a series of sus-
12 tainable steps in accordance with section 20302(b) of title
13 51, United States Code, in order to achieve the objective
14 of human exploration of Mars specified in section
15 202(b)(5) of the National Aeronautics and Space Adminis-
16 tration Authorization Act of 2010 (42 U.S.C.
17 18312(b)(5)).

18 “(b) COST-EFFECTIVENESS.—In order to maximize
19 the cost-effectiveness of the long-term space exploration
20 and utilization activities of the United States, the Admin-
21 istrator shall take all necessary steps, including engaging
22 international, academic, and industry partners, to ensure
23 that activities in the Administration’s human space explo-
24 ration program balance how those activities might also
25 help meet the requirements of future exploration and utili-

1 zation activities leading to human habitation on the sur-
2 face of Mars.

3 “(c) COMPLETION.—Within budgetary consider-
4 ations, once an exploration-related project enters its devel-
5 opment phase, the Administrator shall seek, to the max-
6 imum extent practicable, to complete that project without
7 undue delays.

8 “(d) INTERNATIONAL PARTICIPATION.—In order to
9 achieve the goal of successfully conducting a crewed mis-
10 sion to the surface of Mars, the President may invite the
11 United States partners in the ISS program and other na-
12 tions, as appropriate, to participate in an international ini-
13 tiative under the leadership of the United States.”.

14 **SEC. 415. UPDATE OF EXPLORATION PLAN AND PROGRAMS.**

15 Section 70502(2) of title 51, United States Code, is
16 amended to read as follows:

17 “(2) implement an exploration research and
18 technology development program to enable human
19 and robotic operations consistent with section
20 20302(b) of this title;”.

21 **SEC. 416. REPEALS.**

22 (a) SPACE SHUTTLE CAPABILITY ASSURANCE.—Sec-
23 tion 203 of the National Aeronautics and Space Adminis-
24 tration Authorization Act of 2010 (42 U.S.C. 18313) is
25 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 (b) SHUTTLE PRICING POLICY FOR COMMERCIAL
7 AND FOREIGN USERS.—Chapter 703 of title 51, United
8 States Code, and the item relating to that chapter in the
9 table of chapters for that title, are repealed.

10 (c) SHUTTLE PRIVATIZATION.—Section 50133 of
11 title 51, United States Code, and the item relating to that
12 section in the table of sections for chapter 501 of that
13 title, are repealed.

14 **SEC. 417. ASSURED ACCESS TO SPACE.**

15 Section 70501 of title 51, United States Code, is
16 amended—

17 (1) by amending subsection (a) to read as fol-
18 lows:

19 “(a) POLICY STATEMENT.—In order to ensure con-
20 tinuous United States participation and leadership in the
21 exploration and utilization of space and as an essential
22 instrument of national security, it is the policy of the
23 United States to maintain an uninterrupted capability for
24 human space flight and operations—

25 “(1) in low-Earth orbit; and

1 “(2) beyond low-Earth orbit once the capabili-
2 ties described in section 421(e) of the National Aer-
3 onautics and Space Administration Transition Au-
4 thorization Act of 2016 become available.”; and

5 (2) in subsection (b), by striking “Committee
6 on Science and Technology of the House of Rep-
7 resentatives and the Committee on Commerce,
8 Science, and Transportation of the Senate describing
9 the progress being made toward developing the Crew
10 Exploration Vehicle and the Crew Launch Vehicle”
11 and inserting “Committee on Commerce, Science,
12 and Transportation of the Senate and the Com-
13 mittee on Science, Space, and Technology of the
14 House of Representatives describing the progress
15 being made toward developing the Space Launch
16 System and Orion”.

17 **Subtitle B—Assuring Core**
18 **Capabilities for Exploration**

19 **SEC. 421. SPACE LAUNCH SYSTEM, ORION, AND EXPLO-**
20 **RATION GROUND SYSTEMS.**

21 (a) FINDINGS.—Congress makes the following find-
22 ings:

23 (1) NASA has made steady progress in devel-
24 oping and testing the Space Launch System and
25 Orion exploration systems with the successful Explo-

1 ration Flight Test of Orion in December of 2014,
2 the final qualification test firing of the 5-segment
3 Space Launch System boosters in June 2016, and a
4 full thrust, full duration test firing of the RS-25
5 Space Launch System core stage engine in August
6 2016.

7 (2) Through the 21st Century Launch Complex
8 program and Exploration Ground Systems pro-
9 grams, NASA has made significant progress in
10 transforming exploration ground systems infrastruc-
11 ture to meet NASA’s mission requirements for the
12 Space Launch System and Orion and to modernize
13 NASA’s launch complexes to the benefit of the civil,
14 defense, and commercial space sectors.

15 (b) SPACE LAUNCH SYSTEM.—

16 (1) SENSE OF CONGRESS.—It is the sense of
17 Congress that the Space Launch System is the most
18 practical approach to reaching the Moon, Mars, and
19 beyond.

20 (2) REAFFIRMATION.—Congress reaffirms the
21 policy and minimum capability requirements for the
22 Space Launch System under section 302 of the Na-
23 tional Aeronautics and Space Administration Au-
24 thorization Act of 2010 (42 U.S.C. 18322).

1 (c) SENSE OF CONGRESS ON SPACE LAUNCH SYS-
2 TEM, ORION, AND EXPLORATION GROUND SYSTEMS.—It
3 is the sense of Congress that—

4 (1) as the United States works to send humans
5 on a series of missions to Mars in the 2030s, the
6 United States national space program should con-
7 tinue to make progress on its commitment by fully
8 developing the Space Launch System, Orion, and re-
9 lated Exploration Ground Systems;

10 (2) using the Space Launch System and Orion
11 for a wide range of contemplated missions will facili-
12 tate the national defense, science, and exploration
13 objectives of the United States;

14 (3) the United States should have continuity of
15 purpose for the Space Launch System and Orion in
16 deep space exploration missions, using them begin-
17 ning with the uncrewed mission, EM-1, planned for
18 2018, followed by the crewed mission, EM-2, in cis-
19 lunar space planned for 2021, and for subsequent
20 missions beginning with EM-3 extending into cis-
21 lunar space and eventually to Mars;

22 (4) the President's annual budget requests for
23 the Space Launch System and Orion development,
24 test, and operational phases should strive to accu-

1 rately reflect the resource requirements of each of
2 those phases;

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

7 (6) the Administrator should budget for and
8 undertake a robust ground test and uncrewed and
9 crewed flight test and demonstration program for
10 the Space Launch System and Orion in order to pro-
11 mote safety and reduce programmatic risk.

12 (d) IN GENERAL.—The Administrator shall continue
13 development of the fully integrated Space Launch System,
14 including an upper stage needed to go beyond low-Earth
15 orbit, in order to safely enable human space exploration
16 of the Moon, Mars, and beyond over the course of the next
17 century as required in section 302(c) of the National Aero-
18 nautics and Space Administration Authorization Act of
19 2010 (42 U.S.C. 18322(c)).

20 (e) EXPLORATION MISSIONS.—The Administrator
21 shall continue development of—

22 (1) an uncrewed exploration mission to dem-
23 onstrate the capability of both the Space Launch
24 System and Orion as an integrated system by 2018;

1 (2) subject to applicable human rating proc-
2 esses and requirements, a crewed exploration mis-
3 sion to demonstrate the Space Launch System, in-
4 cluding the Core Stage and Exploration Upper
5 Stages, by 2021;

6 (3) subsequent missions beginning with EM-3
7 at operational flight rate sufficient to maintain safe-
8 ty and operational readiness using the Space Launch
9 System and Orion to extend into cis-lunar space and
10 eventually to Mars; and

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

14 (f) OTHER USES.—The Administrator shall assess
15 the utility of the Space Launch System for use by the
16 science community and for other Federal Government
17 launch needs, including consideration of overall cost and
18 schedule savings from reduced transit times and increased
19 science returns enabled by the unique capabilities of the
20 Space Launch System.

21 (g) UTILIZATION REPORT.—

22 (1) IN GENERAL.—The Administrator, in con-
23 sultation with the Secretary of Defense and the Di-
24 rector of National Intelligence, shall prepare a re-
25 port that addresses the effort and budget required to

1 enable and utilize a cargo variant of the 130-ton
2 Space Launch System configuration described in
3 section 302(c) of the National Aeronautics and
4 Space Administration Authorization Act of 2010 (42
5 U.S.C. 18322(c)).

6 (2) CONTENTS.—In preparing the report, the
7 Administrator shall—

8 (A) consider the technical requirements of
9 the scientific and national security communities
10 related to a cargo variant of the Space Launch
11 System; and

12 (B) directly assess the utility and esti-
13 mated cost savings obtained by using a cargo
14 variant of the Space Launch System for na-
15 tional security and space science missions.

16 (3) SUBMISSION TO CONGRESS.—Not later than
17 180 days after the date of enactment of this Act, the
18 Administrator shall submit the report to the appro-
19 priate committees of Congress.

20 **Subtitle C—Journey to Mars**

21 **SEC. 431. FINDINGS ON HUMAN SPACE EXPLORATION.**

22 Congress makes the following findings:

23 (1) In accordance with section 204 of the Na-
24 tional Aeronautics and Space Administration Au-
25 thorization Act of 2010 (124 Stat. 2813), the Na-

1 tional Academies of Sciences, Engineering, and Med-
2 icine, through its Committee on Human Spaceflight,
3 conducted a review of the goals, core capabilities,
4 and direction of human space flight, and published
5 the findings and recommendations in a 2014 report
6 entitled, “Pathways to Exploration: Rationales and
7 Approaches for a U.S. Program of Human Space
8 Exploration”.

9 (2) The Committee on Human Spaceflight in-
10 cluded leaders from the aerospace, scientific, secu-
11 rity, and policy communities.

12 (3) With input from the public, the Committee
13 on Human Spaceflight concluded that many prac-
14 tical and aspirational rationales for human space
15 flight together constitute a compelling case for con-
16 tinued national investment and pursuit of human
17 space exploration toward the horizon goal of Mars.

18 (4) According to the Committee on Human
19 Spaceflight, the rationales include economic benefits,
20 national security, national prestige, inspiring stu-
21 dents and other citizens, scientific discovery, human
22 survival, and a sense of shared destiny.

23 (5) The Committee on Human Spaceflight af-
24 firmed that Mars is the appropriate long-term goal
25 for the human space flight program.

1 (6) The Committee on Human Spaceflight rec-
2 ommended that NASA define a series of sustainable
3 steps and conduct mission planning and technology
4 development as needed to achieve the long-term goal
5 of placing humans on the surface of Mars.

6 (7) Expanding human presence beyond low-
7 Earth orbit and advancing toward human missions
8 to Mars requires early planning and timely decisions
9 to be made in the near-term on the necessary
10 courses of action for commitments to achieve short-
11 term and long-term goals and objectives.

12 (8) In addition to the 2014 report described in
13 paragraph (1), there are several independently devel-
14 oped reports or concepts that describe potential
15 Mars architectures or concepts and identify Mars as
16 the long-term goal for human space exploration, in-
17 cluding NASA’s “The Global Exploration Roadmap”
18 of 2013, “NASA’s Journey to Mars—Pioneering
19 Next Steps in Space Exploration” of 2015, NASA
20 Jet Propulsion Laboratory’s “Minimal Architecture
21 for Human Journeys to Mars” of 2015, and Explore
22 Mars’ “The Humans to Mars Report 2016”.

23 **SEC. 432. HUMAN EXPLORATION ROADMAP.**

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

1 (1) expanding human presence beyond low-
2 Earth orbit and advancing toward human missions
3 to Mars in the 2030s requires early strategic plan-
4 ning and timely decisions to be made in the near-
5 term on the necessary courses of action for commit-
6 ments to achieve short-term and long-term goals and
7 objectives;

8 (2) for strong and sustained United States
9 leadership, a need exists to advance a human explo-
10 ration roadmap, addressing exploration objectives in
11 collaboration with international, academic, and in-
12 dustry partners;

13 (3) an approach that incrementally advances to-
14 ward a long-term goal is one in which nearer-term
15 developments and implementation would influence
16 future development and implementation; and

17 (4) a human exploration roadmap should begin
18 with low-Earth orbit, then address in greater detail
19 progress beyond low-Earth orbit to cis-lunar space,
20 and then address future missions aimed at human
21 arrival and activities near and then on the surface
22 of Mars.

23 (b) HUMAN EXPLORATION ROADMAP.—

24 (1) IN GENERAL.—The Administrator shall de-
25 velop a human exploration roadmap, including a

1 critical decision plan, to expand human presence be-
2 yond low-Earth orbit to the surface of Mars and be-
3 yond, considering potential interim destinations such
4 as cis-lunar space and the moons of Mars.

5 (2) SCOPE.—The human exploration roadmap
6 shall include—

7 (A) an integrated set of exploration,
8 science, and other goals and objectives of a
9 United States human space exploration pro-
10 gram to achieve the long-term goal of human
11 missions near or on the surface of Mars in the
12 2030s;

13 (B) opportunities for international, aca-
14 demic, and industry partnerships for explo-
15 ration-related systems, services, research, and
16 technology if those opportunities provide cost-
17 savings, accelerate program schedules, or other-
18 wise benefit the goals and objectives developed
19 under subparagraph (A);

20 (C) sets and sequences of precursor mis-
21 sions in cis-lunar space and other missions or
22 activities necessary—

23 (i) to demonstrate the proficiency of
24 the capabilities and technologies identified
25 under subparagraph (D); and

1 (ii) to meet the goals and objectives
2 developed under subparagraph (A), includ-
3 ing anticipated timelines and missions for
4 the Space Launch System and Orion;

5 (D) an identification of the specific capa-
6 bilities and technologies, including the Space
7 Launch System, Orion, a deep space habitat,
8 and other capabilities, that facilitate the goals
9 and objectives developed under subparagraph
10 (A);

11 (E) a description of how cis-lunar ele-
12 ments, objectives, and activities advance the
13 human exploration of Mars;

14 (F) an assessment of potential human
15 health and other risks, including radiation expo-
16 sure;

17 (G) mitigation plans, whenever possible, to
18 address the risks identified in subparagraph
19 (F);

20 (H) a description of those technologies al-
21 ready under development across the Federal
22 Government or by other entities that facilitate
23 the goals and objectives developed under sub-
24 paragraph (A);

1 (I) a specific process for the evolution of
2 the capabilities of the fully integrated Orion
3 with the Space Launch System and a descrip-
4 tion of how these systems facilitate the goals
5 and objectives developed under subparagraph
6 (A) and demonstrate the capabilities and tech-
7 nologies described in subparagraph (D);

8 (J) a description of the capabilities and
9 technologies that need to be demonstrated or
10 research data that could be gained through the
11 utilization of the ISS and the status of the de-
12 velopment of such capabilities and technologies;

13 (K) a framework for international coopera-
14 tion in the development of all capabilities and
15 technologies identified under this section, in-
16 cluding an assessment of the risks posed by re-
17 lying on international partners for capabilities
18 and technologies on the critical path of develop-
19 ment;

20 (L) a process for partnering with non-
21 governmental entities using Space Act Agree-
22 ments or other acquisition instruments for fu-
23 ture human space exploration; and

24 (M) include information on the phasing of
25 planned intermediate destinations, Mars mis-

1 sion risk areas and potential risk mitigation ap-
2 proaches, technology requirements and phasing
3 of required technology development activities,
4 the management strategy to be followed, related
5 ISS activities, planned international collabo-
6 rative activities, potential commercial contribu-
7 tions, and other activities relevant to the
8 achievement of the goal established in this sec-
9 tion.

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

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

15 (B) using existing commercially available
16 technologies and capabilities or those tech-
17 nologies and capabilities being developed by in-
18 dustry for commercial purposes;

19 (C) establishing an organizational ap-
20 proach to ensure collaboration and coordination
21 among NASA’s Mission Directorates under sec-
22 tion 821, when appropriate, including to collect
23 and return to Earth a sample from the Martian
24 surface;

1 (D) building upon the initial uncrewed
2 mission, EM-1, and first crewed mission, EM-
3 2, of the Space Launch System and Orion to
4 establish a sustainable cadence of missions ex-
5 tending human exploration missions into cis-
6 lunar space, including anticipated timelines and
7 milestones;

8 (E) developing the robotic and precursor
9 missions and activities that will demonstrate,
10 test, and develop key technologies and capabili-
11 ties essential for achieving human missions to
12 Mars, including long-duration human oper-
13 ations beyond low-Earth orbit, space suits, solar
14 electric propulsion, deep space habitats, envi-
15 ronmental control life support systems, Mars
16 lander and ascent vehicle, entry, descent, land-
17 ing, ascent, Mars surface systems, and in-situ
18 resource utilization;

19 (F) demonstrating and testing 1 or more
20 habitat modules in cis-lunar space to prepare
21 for Mars missions;

22 (G) using public-private, firm fixed-price
23 partnerships, where practicable;

1 (H) collaborating with international, aca-
2 demic, and industry partners, when appro-
3 priate;

4 (I) any risks to human health and sensitive
5 onboard technologies, including radiation expo-
6 sure;

7 (J) any risks identified through research
8 outcomes under the NASA Human Research
9 Program's Behavioral Health Element; and

10 (K) the recommendations and ideas of sev-
11 eral independently developed reports or con-
12 cepts that describe potential Mars architectures
13 or concepts and identify Mars as the long-term
14 goal for human space exploration, including the
15 reports described under section 431.

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

20 (A) identifying and defining key decisions
21 guiding human space exploration priorities and
22 plans that need to be made before June 30,
23 2020, including decisions that may guide
24 human space exploration capability develop-

1 ment, precursor missions, long-term missions,
2 and activities;

3 (B) defining decisions needed to maximize
4 efficiencies and resources for reaching the near,
5 intermediate, and long-term goals and objec-
6 tives of human space exploration; and

7 (C) identifying and defining timelines and
8 milestones for a sustainable cadence of missions
9 beginning with EM-3 for the Space Launch
10 System and Orion to extend human exploration
11 from cis-lunar space to the surface of Mars.

12 (5) REPORTS.—

13 (A) INITIAL HUMAN EXPLORATION ROAD-
14 MAP.—The Administrator shall submit to the
15 appropriate committees of Congress—

16 (i) an initial human exploration road-
17 map, including a critical decision plan, be-
18 fore December 1, 2017; and

19 (ii) an updated human exploration
20 roadmap periodically as the Administrator
21 considers necessary but not less than bien-
22 nially.

23 (B) CONTENTS.—Each human exploration
24 roadmap under this paragraph shall include a
25 description of—

1 (i) the achievements and goals accom-
2 plished in the process of developing such
3 capabilities and technologies during the 2-
4 year period prior to the submission of the
5 human exploration roadmap; and

6 (ii) the expected goals and achieve-
7 ments in the following 2- year period.

8 (C) SUBMISSION WITH BUDGET.—Each
9 human exploration roadmap under this section
10 shall be included in the budget for that fiscal
11 year transmitted to Congress under section
12 1105(a) of title 31, United States Code.

13 **SEC. 433. ADVANCED SPACE SUIT CAPABILITY.**

14 Not later than 90 days after the date of enactment
15 of this Act, the Administrator shall submit to the appro-
16 priate committees of Congress a detailed plan for achiev-
17 ing an advanced space suit capability that aligns with the
18 crew needs for exploration enabled by the Space Launch
19 System and Orion, including an evaluation of the merit
20 of delivering the planned suit system for use on the ISS.

21 **SEC. 434. ASTEROID ROBOTIC REDIRECT MISSION.**

22 (a) FINDINGS.—Congress makes the following find-
23 ings:

24 (1) NASA initially estimated that the Asteroid
25 Robotic Redirect Mission would launch in December

1 2020 and cost no more than \$1,250,000,000, ex-
2 cluding launch and operations.

3 (2) On July 15, 2016, NASA conducted its Key
4 Decision Point–B review of the Asteroid Robotic Re-
5 direct Mission or approval for Phase B in mission
6 formulation.

7 (3) During the Key Decision Point–B review,
8 NASA estimated that costs have grown to
9 \$1,400,000,000 excluding launch and operations for
10 a launch in December 2021 and the agency must
11 evaluate whether to accept the increase or reduce the
12 Asteroid Robotic Redirect Mission’s scope to stay
13 within the cost cap set by the Administrator.

14 (4) In April 2015, the NASA Advisory Coun-
15 cil—

16 (A) issued a finding that—

17 (i) high-performance solar electric
18 propulsion will likely be an important part
19 of an architecture to send humans to
20 Mars; and

21 (ii) maneuvering a large test mass is
22 not necessary to provide a valid in-space
23 test of a new solar electric propulsion
24 stage;

1 (B) determined that a solar electric propul-
2 sion mission will contribute more directly to the
3 goal of sending humans to Mars if the mission
4 is focused entirely on development and valida-
5 tion of the solar electric propulsion stage; and

6 (C) determined that other possible motiva-
7 tions for acquiring and maneuvering a boulder,
8 such as asteroid science and planetary defense,
9 do not have value commensurate with their
10 probable cost.

11 (5) The Asteroid Robotic Redirect Mission is
12 competing for resources with other critical explo-
13 ration development programs, including the Space
14 Launch System, Orion, commercial crew, and a hab-
15 itation module.

16 (6) In 2014, the NASA Advisory Council rec-
17 ommended that NASA conduct an independent cost
18 and technical assessment of the Asteroid Robotic
19 Redirect Mission.

20 (7) In 2015, the NASA Advisory Council rec-
21 ommended that NASA preserve the following key ob-
22 jectives if the program needed to be descoped:

23 (A) Development of high power solar elec-
24 tric propulsion.

1 (B) Ability to maneuver in a low gravity
2 environment in deep space.

3 (8) In January 2015 and July 2015, the NASA
4 Advisory Council expressed its concern to NASA
5 about the potential for growing costs for the pro-
6 gram and highlighted that choices would need to be
7 made about the program's content.

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

10 (1) the technological and scientific goals of the
11 Asteroid Robotic Redirect Mission may not be com-
12 mensurate with the cost; and

13 (2) alternative missions may provide a more
14 cost effective and scientifically beneficial means to
15 demonstrate the technologies needed for a human
16 mission to Mars that would otherwise be dem-
17 onstrated by the Asteroid Robotic Redirect Mission.

18 (c) EVALUATION AND REPORT.—Not later than 180
19 days after the date of enactment of this Act, the Adminis-
20 trator shall—

21 (1) conduct an evaluation of—

22 (A) alternative approaches to the Asteroid
23 Robotic Redirect Mission for demonstrating the
24 technologies and capabilities needed for a
25 human mission to Mars that would otherwise be

1 demonstrated by the Asteroid Robotic Redirect
2 Mission;

3 (B) the scientific and technical benefits of
4 the alternative approaches under subparagraph
5 (A) to future human space exploration com-
6 pared to scientific and technical benefits of the
7 Asteroid Redirect Robotic Mission;

8 (C) the commercial benefits of the alter-
9 native approaches identified in subparagraph
10 (A), including the impact on the development of
11 domestic solar electric propulsion technology to
12 bolster United States competitiveness in the
13 global marketplace; and

14 (D) a comparison of the estimated costs of
15 the alternative approaches identified in sub-
16 paragraph (A); and

17 (2) submit to the appropriate committees of
18 Congress a report on the evaluation under para-
19 graph (1), including any recommendations.

20 **SEC. 435. MARS 2033 REPORT.**

21 (a) IN GENERAL.—Not later than 120 days after the
22 date of enactment of this Act, the Administrator shall con-
23 tract with an independent, non-governmental systems en-
24 gineering and technical assistance organization to study

1 a Mars human space flight mission to be launched in
2 2033.

3 (b) CONTENTS.—The study shall include—

4 (1) a technical development, test, fielding, and
5 operations plan using the Space Launch System,
6 Orion, and other systems to successfully launch such
7 a Mars human space flight mission by 2033;

8 (2) an annual budget profile, including cost es-
9 timates, for the technical development, test, fielding,
10 and operations plan to carry out a Mars human
11 space flight mission by 2033; and

12 (3) a comparison of the annual budget profile
13 to the 5-year budget profile contained in the Presi-
14 dent’s budget request for fiscal year 2017 under sec-
15 tion 1105 of title 31, United States Code.

16 (c) REPORT.—Not later than 180 days after the date
17 of enactment of this Act, the Administrator shall submit
18 to the appropriate committees of Congress a report on the
19 study, including findings and recommendations regarding
20 the Mars 2033 human space flight mission described in
21 subsection (a).

22 (d) ASSESSMENT.—Not later than 60 days after the
23 date the report is submitted under subsection (c), the Ad-
24 ministrator shall submit to the appropriate committees of
25 Congress an assessment by the NASA Advisory Council

1 of whether the proposal for a Mars human space flight
2 mission to be launched in 2033 is in the strategic interests
3 of the United States in space exploration.

4 **Subtitle D—TREAT Astronauts Act**

5 **SEC. 441. SHORT TITLE.**

6 This subtitle may be cited as the “To Research,
7 Evaluate, Assess, and Treat Astronauts Act” or the
8 “TREAT Astronauts Act”.

9 **SEC. 442. FINDINGS; SENSE OF CONGRESS.**

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

12 (1) Human space exploration can pose signifi-
13 cant challenges and is full of substantial risk, which
14 has ultimately claimed the lives of 24 National Aero-
15 nautics and Space Administration astronauts serving
16 in the line of duty.

17 (2) As United States government astronauts
18 participate in long-duration and exploration space
19 flight missions they may experience increased health
20 risks, such as vision impairment, bone
21 demineralization, and behavioral health and perform-
22 ance risks, and may be exposed to galactic cosmic
23 radiation. Exposure to high levels of radiation and
24 microgravity can result in acute and long-term
25 health consequences that can increase the risk of

1 cancer and tissue degeneration and have potential
2 effects on the musculoskeletal system, central nerv-
3 ous system, cardiovascular system, immune function,
4 and vision.

5 (3) To advance the goal of long-duration and
6 exploration space flight missions, United States gov-
7 ernment astronaut Scott Kelly participated in a 1-
8 year twins study in space while his identical twin
9 brother, former United States government astronaut
10 Mark Kelly, acted as a human control specimen on
11 Earth, providing an understanding of the physical,
12 behavioral, microbiological, and molecular reaction of
13 the human body to an extended period of time in
14 space.

15 (4) Since the Administration currently provides
16 medical monitoring, diagnosis, and treatment for
17 United States government astronauts during their
18 active employment, given the unknown long-term
19 health consequences of long-duration space explo-
20 ration, the Administration has requested statutory
21 authority from Congress to provide medical moni-
22 toring, diagnosis, and treatment to former United
23 States government astronauts for psychological and
24 medical conditions associated with human space
25 flight.

1 (b) SENSE OF CONGRESS.—It is the sense of Con-
2 gress that—

3 (1) the United States should continue to seek
4 the unknown and lead the world in space exploration
5 and scientific discovery as the Administration pre-
6 pares for long-duration and exploration space flight
7 in deep space and an eventual mission to Mars;

8 (2) data relating to the health of astronauts will
9 become increasingly valuable to improving our un-
10 derstanding of many diseases humans face on Earth;

11 (3) the Administration should provide the type
12 of monitoring, diagnosis, and treatment described in
13 subsection (a) only for conditions the Administration
14 considers unique to the training or exposure to the
15 space flight environment of United States govern-
16 ment astronauts and should not require any former
17 United States Government astronauts to participate
18 in the Administration’s monitoring;

19 (4) such monitoring, diagnosis, and treatment
20 should not replace a former United States govern-
21 ment astronaut’s private health insurance;

22 (5) expanded data acquired from such moni-
23 toring, diagnosis, and treatment should be used to
24 tailor treatment, inform the requirements for new
25 space flight medical hardware, and develop controls

1 in order to prevent disease occurrence in the astro-
2 naut corps; and

3 (6) the 340-day space mission of Scott Kelly
4 aboard the ISS—

5 (A) was pivotal for the goal of the United
6 States for humans to explore deep space and
7 Mars as the mission generated new insight into
8 how the human body adjusts to weightlessness,
9 isolation, radiation, and the stress of long-dura-
10 tion space flight; and

11 (B) will help support the physical and
12 mental well-being of astronauts during longer
13 space exploration missions in the future.

14 **SEC. 443. MEDICAL MONITORING AND RESEARCH RELAT-**
15 **ING TO HUMAN SPACE FLIGHT.**

16 (a) IN GENERAL.—Subchapter III of chapter 201 of
17 title 51, United States Code, as amended by section 305
18 of this Act, is further amended by adding at the end the
19 following:

20 **“§ 20149. Medical monitoring and research relating to**
21 **human space flight**

22 “(a) IN GENERAL.—Notwithstanding any other pro-
23 vision of law, the Administrator may provide for—

24 “(1) the medical monitoring and diagnosis of a
25 former United States government astronaut or a

1 former payload specialist for conditions that the Ad-
2 ministrator considers potentially associated with
3 human space flight; and

4 “(2) the treatment of a former United States
5 government astronaut or a former payload specialist
6 for conditions that the Administrator considers asso-
7 ciated with human space flight, including scientific
8 and medical tests for psychological and medical con-
9 ditions.

10 “(b) REQUIREMENTS.—

11 “(1) NO COST SHARING.—The medical moni-
12 toring, diagnosis, or treatment described in sub-
13 section (a) shall be provided without any deductible,
14 copayment, or other cost sharing obligation.

15 “(2) ACCESS TO LOCAL SERVICES.—The med-
16 ical monitoring, diagnosis, and treatment described
17 in subsection (a) may be provided by a local health
18 care provider if it is unadvisable due to the health
19 of the applicable former United States government
20 astronaut or former payload specialist for that
21 former United States government astronaut or
22 former payload specialist to travel to the Lyndon B.
23 Johnson Space Center, as determined by the Admin-
24 istrator.

1 “(3) SECONDARY PAYMENT.—Payment or reim-
2 bursement for the medical monitoring, diagnosis, or
3 treatment described in subsection (a) shall be sec-
4 ondary to any obligation of the United States Gov-
5 ernment or any third party under any other provi-
6 sion of law or contractual agreement to pay for or
7 provide such medical monitoring, diagnosis, or treat-
8 ment. Any costs for items and services that may be
9 provided by the Administrator for medical moni-
10 toring, diagnosis, or treatment under subsection (a)
11 that are not paid for or provided under such other
12 provision of law or contractual agreement, due to the
13 application of deductibles, copayments, coinsurance,
14 other cost sharing, or otherwise, are reimbursable by
15 the Administrator on behalf of the former United
16 States government astronaut or former payload spe-
17 cialist involved to the extent such items or services
18 are authorized to be provided by the Administrator
19 for such medical monitoring, diagnosis, or treatment
20 under subsection (a).

21 “(4) CONDITIONAL PAYMENT.—The Adminis-
22 trator may provide for conditional payments for or
23 provide medical monitoring, diagnosis, or treatment
24 described in subsection (a) that is obligated to be
25 paid for or provided by the United States or any

1 third party under any other provision of law or con-
2 tractual agreement to pay for or provide such med-
3 ical monitoring, diagnosis, or treatment if—

4 “(A) payment for (or the provision of)
5 such medical monitoring, diagnosis, or treat-
6 ment services has not been made (or provided)
7 or cannot reasonably be expected to be made
8 (or provided) promptly by the United States or
9 such third party, respectively; and

10 “(B) such payment (or such provision of
11 services) by the Administrator is conditioned on
12 reimbursement by the United States or such
13 third party, respectively, for such medical moni-
14 toring, diagnosis, or treatment.

15 “(c) EXCLUSIONS.—The Administrator may not—

16 “(1) provide for medical monitoring or diag-
17 nosis of a former United States government astro-
18 naut or former payload specialist under subsection
19 (a) for any psychological or medical condition that
20 is not potentially associated with human space flight;

21 “(2) provide for treatment of a former United
22 States government astronaut or former payload spe-
23 cialist under subsection (a) for any psychological or
24 medical condition that is not associated with human
25 space flight; or

1 “(3) require a former United States govern-
2 ment astronaut or former payload specialist to par-
3 ticipate in the medical monitoring, diagnosis, or
4 treatment authorized under subsection (a).

5 “(d) PRIVACY.—Consistent with applicable provisions
6 of Federal law relating to privacy, the Administrator shall
7 protect the privacy of all medical records generated under
8 subsection (a) and accessible to the Administration.

9 “(e) REGULATIONS.—The Administrator shall pro-
10 mulgate such regulations as are necessary to carry out this
11 section.

12 “(f) DEFINITION OF UNITED STATES GOVERNMENT
13 ASTRONAUT.—In this section, the term ‘United States
14 government astronaut’ has the meaning given the term
15 ‘government astronaut’ in section 50902, except it does
16 not include an individual who is an international partner
17 astronaut.

18 “(g) DATA USE AND DISCLOSURE.—The Adminis-
19 trator may use or disclose data acquired in the course of
20 medical monitoring, diagnosis, or treatment of a former
21 United States government astronaut or a former payload
22 specialist under subsection (a), in accordance with sub-
23 section (d). Former United States government astronaut
24 or former payload specialist participation in medical moni-
25 toring, diagnosis, or treatment under subsection (a) shall

1 constitute consent for the Administrator to use or disclose
2 such data.”.

3 (b) TABLE OF CONTENTS.—The table of contents for
4 chapter 201 of title 51, United States Code, as amended
5 by section 305 of this Act, is further amended by inserting
6 after the item relating to section 20148 the following:

“20149. Medical monitoring and research relating to human space flight.”.

7 (c) ANNUAL REPORTS.—

8 (1) IN GENERAL.—Each fiscal year, not later
9 than the date of submission of the President’s an-
10 nual budget request for that fiscal year under sec-
11 tion 1105 of title 31, United States Code, the Ad-
12 ministrator shall publish a report, in accordance
13 with applicable Federal privacy laws, on the activi-
14 ties of the Administration under section 20149 of
15 title 51, United States Code.

16 (2) CONTENTS.—Each report under paragraph
17 (1) shall include a detailed cost accounting of the
18 Administration’s activities under section 20149 of
19 title 51, United States Code, and a 5-year budget
20 estimate.

21 (3) SUBMISSION TO CONGRESS.—The Adminis-
22 trator shall submit to the appropriate committees of
23 Congress each report under paragraph (1) not later
24 than the date of submission of the President’s an-

1 nual budget request for that fiscal year under sec-
2 tion 1105 of title 31, United States Code.

3 (d) COST ESTIMATE.—

4 (1) REQUIREMENT.—Not later than 90 days
5 after the date of enactment of this Act, the Adminis-
6 trator shall enter into an arrangement with an inde-
7 pendent external organization to undertake an inde-
8 pendent cost estimate of the cost to the Administra-
9 tion and the Federal Government to implement and
10 administer the activities of the Administration under
11 section 20149 of title 51, United States Code. The
12 independent external organization may not be a
13 NASA entity, such as the Office of Safety and Mis-
14 sion Assurance.

15 (2) SUBMITTAL TO CONGRESS.—Not later than
16 1 year after the date of the enactment of this Act,
17 the Administrator shall submit to the appropriate
18 committees of Congress the independent cost esti-
19 mate under paragraph (1).

20 (e) PRIVACY STUDY.—

21 (1) STUDY.—The Administrator shall carry out
22 a study on any potential privacy or legal issues re-
23 lated to the possible sharing beyond the Federal
24 Government of data acquired under the activities of

1 the Administration under section 20149 of title 51,
2 United States Code.

3 (2) REPORT.—Not later than 270 days after
4 the date of enactment of this Act, the Administrator
5 shall submit to the appropriate committees of Con-
6 gress a report containing the results of the study
7 carried out under paragraph (1).

8 (f) INSPECTOR GENERAL AUDIT.—The Inspector
9 General of NASA shall periodically audit or review, as the
10 Inspector General considers necessary to prevent waste,
11 fraud, and abuse, the activities of the Administration
12 under section 20149 of title 51, United States Code.

13 **TITLE V—ADVANCING SPACE** 14 **SCIENCE**

15 **SEC. 501. MAINTAINING A BALANCED SPACE SCIENCE** 16 **PORTFOLIO.**

17 (a) SENSE OF CONGRESS ON SCIENCE PORTFOLIO.—
18 Congress reaffirms the sense of Congress that—

19 (1) a balanced and adequately funded set of ac-
20 tivities, consisting of research and analysis grant
21 programs, technology development, suborbital re-
22 search activities, and small, medium, and large space
23 missions, contributes to a robust and productive
24 science program and serves as a catalyst for innova-
25 tion and discovery; and

1 (2) the Administrator should set science prior-
2 ities by following the guidance provided by the sci-
3 entific community through the National Academies
4 of Sciences, Engineering, and Medicine’s decadal
5 surveys.

6 (b) **POLICY.**—It is the policy of the United States to
7 ensure, to the extent practicable, a steady cadence of
8 large, medium, and small science missions.

9 **SEC. 502. PLANETARY SCIENCE.**

10 (a) **FINDINGS.**—Congress finds that—

11 (1) Administration support for planetary
12 science is critical to enabling greater understanding
13 of the solar system and the origin of the Earth;

14 (2) the United States leads the world in plan-
15 etary science and can augment its success in that
16 area with appropriate international, academic, and
17 industry partnerships;

18 (3) a mix of small, medium, and large planetary
19 science missions is required to sustain a steady ca-
20 dence of planetary exploration; and

21 (4) robotic planetary exploration is a key com-
22 ponent of preparing for future human exploration.

23 (b) **MISSION PRIORITIES.**—

24 (1) **IN GENERAL.**—In accordance with the pri-
25 orities established in the most recent Planetary

1 Science Decadal Survey, the Administrator shall en-
2 sure, to the greatest extent practicable, the comple-
3 tion of a balanced set of Discovery, New Frontiers,
4 and Flagship missions at the cadence recommended
5 by the most recent Planetary Science Decadal Sur-
6 vey.

7 (2) MISSION PRIORITY ADJUSTMENTS.—Con-
8 sistent with the set of missions described in para-
9 graph (1), and while maintaining the continuity of
10 scientific data and steady development of capabilities
11 and technologies, the Administrator may seek, if
12 necessary, adjustments to mission priorities, sched-
13 ule, and scope in light of changing budget projec-
14 tions.

15 **SEC. 503. JAMES WEBB SPACE TELESCOPE.**

16 It is the sense of Congress that—

17 (1) the James Webb Space Telescope will—

18 (A) significantly advance our under-
19 standing of star and planet formation, and im-
20 prove our knowledge of the early universe; and

21 (B) support United States leadership in
22 astrophysics;

23 (2) consistent with annual Government Ac-
24 countability Office reviews of the James Webb Space
25 Telescope program, the Administrator should con-

1 tinue robust surveillance of the performance of the
2 James Webb Space Telescope project and continue
3 to improve the reliability of cost estimates and con-
4 tractor performance data and other major space
5 flight projects in order to enhance NASA’s ability to
6 successfully deliver the James Webb Space Telescope
7 on-time and within budget;

8 (3) the on-time and on-budget delivery of the
9 James Webb Space Telescope is a high congressional
10 priority; and

11 (4) the Administrator should ensure that inte-
12 grated testing is appropriately timed and sufficiently
13 comprehensive to enable potential issues to be identi-
14 fied and addressed early enough to be handled with-
15 in the James Webb Space Telescope’s development
16 schedule and prior to its launch.

17 **SEC. 504. WIDE-FIELD INFRARED SURVEY TELESCOPE.**

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

20 (1) the Wide-Field Infrared Survey Telescope
21 (referred to in this section as “WFIRST”) mission
22 has the potential to enable scientific discoveries that
23 will transform our understanding of the universe;
24 and

1 (2) the Administrator, to the extent practicable,
2 should make progress on the technologies and capa-
3 bilities needed to position the Administration to
4 meet the objectives, as outlined in the 2010 National
5 Academies' Astronomy and Astrophysics Decadal
6 Survey, in a way that maximizes the scientific pro-
7 ductivity of meeting those objectives for the re-
8 sources invested.

9 (b) CONTINUITY OF DEVELOPMENT.—The Adminis-
10 trator shall ensure that the concept definition and pre-
11 formulation activities of the WFIRST mission continue
12 while the James Webb Space Telescope is being com-
13 pleted.

14 **SEC. 505. MARS 2020 ROVER.**

15 It is the sense of Congress that—

16 (1) the Mars 2020 mission, to develop a Mars
17 rover and to enable the return of samples to Earth,
18 should remain a priority for NASA; and

19 (2) the Mars 2020 mission—

20 (A) should significantly increase our un-
21 derstanding of Mars;

22 (B) should help determine whether life pre-
23 viously existed on that planet; and

24 (C) should provide opportunities to gather
25 knowledge and demonstrate technologies that

1 address the challenges of future human expedi-
2 tions to Mars.

3 **SEC. 506. EUROPA.**

4 (a) FINDINGS.—Congress makes the following find-
5 ings:

6 (1) Studies of Europa, Jupiter’s moon, indicate
7 that Europa may provide a habitable environment,
8 as it contains key ingredients known to support life.

9 (2) In 2012, using the Hubble Space Telescope,
10 NASA scientists observed water vapor around the
11 south polar region of Europa, which provides poten-
12 tial evidence of water plumes in that region.

13 (3) For decades, the Europa mission has con-
14 sistently ranked as a high priority mission for the
15 scientific community.

16 (4) The Europa mission was ranked as the top
17 priority mission in the previous Planetary Science
18 Decadal Survey and ranked as the second-highest
19 priority in the current Planetary Science Decadal
20 Survey.

21 (b) SENSE OF CONGRESS.—It is the sense of Con-
22 gress that—

23 (1) the Europa mission could provide another
24 avenue in which to capitalize on our Nation’s cur-
25 rent investment in the Space Launch System that

1 would significantly reduce the transit time for such
2 a deep space mission; and

3 (2) a scientific, robotic exploration mission to
4 Europa, as prioritized in both Planetary Science
5 Decadal Surveys, should be supported.

6 **SEC. 507. CONGRESSIONAL DECLARATION OF POLICY AND**
7 **PURPOSE.**

8 Section 20102(d) of title 51, United States Code, is
9 amended by adding at the end the following:

10 “(10) The search for life’s origin, evolution, dis-
11 tribution, and future in the universe.”.

12 **SEC. 508. EXTRASOLAR PLANET EXPLORATION STRATEGY.**

13 (a) STRATEGY.—

14 (1) IN GENERAL.—The Administrator shall
15 enter into an arrangement with the National Acad-
16 emies to develop a science strategy for the study and
17 exploration of extrasolar planets, including the use
18 of the Transiting Exoplanet Survey Satellite, the
19 James Webb Space Telescope, a potential Wide-
20 Field Infrared Survey Telescope mission, or any
21 other telescope, spacecraft, or instrument, as appro-
22 priate.

23 (2) REQUIREMENTS.—The strategy shall—

24 (A) outline key scientific questions;

1 (B) identify the most promising research
2 in the field;

3 (C) indicate the extent to which the mis-
4 sion priorities in existing decadal surveys ad-
5 dress the key extrasolar planet research and ex-
6 ploration goals;

7 (D) identify opportunities for coordination
8 with international partners, commercial part-
9 ners, and not-for-profit partners; and

10 (E) make recommendations regarding the
11 activities under subparagraphs (A) through
12 (D), as appropriate.

13 (b) USE OF STRATEGY.—The Administrator shall use
14 the strategy—

15 (1) to inform roadmaps, strategic plans, and
16 other activities of the Administration as they relate
17 to extrasolar planet research and exploration; and

18 (2) to provide a foundation for future activities
19 and initiatives related to extrasolar planet research
20 and exploration.

21 (c) REPORT TO CONGRESS.—Not later than 18
22 months after the date of enactment of this Act, the Na-
23 tional Academies shall submit to the Administrator and
24 to the appropriate committees of Congress a report con-
25 taining the strategy developed under subsection (a).

1 **SEC. 509. ASTROBIOLOGY STRATEGY.**

2 (a) STRATEGY.—

3 (1) IN GENERAL.—The Administrator shall
4 enter into an arrangement with the National Acad-
5 emies to develop a science strategy for astrobiology
6 that would outline key scientific questions, identify
7 the most promising research in the field, and indi-
8 cate the extent to which the mission priorities in ex-
9 isting decadal surveys address the search for life’s
10 origin, evolution, distribution, and future in the Uni-
11 verse.

12 (2) RECOMMENDATIONS.—The strategy shall
13 include recommendations for coordination with inter-
14 national partners.

15 (b) USE OF STRATEGY.—The Administrator shall use
16 the strategy developed under subsection (a) in planning
17 and funding research and other activities and initiatives
18 in the field of astrobiology.

19 (c) REPORT TO CONGRESS.—Not later than 18
20 months after the date of enactment of this Act, the Na-
21 tional Academies shall submit to the Administrator and
22 to the appropriate committees of Congress a report con-
23 taining the strategy developed under subsection (a).

24 **SEC. 510. ASTROBIOLOGY PUBLIC-PRIVATE PARTNERSHIPS.**

25 Not later than 180 days after the date of enactment
26 of this Act, the Administrator shall submit to the appro-

1 priate committees of Congress a report describing how the
2 Administration can expand collaborative partnerships to
3 study life’s origin, evolution, distribution, and future in
4 the universe.

5 **SEC. 511. NEAR-EARTH OBJECTS.**

6 Section 321 of the National Aeronautics and Space
7 Administration Authorization Act of 2005 (51 U.S.C. note
8 prec. 71101) is amended by adding at the end the fol-
9 lowing:

10 “(e) PROGRAM REPORT.—The Director of the Office
11 of Science and Technology Policy and the Administrator
12 shall submit to the Committee on Commerce, Science, and
13 Transportation of the Senate and the Committee on
14 Science, Space, and Technology of the House of Rep-
15 resentatives, not later than 1 year after the date of enact-
16 ment of the National Aeronautics and Space Administra-
17 tion Transition Authorization Act of 2016, an initial re-
18 port that provides—

19 “(1) recommendations for carrying out the Sur-
20 vey program and an associated proposed budget;

21 “(2) an analysis of possible options that the Ad-
22 ministration could employ to divert an object on a
23 likely collision course with Earth; and

24 “(3) a description of the status of efforts to co-
25 ordinate and cooperate with other countries to dis-

1 cover hazardous asteroids and comets, plan a mitiga-
2 tion strategy, and implement that strategy in the
3 event of the discovery of an object on a likely colli-
4 sion course with Earth.

5 “(f) ANNUAL REPORTS.—After the initial report
6 under subsection (e), the Administrator shall annually
7 transmit to the Committee on Commerce, Science, and
8 Transportation of the Senate and the Committee on
9 Science, Space, and Technology of the House of Rep-
10 resentatives a report that includes—

11 “(1) a summary of all activities carried out
12 under subsection (d) since the date of enactment of
13 the National Aeronautics and Space Administration
14 Transition Authorization Act of 2016, including the
15 progress toward achieving 90 percent completion of
16 the survey described in subsection (d); and

17 “(2) a summary of expenditures for all activi-
18 ties carried out under subsection (d) since the date
19 of enactment of the National Aeronautics and Space
20 Administration Transition Authorization Act of
21 2016.

22 “(g) ASSESSMENT.—The Administrator, in collabora-
23 tion with other relevant Federal agencies, shall carry out
24 a technical and scientific assessment of the capabilities
25 and resources—

1 “(1) to accelerate the survey described in sub-
2 section (d); and

3 “(2) to expand the Administration’s Near-Earth
4 Object Program to include the detection, tracking,
5 cataloguing, and characterization of potentially haz-
6 ardous near-Earth objects less than 140 meters in
7 diameter.

8 “(h) TRANSMITTAL.—Not later than 270 days after
9 the date of enactment of the National Aeronautics and
10 Space Administration Transition Authorization Act of
11 2016, the Administrator shall transmit the results of the
12 assessment under subsection (g) to the Committee on
13 Commerce, Science, and Transportation of the Senate and
14 the Committee on Science, Space, and Technology of the
15 House of Representatives.”.

16 **SEC. 512. NEAR-EARTH OBJECTS PUBLIC-PRIVATE PART-**
17 **NERSHIPS.**

18 (a) SENSE OF CONGRESS.—It is the sense of Con-
19 gress that the Administration should seek to leverage the
20 capabilities of the private sector and philanthropic organi-
21 zations to the maximum extent practicable in carrying out
22 the Near-Earth Object Survey Program in order to meet
23 the goal of that program under section 321(d)(1) of the
24 National Aeronautics and Space Administration Author-
25 ization Act of 2005 (51 U.S.C. note prec. 71101(d)(1)).

1 (b) REPORT.—Not later than 180 days after the date
2 of enactment of this Act, the Administrator shall submit
3 to the appropriate committees of Congress a report de-
4 scribing how the Administration can expand collaborative
5 partnerships to detect, track, catalogue, and categorize
6 near-Earth objects.

7 **SEC. 513. ASSESSMENT OF SCIENCE MISSION EXTENSIONS.**

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

10 **“§ 30504. Assessment of science mission extensions**

11 “(a) ASSESSMENTS.—

12 “(1) IN GENERAL.—The Administrator shall
13 carry out triennial reviews within each of the Science
14 divisions to assess the cost and benefits of extending
15 the date of the termination of data collection for
16 those missions that exceed their planned missions’
17 lifetime.

18 “(2) CONSIDERATIONS.—In conducting an as-
19 sessment under paragraph (1), the Administrator
20 shall consider whether and how extending missions
21 impacts the start of future missions.

22 “(b) CONSULTATION AND CONSIDERATION OF PO-
23 TENTIAL BENEFITS OF INSTRUMENTS ON MISSIONS.—
24 When deciding whether to extend a mission that has an
25 operational component, the Administrator shall—

1 “(1) consult with any affected Federal agency;
2 and

3 “(2) take into account the potential benefits of
4 instruments on missions that are beyond their
5 planned mission lifetime.

6 “(c) REPORTS.—The Administrator shall submit to
7 the Committee on Commerce, Science, and Transportation
8 of the Senate and the Committee on Science, Space, and
9 Technology of the House of Representatives, at the same
10 time as the submission to Congress of the Administra-
11 tion’s annual budget request for each fiscal year, a report
12 detailing any assessment under subsection (a) that was
13 carried out during the previous year.”.

14 **SEC. 514. STRATOSPHERIC OBSERVATORY FOR INFRARED**
15 **ASTRONOMY.**

16 The Administrator may not terminate science oper-
17 ations of the Stratospheric Observatory for Infrared As-
18 tronomy before December 31, 2017.

19 **SEC. 515. RADIOISOTOPE POWER SYSTEMS.**

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

22 (1) exploration of the outer reaches of the solar
23 system is enabled by radioisotope power systems;

24 (2) establishing continuity in the production of
25 the material needed for radioisotope power systems

1 is essential to maintaining the availability of such
2 systems for future deep space exploration missions;
3 and

4 (3) Federal agencies supporting the Adminis-
5 tration through the production of such material
6 should do so in a cost effective manner so as not to
7 impose excessive reimbursement requirements on the
8 Administration.

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

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

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

22 (c) CONTENTS OF ANALYSIS.—The analysis con-
23 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) REPORT TO CONGRESS.—Not later than 180 days
20 after the date of enactment of this Act, the Administrator
21 shall submit the results of the analysis to the appropriate
22 committees of Congress.

1 **SEC. 516. ASSESSMENT OF MARS ARCHITECTURE.**

2 (a) ASSESSMENT.—The Administrator shall enter
3 into an arrangement with the National Academies of
4 Sciences, Engineering, and Medicine to assess—

5 (1) the Administration’s Mars exploration ar-
6 chitecture and its responsiveness to the strategies,
7 priorities, and guidelines put forward by the Na-
8 tional Academies’ planetary science decadal surveys
9 and other relevant National Academies Mars-related
10 reports;

11 (2) the long-term goals of the Administration’s
12 Mars Exploration Program and such program’s abil-
13 ity to optimize the science return, given the current
14 fiscal posture of the program;

15 (3) the Mars exploration architecture’s relation-
16 ship to Mars-related activities to be undertaken by
17 foreign agencies and organizations; and

18 (4) the extent to which the Mars exploration ar-
19 chitecture represents a reasonably balanced mission
20 portfolio.

21 (b) REPORT TO CONGRESS.—Not later than 18
22 months after the date of enactment of this Act, the Ad-
23 ministrator shall submit the results of the assessment to
24 the appropriate committees of Congress.

1 **SEC. 517. COLLABORATION.**

2 The Administration shall continue to develop first-of-
3 a-kind instruments that, once proved, can be transitioned
4 to other agencies for operations. Whenever responsibilities
5 for the development of sensors or for measurements are
6 transferred to the Administration from another agency,
7 the Administration shall seek, to the extent possible, to
8 be reimbursed for the assumption of such responsibilities.

9 **TITLE VI—AERONAUTICS**

10 **SEC. 601. SENSE OF CONGRESS ON AERONAUTICS.**

11 It is the sense of Congress that—

12 (1) a robust aeronautics research portfolio will
13 help maintain the United States status as a leader
14 in aviation, enhance the competitiveness of the
15 United States in the world economy, and improve
16 the quality of life of all citizens;

17 (2) aeronautics research is essential to the Ad-
18 ministration’s mission, continues to be an important
19 core element of the Administration’s mission, and
20 should be supported;

21 (3) the Administrator should coordinate and
22 consult with relevant Federal agencies and the pri-
23 vate sector to minimize duplication of efforts and le-
24 verage resources; and

25 (4) carrying aeronautics research to a level of
26 maturity that allows the Administration’s research

1 results to be transferred to the users, whether pri-
2 vate or public sector, is critical to their eventual
3 adoption.

4 **SEC. 602. TRANSFORMATIVE AERONAUTICS RESEARCH.**

5 It is the sense of Congress that the Administrator
6 should look strategically into the future and ensure that
7 the Administration's Center personnel are at the leading
8 edge of aeronautics research by encouraging investigations
9 into the early-stage advancement of new processes, novel
10 concepts, and innovative technologies that have the poten-
11 tial to meet national aeronautics needs.

12 **SEC. 603. HYPERSONIC RESEARCH.**

13 (a) ROADMAP FOR HYPERSONIC RESEARCH.—Not
14 later than 1 year after the date of enactment of this Act,
15 the Administrator, in consultation with the heads of other
16 relevant Federal agencies, shall develop and submit to the
17 appropriate committees of Congress a research and devel-
18 opment roadmap for hypersonic aircraft research.

19 (b) OBJECTIVE.—The objective of the roadmap is to
20 explore hypersonic science and technology using air-
21 breathing propulsion concepts, through a mix of theo-
22 retical work, basic and applied research, and development
23 of flight research demonstration vehicles.

1 (c) CONTENTS.—The roadmap shall recommend ap-
2 propriate Federal agency contributions, coordination ef-
3 forts, and technology milestones.

4 **SEC. 604. 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.—

18 (1) IN GENERAL.—Not later than 1 year after
19 the date of enactment of this Act, the Administrator
20 shall develop and submit to the appropriate commit-
21 tees of Congress a roadmap that allows for flexible
22 funding profiles for supersonic aeronautics research
23 and development.

24 (2) OBJECTIVE.—The objective of the roadmap
25 is to develop and demonstrate, in a relevant environ-

1 ment, airframe and propulsion technologies to mini-
2 mize the environmental impact, including noise, of
3 supersonic overland flight in an efficient and eco-
4 nomical manner.

5 (3) CONTENTS.—The roadmap shall include—

6 (A) the baseline research as embodied by
7 the Administration’s existing research on super-
8 sonic flight;

9 (B) a list of specific technological, environ-
10 mental, and other challenges that must be over-
11 come to minimize the environmental impact, in-
12 cluding noise, of supersonic overland flight;

13 (C) a research plan to address the chal-
14 lenges under subparagraph (B), including a
15 project timeline for accomplishing relevant re-
16 search goals;

17 (D) a plan for coordination with stake-
18 holders, including relevant government agencies
19 and industry; and

20 (E) a plan for how the Administration will
21 ensure that sonic boom research is coordinated
22 as appropriate with relevant Federal agencies.

23 **SEC. 605. ROTORCRAFT RESEARCH.**

24 (a) ROADMAP FOR ROTORCRAFT RESEARCH.—Not
25 later than 1 year after the date of enactment of this Act,

1 the Administrator, in consultation with the heads of other
2 relevant Federal agencies, shall prepare and submit to the
3 appropriate committees of Congress a roadmap for re-
4 search relating to rotorcraft and other runway-inde-
5 pendent air vehicles.

6 (b) OBJECTIVE.—The objective of the roadmap is to
7 develop and demonstrate improved safety, noise, and envi-
8 ronmental impact in a relevant environment.

9 (c) CONTENTS.—The roadmap shall include specific
10 goals for the research, a timeline for implementation,
11 metrics for success, and guidelines for collaboration and
12 coordination with industry and other Federal agencies.

13 **TITLE VII—SPACE TECHNOLOGY**

14 **SEC. 701. SPACE TECHNOLOGY INFUSION.**

15 (a) SENSE OF CONGRESS ON SPACE TECHNOLOGY.—
16 It is the sense of Congress that space technology is crit-
17 ical—

18 (1) to developing technologies and capabilities
19 that will make the Administration’s core missions
20 more affordable and more reliable;

21 (2) to enabling a new class of Administration
22 missions beyond low-Earth orbit; and

23 (3) to improving technological capabilities and
24 promote innovation for the Administration and the
25 Nation.

1 (b) SENSE OF CONGRESS ON PROPULSION TECH-
2 NOLOGY.—It is the sense of Congress that advancing pro-
3 pulsion technology would improve the efficiency of trips
4 to Mars and could shorten travel time to Mars, reduce
5 astronaut health risks, and reduce radiation exposure,
6 consumables, and mass of materials required for the jour-
7 ney.

8 (c) POLICY.—It is the policy of the United States
9 that the Administrator shall develop technologies to sup-
10 port the Administration’s core missions, as described in
11 section 2(3) of the National Aeronautics and Space Ad-
12 ministration Authorization Act of 2010 (42 U.S.C.
13 18301(3)), and support sustained investments in early
14 stage innovation, fundamental research, and technologies
15 to expand the boundaries of the national aerospace enter-
16 prise.

17 (d) PROPULSION TECHNOLOGIES.—A goal of propul-
18 sion technologies developed under subsection (c) shall be
19 to significantly reduce human travel time to Mars.

20 **SEC. 702. SPACE TECHNOLOGY PROGRAM.**

21 (a) SPACE TECHNOLOGY PROGRAM AUTHORIZED.—
22 The Administrator shall conduct a space technology pro-
23 gram (referred to in this section as the “Program”) to
24 research and develop advanced space technologies that

1 could deliver innovative solutions across the Administra-
2 tion's space exploration and science missions.

3 (b) CONSIDERATIONS.—In conducting the Program,
4 the Administrator shall consider—

5 (1) the recommendations of the National Acad-
6 emies' review of the Administration's Space Tech-
7 nology roadmaps and priorities; and

8 (2) the applicable enabling aspects of the step-
9 ping stone approach to exploration under section
10 70504 of title 51, United States Code.

11 (c) REQUIREMENTS.—In conducting the Program,
12 the Administrator shall—

13 (1) to the extent practicable, use a competitive
14 process to select research and development projects;

15 (2) to the extent practicable and appropriate,
16 use small satellites and the Administration's sub-
17 orbital and ground-based platforms to demonstrate
18 space technology concepts and developments; and

19 (3) as appropriate, partner with other Federal
20 agencies, universities, private industry, and foreign
21 countries.

22 (d) SMALL BUSINESS PROGRAMS.—The Adminis-
23 trator shall organize and manage the Administration's
24 Small Business Innovation Research Program and Small

1 Business Technology Transfer Program within the Pro-
2 gram.

3 (e) NONDUPLICATION CERTIFICATION.—The Admin-
4 istrator shall submit a budget for each fiscal year, as
5 transmitted to Congress under section 1105(a) of title 31,
6 United States Code, that avoids duplication of projects,
7 programs, or missions conducted by Program with other
8 projects, programs, or missions conducted by another of-
9 fice or directorate of the Administration.

10 (f) COLLABORATION, COORDINATION, AND ALIGN-
11 MENT.—

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

13 (A) ensure that the Administration’s
14 projects, programs, and activities in support of
15 technology research and development of ad-
16 vanced space technologies are fully coordinated
17 and aligned;

18 (B) ensure that the results the projects,
19 programs, and activities under subparagraph
20 (A) are shared and leveraged within the Admin-
21 istration; and

22 (C) ensure that the organizational respon-
23 sibility for research and development activities
24 in support of human space exploration not initi-

1 ated as of the date of enactment of this Act is
2 established on the basis of a sound rationale.

3 (2) SENSE OF CONGRESS.—It is the sense of
4 Congress that projects, programs, and missions
5 being conducted by the Human Exploration and Op-
6 erations Mission Directorate in support of research
7 and development of advanced space technologies and
8 systems focusing on human space exploration should
9 continue in that Directorate.

10 (g) REPORT.—Not later than 180 days after the date
11 of enactment of this Act, the Administrator shall provide
12 to the appropriate committees of Congress a report—

13 (1) comparing the Administration’s space tech-
14 nology investments with the high-priority technology
15 areas identified by the National Academies in the
16 National Research Council’s report on the Adminis-
17 tration’s Space Technology Roadmaps; and

18 (2) including—

19 (A) identification of how the Administra-
20 tion will address any gaps between the agency’s
21 investments and the recommended technology
22 areas, including a projection of funding require-
23 ments; and

24 (B) identification of the rationale described
25 in subsection (f)(1)(C).

1 (h) ANNUAL REPORT.—The Administrator shall in-
2 clude in the Administration’s annual budget request for
3 each fiscal year the rationale for assigning organizational
4 responsibility for, in the year prior to the budget fiscal
5 year, each initiated project, program, and mission focused
6 on research and development of advanced technologies for
7 human space exploration.

8 **TITLE VIII—MAXIMIZING**
9 **EFFICIENCY**

10 **Subtitle A—Agency Information**
11 **Technology and Cybersecurity**

12 **SEC. 811. INFORMATION TECHNOLOGY GOVERNANCE.**

13 (a) IN GENERAL.—The Administrator shall, in a
14 manner that reflects the unique nature of NASA’s mission
15 and expertise—

16 (1) ensure the NASA Chief Information Officer,
17 Mission Directorates, and Centers have appropriate
18 roles in the management, governance, and oversight
19 processes related to information technology oper-
20 ations and investments and information security pro-
21 grams for the protection of NASA systems;

22 (2) ensure the NASA Chief Information Officer
23 has the appropriate resources and insight to oversee
24 NASA information technology and information secu-
25 rity operations and investments;

1 (3) provide an information technology program
2 management framework to increase the efficiency
3 and effectiveness of information technology invest-
4 ments, including relying on metrics for identifying
5 and reducing potential duplication, waste, and cost;

6 (4) improve the operational linkage between the
7 NASA Chief Information Officer and each NASA
8 mission directorate, center, and mission support of-
9 fice to ensure both agency and mission needs are
10 considered in agency-wide information technology
11 and information security management and oversight;

12 (5) review the portfolio of information tech-
13 nology investments and spending, including informa-
14 tion technology-related investments included as part
15 of activities within NASA mission directorates that
16 may not be considered information technology, to en-
17 sure investments are recognized and reported appro-
18 priately based on guidance from the Office of Man-
19 agement and Budget;

20 (6) consider appropriate revisions to the char-
21 ters of information technology boards and councils
22 that inform information technology investment and
23 operation decisions; and

1 (7) consider whether the NASA Chief Informa-
2 tion Officer should have a seat on any boards or
3 councils described in paragraph (6).

4 (b) GAO STUDY.—

5 (1) STUDY.—The Comptroller General of the
6 United States shall conduct a study of the effective-
7 ness of the Administration’s Information Technology
8 Governance in ensuring information technology re-
9 sources are aligned with agency missions and are
10 cost effective and secure.

11 (2) CONTENTS.—The study shall include an as-
12 sessment of—

13 (A) the resources available for overseeing
14 Administration-wide information technology op-
15 erations, investments, and security measures
16 and the NASA Chief Information Officer’s visi-
17 bility and involvement into information tech-
18 nology oversight and access to those resources;

19 (B) the effectiveness and challenges of the
20 Administration’s information technology struc-
21 ture, decision making processes and authorities,
22 including impacts on its ability to implement in-
23 formation security; and

24 (C) the impact of NASA Chief Information
25 Officer approval authority over information

1 technology investments that exceed a defined
2 monetary threshold, including any potential im-
3 pacts of such authority on the Administration’s
4 missions, flights programs and projects, re-
5 search activities, and Center operations.

6 (3) REPORT.—Not later than 1 year after the
7 date of enactment of this Act, the Comptroller Gen-
8 eral shall submit to the appropriate committees of
9 Congress a report detailing the results of the study
10 under paragraph (1), including any recommenda-
11 tions.

12 **SEC. 812. INFORMATION TECHNOLOGY STRATEGIC PLAN.**

13 (a) IN GENERAL.—Subject to subsection (b), the Ad-
14 ministrators shall develop an information technology stra-
15 tegic plan to guide NASA information technology manage-
16 ment and strategic objectives.

17 (b) REQUIREMENTS.—In developing the strategic
18 plan, the Administrator shall ensure that the strategic
19 plan addresses—

20 (1) the deadline under section 306(a) of title 5,
21 United States Code; and

22 (2) the requirements under section 3506 of title
23 44, United States Code.

1 (c) CONTENTS.—The strategic plan shall address, in
2 a manner that reflects the unique nature of NASA’s mis-
3 sion and expertise—

4 (1) near and long-term goals and objectives for
5 leveraging information technology;

6 (2) a plan for how NASA will submit to Con-
7 gress of a list of information technology projects, in-
8 cluding completion dates and risk level in accordance
9 with guidance from the Office of Management and
10 Budget;

11 (3) an implementation overview for an agency-
12 wide approach to information technology investments
13 and operations, including reducing barriers to cross-
14 center collaboration;

15 (4) coordination by the NASA Chief Informa-
16 tion Officer with centers and mission directorates to
17 ensure that information technology policies are effec-
18 tively and efficiently implemented across the agency;

19 (5) a plan to increase the efficiency and effec-
20 tiveness of information technology investments, in-
21 cluding a description of how unnecessarily duplica-
22 tive, wasteful, legacy, or outdated information tech-
23 nology across NASA will be identified and elimi-
24 nated, and a schedule for the identification and
25 elimination of such information technology;

1 (6) a plan for improving the information secu-
2 rity of agency information and agency information
3 systems, including improving security control assess-
4 ments and role-based security training of employees;
5 and

6 (7) submission by NASA to Congress of infor-
7 mation regarding high risk projects and cybersecu-
8 rity risks.

9 (d) CONGRESSIONAL OVERSIGHT.—The Adminis-
10 trator shall submit to the appropriate committees of Con-
11 gress the strategic plan under subsection (a) and any up-
12 dates thereto.

13 **SEC. 813. CYBERSECURITY.**

14 (a) FINDING.—The security of NASA information
15 and information systems is vital to the success of the mis-
16 sion of the agency.

17 (b) INFORMATION SECURITY PLAN.—

18 (1) IN GENERAL.—Not later than 1 year after
19 the date of enactment of this Act, the Administrator
20 shall implement the information security plan devel-
21 oped under paragraph (2) and take such further ac-
22 tions as the Administrator considers necessary to
23 improve the information security system in accord-
24 ance with this section.

1 (2) INFORMATION SECURITY PLAN.—Subject to
2 paragraphs (3) and (4), the Administrator shall de-
3 velop an agency-wide information security plan to
4 enhance information security for NASA information
5 and information infrastructure.

6 (3) REQUIREMENTS.—In developing the plan
7 under paragraph (2), the Administrator shall ensure
8 that the plan—

9 (A) reflects the unique nature of NASA’s
10 mission and expertise;

11 (B) is informed by policies, standards,
12 guidelines, and directives on information secu-
13 rity required for Federal agencies;

14 (C) is consistent with the standards and
15 guidelines under section 11331 of title 40,
16 United States Code; and

17 (D) meets applicable National Institute of
18 Standards and Technology information security
19 standards and guidelines.

20 (4) CONTENTS.—The plan shall address—

21 (A) an overview of the requirements of the
22 information security system;

23 (B) an agency-wide risk management
24 framework for information security;

1 (C) a description of the information secu-
2 rity system management controls and common
3 controls that are necessary to ensure compli-
4 ance with information security-related require-
5 ments;

6 (D) an identification and assignment of
7 roles, responsibilities, and management commit-
8 ment for information security at the agency;

9 (E) coordination among organizational en-
10 tities, including between each center, facility,
11 mission directorate, and mission support office,
12 and among agency entities responsible for dif-
13 ferent aspects of information security;

14 (F) the need to protect the information se-
15 curity of mission-critical systems and activities
16 and high-impact and moderate-impact informa-
17 tion systems; and

18 (G) a schedule of frequent reviews and up-
19 dates, as necessary, of the plan.

20 **SEC. 814. SECURITY MANAGEMENT OF FOREIGN NATIONAL**
21 **ACCESS.**

22 The Administrator shall notify the appropriate com-
23 mittees of Congress when the agency has implemented the
24 information technology security recommendations from
25 the National Academy of Public Administration on foreign

1 national access management, based on reports from Janu-
2 ary 2014 and March 2016.

3 **SEC. 815. CYBERSECURITY OF WEB APPLICATIONS.**

4 Not later than 180 days after the date of enactment
5 of this Act, the Administrator shall, in a manner that re-
6 flects the unique nature of NASA’s mission and exper-
7 tise—

8 (1) develop a plan, including such actions and
9 milestones as are necessary, to fully remediate secu-
10 rity vulnerabilities of NASA web applications within
11 a timely fashion after discovery; and

12 (2) provide an update on its plan to implement
13 the recommendation from the NASA Inspector Gen-
14 eral in the audit report dated July 10, 2014, (IG-
15 14-023) to remove from the Internet or otherwise
16 secure all NASA web applications in development or
17 testing mode.

18 **Subtitle B—Collaboration Among**
19 **Mission Directorates and Other**
20 **Matters**

21 **SEC. 821. COLLABORATION AMONG MISSION DIREC-**
22 **TORATES.**

23 The Administrator shall encourage an interdiscipli-
24 nary approach among all NASA mission directorates and
25 divisions, whenever appropriate, for projects or missions—

1 (1) to improve coordination, and encourage col-
2 laboration and early planning on scope;

3 (2) to determine areas of overlap or alignment;

4 (3) to find ways to leverage across divisional
5 perspectives to maximize outcomes; and

6 (4) to be more efficient with resources and
7 funds.

8 **SEC. 822. NASA LAUNCH CAPABILITIES COLLABORATION.**

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

11 (1) The Launch Services Program is respon-
12 sible for the acquisition, management, and technical
13 oversight of commercial launch services for NASA’s
14 science and robotic missions.

15 (2) The Commercial Crew Program is respon-
16 sible for the acquisition, management, and technical
17 oversight of commercial crew transportation systems.

18 (3) The Launch Services Program and Com-
19 mercial Crew Program have worked together to gain
20 exceptional technical insight into the contracted
21 launch service providers that are common to both
22 programs.

23 (4) The Launch Services Program has a long
24 history of oversight of 12 different launch vehicles
25 and over 80 launches.

1 (5) Co-location of the Launch Services Program
2 and Commercial Crew Program has enabled the
3 Commercial Crew Program to efficiently obtain the
4 launch vehicle technical expertise of and provide en-
5 gineering and analytical support to the Commercial
6 Crew Program.

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

9 (1) the Launch Services Program and Commer-
10 cial Crew Program each benefit from communication
11 and coordination of launch manifests, technical in-
12 formation, and common launch vehicle insight be-
13 tween the programs; and

14 (2) such communication and coordination is en-
15 abled by the co-location of the programs.

16 (c) IN GENERAL.—The Administrator shall pursue a
17 strategy for acquisition of crewed transportation services
18 and non-crewed launch services that continues to enhance
19 communication, collaboration, and coordination between
20 the Launch Services Program and the Commercial Crew
21 Program.

22 **SEC. 823. DETECTION AND AVOIDANCE OF COUNTERFEIT**
23 **PARTS.**

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

1 (1) A 2012 investigation by the Committee on
2 Armed Services of the Senate of counterfeit elec-
3 tronic parts in the Department of Defense supply
4 chain from 2009 through 2010 uncovered 1,800
5 cases and over 1,000,000 counterfeit parts and ex-
6 posed the threat such counterfeit parts pose to serv-
7 ice members and national security.

8 (2) Since 2010, the Comptroller General of the
9 United States has identified in 3 separate reports
10 the risks and challenges associated with counterfeit
11 parts and counterfeit prevention at both the Depart-
12 ment of Defense and NASA, including inconsistent
13 definitions of counterfeit parts, poorly targeted qual-
14 ity control practices, and potential barriers to im-
15 provements to these practices.

16 (b) SENSE OF CONGRESS.—It is the sense of Con-
17 gress that the presence of counterfeit electronic parts in
18 the NASA supply chain poses a danger to United States
19 government astronauts, crew, and other personnel and a
20 risk to the agency overall.

21 (c) REGULATIONS.—

22 (1) IN GENERAL.—Not later than 270 days
23 after the date of enactment of this Act, the Adminis-
24 trator shall revise the NASA Supplement to the
25 Federal Acquisition Regulation to improve the detec-

1 tion and avoidance of counterfeit electronic parts in
2 the supply chain.

3 (2) CONTRACTOR RESPONSIBILITIES.—In revis-
4 ing the regulations under paragraph (1), the Admin-
5 istrator shall—

6 (A) require each covered contractor—

7 (i) to detect and avoid the use or in-
8 clusion of any counterfeit parts in elec-
9 tronic parts or products that contain elec-
10 tronic parts;

11 (ii) to take such corrective actions as
12 the Administrator considers necessary to
13 remedy the use or inclusion described in
14 clause (i); and

15 (iii) including a subcontractor, to no-
16 tify the applicable NASA contracting offi-
17 cer not later than 30 calendar days after
18 the date the covered contractor becomes
19 aware, or has reason to suspect, that any
20 end item, component, part or material con-
21 tained in supplies purchased by NASA, or
22 purchased by a covered contractor or sub-
23 contractor for delivery to, or on behalf of,
24 NASA, contains a counterfeit electronic

1 part or suspect counterfeit electronic part;
2 and

3 (B) prohibit the cost of counterfeit elec-
4 tronic parts, suspect counterfeit electronic
5 parts, and any corrective action described under
6 subparagraph (A)(ii) from being included as al-
7 lowable costs under agency contracts, unless—

8 (i)(I) the covered contractor has an
9 operational system to detect and avoid
10 counterfeit electronic parts and suspect
11 counterfeit electronic parts that has been
12 reviewed and approved by NASA or the
13 Department of Defense; and

14 (II) the covered contractor has
15 provided the notice under subpara-
16 graph (A)(iii); or

17 (ii) the counterfeit electronic parts or
18 suspect counterfeit electronic parts were
19 provided to the covered contractor as Gov-
20 ernment property in accordance with part
21 45 of the Federal Acquisition Regulation.

22 (3) SUPPLIERS OF ELECTRONIC PARTS.—In re-
23 vising the regulations under paragraph (1), the Ad-
24 ministrator shall—

1 (A) require NASA and covered contractors,
2 including subcontractors, at all tiers—

3 (i) to obtain electronic parts that are
4 in production or currently available in
5 stock from—

6 (I) the original manufacturers of
7 the parts or their authorized dealers;
8 or

9 (II) suppliers who obtain such
10 parts exclusively from the original
11 manufacturers of the parts or their
12 authorized dealers; and

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

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

21 (i) notification of the agency; and

22 (ii) inspection, testing, and authen-
23 tication of electronic parts that NASA or
24 a covered contractor, including a subcon-
25 tractor, obtains from any source other

1 than a source described in subparagraph
2 (A);

3 (C) establish qualification requirements,
4 consistent with the requirements of section
5 2319 of title 10, United States Code, pursuant
6 to which NASA may identify suppliers that
7 have appropriate policies and procedures in
8 place to detect and avoid counterfeit electronic
9 parts and suspect counterfeit electronic parts;
10 and

11 (D) authorize a covered contractor, includ-
12 ing a subcontractor, to identify and use addi-
13 tional suppliers beyond those identified under
14 subparagraph (C) if—

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

18 (ii) the covered contractor assumes re-
19 sponsibility for the authenticity of parts
20 provided by such suppliers under para-
21 graph (2); and

22 (iii) the selection of such suppliers is
23 subject to review and audit by NASA.

24 (d) DEFINITIONS.—In this section:

1 (1) COVERED CONTRACTOR.—The term “cov-
2 ered contractor” means a contractor that supplies
3 an electronic part, or a product that contains an
4 electronic part, to NASA.

5 (2) ELECTRONIC PART.—The term “electronic
6 part” means a discrete electronic component, includ-
7 ing a microcircuit, transistor, capacitor, resistor, or
8 diode, that is intended for use in a safety or mission
9 critical application.

10 **SEC. 824. EDUCATION AND OUTREACH.**

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

13 (1) United States competitiveness in the 21st
14 century requires engaging the science, technology,
15 engineering, and mathematics (referred to in this
16 section as “STEM”) talent in all States;

17 (2) the Administration is uniquely positioned to
18 educate and inspire students and the broader public
19 on STEM subjects and careers;

20 (3) the Administration’s Education and Com-
21 munication Offices, Mission Directorates, and Cen-
22 ters have been effective in delivering educational
23 content because of the strong engagement of Admin-
24 istration scientists and engineers in the Administra-
25 tion’s education and outreach activities;

1 (4) the Administration’s education and outreach
2 programs, including the Experimental Program to
3 Stimulate Competitive Research (EPSCoR) and the
4 Space Grant College and Fellowship Program, re-
5 flect the Administration’s successful commitment to
6 growing and diversifying the national science and
7 engineering workforce; and

8 (5) in order to grow and diversify the Nation’s
9 engineering workforce, it is vital for the Administra-
10 tion to bolster programs, such as High Schools
11 United with NASA to Create Hardware (HUNCH)
12 program, that conduct outreach activities to under-
13 served rural communities, vocational schools, and
14 tribal colleges and universities and encourage new
15 participation in the STEM workforce.

16 (b) CONTINUATION OF EDUCATION AND OUTREACH
17 ACTIVITIES AND PROGRAMS.—

18 (1) IN GENERAL.—The Administrator shall con-
19 tinue engagement with the public and education op-
20 portunities for students via all the Administration’s
21 mission directorates to the maximum extent prac-
22 ticable.

23 (2) REPORT.—Not later than 60 days after the
24 date of enactment of this Act, the Administrator
25 shall submit to the appropriate committees of Con-

1 gress a report on the Administration’s near-term
2 outreach plans for advancing space law education.

3 **SEC. 825. LEVERAGING COMMERCIAL SATELLITE SERV-**
4 **ICING CAPABILITIES ACROSS MISSION DI-**
5 **RECTORATES.**

6 (a) FINDINGS.—Congress makes the following find-
7 ings:

8 (1) Refueling and relocating aging satellites to
9 extend their operational lifetimes is a capacity that
10 NASA will substantially benefit from and is impor-
11 tant for lowering the costs of ongoing scientific, na-
12 tional security, and commercial satellite operations.

13 (2) The technologies involved in satellite serv-
14 icing, such as dexterous robotic arms, propellant
15 transfer systems, and solar electric propulsion, are
16 all critical capabilities to support a human explo-
17 ration mission to Mars.

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

20 (1) satellite servicing is a vital capability that
21 will bolster the capacity and affordability of NASA’s
22 ongoing scientific and human exploration operations
23 while simultaneously enhancing the ability of domes-
24 tic companies to compete in the global marketplace;
25 and

1 (2) future NASA satellites and spacecraft
2 across mission directorates should be constructed in
3 a manner that allows for servicing in order to maxi-
4 mize operational longevity and affordability.

5 (c) LEVERAGING OF CAPABILITIES.—The Adminis-
6 trator shall identify orbital assets in both the Science Mis-
7 sion Directorate and the Human Exploration and Oper-
8 ations Mission Directorate that could benefit from satellite
9 servicing-related technologies, and shall work across all
10 NASA mission directorates to evaluate opportunities for
11 the private sector to perform such services or advance
12 technical capabilities by leveraging the technologies and
13 techniques developed by NASA programs and other indus-
14 try programs.

15 **SEC. 826. FLIGHT OPPORTUNITIES.**

16 (a) DEVELOPMENT OF PAYLOADS.—

17 (1) IN GENERAL.—In order to conduct nec-
18 essary research, the Administrator shall continue
19 and, as the Administrator considers appropriate, ex-
20 pand the development of technology payloads for—

21 (A) scientific research; and

22 (B) investigating new or improved capabili-
23 ties.

1 (2) FUNDS.—For the purpose of carrying out
2 paragraph (1), the Administrator shall make funds
3 available for—

4 (A) flight testing;

5 (B) payload development; and

6 (C) hardware related to subparagraphs (A)
7 and (B).

8 (b) REAFFIRMATION OF POLICY.—Congress reaffirms that the Administrator should provide flight opportunities for payloads to microgravity environments and
9
10
11 suborbital altitudes as authorized by section 907 of the
12 National Aeronautics and Space Administration Author-
13 ization Act of 2010 (42 U.S.C. 18405).

14 **SEC. 827. SENSE OF CONGRESS ON SMALL CLASS LAUNCH**
15 **MISSIONS.**

16 It is the sense of Congress that—

17 (1) Venture Class Launch Services contracts
18 awarded under the Launch Services Program will
19 expand opportunities for future dedicated launches
20 of CubeSats and other small satellites and small or-
21 bital science missions; and

22 (2) principal investigator-led small orbital
23 science missions, including CubeSat class, Small Ex-
24 plorer (SMEX) class, and Venture class, offer valu-
25 able opportunities to advance science at low cost,

1 train the next generation of scientists and engineers,
2 and enable participants to acquire skills in systems
3 engineering and systems integration that are critical
4 to maintaining the Nation’s leadership in space and
5 to enhancing United States innovation and competi-
6 tiveness abroad.

7 **SEC. 828. BASELINE AND COST CONTROLS.**

8 Section 30104(a)(1) of title 51, United States Code,
9 is amended by striking “Procedural Requirements
10 7120.5c, dated March 22, 2005” and inserting “Proce-
11 dural Requirements 7120.5E, dated August 14, 2012”.

12 **SEC. 829. COMMERCIAL TECHNOLOGY TRANSFER PRO-**
13 **GRAM.**

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

17 **SEC. 830. AVOIDING ORGANIZATIONAL CONFLICTS OF IN-**
18 **TEREST IN MAJOR ADMINISTRATION ACQUI-**
19 **SITION PROGRAMS.**

20 (a) REVISED REGULATIONS REQUIRED.—Not later
21 than 270 days after the date of enactment of this Act,
22 the Administrator shall revise the Administration Supple-
23 ment to the Federal Acquisition Regulation to provide uni-
24 form guidance and recommend revised requirements for
25 organizational conflicts of interest by contractors in major

1 acquisition programs in order to address the elements
2 identified in subsection (b).

3 (b) ELEMENTS.—The revised regulations under sub-
4 section (a) shall, at a minimum—

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

7 (A) lead system integrator contracts on
8 major acquisition programs and contracts that
9 follow lead system integrator contracts on such
10 programs, particularly contracts for production;

11 (B) the ownership of business units per-
12 forming systems engineering and technical as-
13 sistance functions, professional services, or
14 management support services in relation to
15 major acquisition programs by contractors who
16 simultaneously own business units competing to
17 perform as either the prime contractor or the
18 supplier of a major subsystem or component for
19 such programs;

20 (C) the award of major subsystem con-
21 tracts by a prime contractor for a major acqui-
22 sition program to business units or other affili-
23 ates of the same parent corporate entity, and
24 particularly the award of subcontracts for soft-

1 ware integration or the development of a pro-
2 prietary software system architecture; or

3 (D) the performance by, or assistance of,
4 contractors in technical evaluations on major
5 acquisition programs;

6 (2) require the Administration to request advice
7 on systems architecture and systems engineering
8 matters with respect to major acquisition programs
9 from objective sources independent of the prime con-
10 tractor;

11 (3) require that a contract for the performance
12 of systems engineering and technical assistance
13 functions for a major acquisition program contains
14 a provision prohibiting the contractor or any affiliate
15 of the contractor from participating as a prime con-
16 tractor or a major subcontractor in the development
17 of a system under the program; and

18 (4) establish such limited exceptions to the re-
19 quirement in paragraphs (2) and (3) as the Admin-
20 istrator considers necessary to ensure that the Ad-
21 ministration has continued access to advice on sys-
22 tems architecture and systems engineering matters
23 from highly qualified contractors with domain expe-
24 rience and expertise, while ensuring that such advice
25 comes from sources that are objective and unbiased.

1 **SEC. 831. PROTECTION OF APOLLO LANDING SITES.**

2 (a) ASSESSMENT.—The Director of the Office of
3 Science and Technology Policy, in consultation with rel-
4 evant Federal agencies and stakeholders, shall assess the
5 issues relating to protecting and preserving historically
6 important Apollo Program lunar landing sites and Apollo
7 program artifacts residing on the lunar surface, including
8 those pertaining to Apollo 11 and Apollo 17.

9 (b) CONTENTS.—In conducting the assessment, the
10 Director shall include—

11 (1) a determination of what risks to the protec-
12 tion and preservation of those sites and artifacts
13 exist or may exist in the future;

14 (2) a determination of what measures are re-
15 quired to ensure such protection and preservation;

16 (3) a determination of the extent to which addi-
17 tional domestic legislation or international treaties
18 or agreements will be required; and

19 (4) specific recommendations for protecting and
20 preserving those lunar landing sites and artifacts.

21 (c) REPORT.—Not later than 1 year after the date
22 of enactment of this Act, the Director shall submit to the
23 appropriate committees of Congress the results of the as-
24 sessment.

1 **SEC. 832. NASA LEASE OF NON-EXCESS PROPERTY.**

2 Section 20145(g) of title 51, United States Code, is
3 amended by striking “10 years after December 26, 2007”
4 and inserting “December 31, 2018”.

5 **SEC. 833. TERMINATION LIABILITY.**

6 It is the sense of Congress that—

7 (1) the ISS, the Space Launch System, and the
8 Orion will enable the Nation to continue operations
9 in low-Earth orbit and to send its astronauts to deep
10 space;

11 (2) the James Webb Space Telescope will revo-
12 lutionize our understanding of star and planet for-
13 mation and how galaxies evolved, and will advance
14 the search for the origins of our universe;

15 (3) as a result of their unique capabilities and
16 their critical contribution to the future of space ex-
17 ploration, these systems have been designated by
18 Congress and the Administration as priority invest-
19 ments;

20 (4) contractors are currently holding program
21 funding, estimated to be in the hundreds of millions
22 of dollars, to cover the potential termination liability
23 should the Government choose to terminate a pro-
24 gram for convenience;

1 (5) as a result, hundreds of millions of taxpayer
2 dollars are unavailable for meaningful work on these
3 programs;

4 (6) according to the Government Accountability
5 Office, the Administration procures most of its
6 goods and services through contracts, and it termi-
7 nates very few of them;

8 (7) in fiscal year 2010, the Administration ter-
9 minated 28 of 16,343 active contracts and orders, a
10 termination rate of about 0.17 percent; and

11 (8) the Administration should vigorously pursue
12 a policy on termination liability that maximizes the
13 utilization of its appropriated funds to make max-
14 imum progress in meeting established technical goals
15 and schedule milestones on these high-priority pro-
16 grams.

17 **SEC. 834. INDEPENDENT REVIEWS.**

18 Not later than 270 days after the date of enactment
19 of this Act, the Administrator shall submit to the appro-
20 priate committees of Congress a report describing—

21 (1) the Administration's procedures for con-
22 ducting independent reviews of projects and pro-
23 grams at lifecycle milestones;

1 (2) how the Administration ensures the inde-
2 pendence of the individuals who conduct those re-
3 views prior to their assignment;

4 (3) the internal and external entities inde-
5 pendent of project and program management that
6 conduct reviews of projects and programs at life
7 cycle milestones; and

8 (4) how the Administration ensures the inde-
9 pendence of such entities and their members.

10 **SEC. 835. NASA ADVISORY COUNCIL.**

11 (a) ASSESSMENT.—The Administrator shall enter
12 into an arrangement with the National Academy of Public
13 Administration to assess the effectiveness of the NASA
14 Advisory Council and to make recommendations to Con-
15 gress for any change to—

16 (1) the functions of the Council;

17 (2) the appointment of members to the Council;

18 (3) the qualifications for members of the Coun-
19 cil;

20 (4) the duration of terms of office for members
21 of the Council;

22 (5) the frequency of meetings of the Council;

23 (6) the structure of leadership and Committees
24 of the Council; and

1 (7) the levels of professional staffing for the
2 Council.

3 (b) CONSIDERATIONS.—In carrying out the assess-
4 ment under subsection (a), the National Academy of Pub-
5 lic Administration shall—

6 (1) consider the impacts of broadening the
7 Council’s role to include providing consultation and
8 advice to Congress under section 20113(g) of title
9 51, United States Code;

10 (2) consider the past activities of the NASA
11 Advisory Council and the activities of other analo-
12 gous Federal advisory bodies; and

13 (3) any other issues that the National Academy
14 of Public Administration determines could poten-
15 tially impact the effectiveness of the Council.

16 (c) REPORT.—The National Academy of Public Ad-
17 ministration shall submit to the appropriate committees
18 of Congress the results of the assessment, including any
19 recommendations.

20 (d) CONSULTATION AND ADVICE.—

21 (1) IN GENERAL.—Section 20113(g) of title 51,
22 United States Code, is amended by inserting “and
23 Congress” after “advice to the Administration”.

1 (2) SUNSET.—Effective September 30, 2017,
2 section 20113(g) of title 51, United States Code, is
3 amended by striking “and Congress”.

4 **SEC. 836. COST ESTIMATION.**

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

7 (1) realistic cost estimating is critically impor-
8 tant to the ultimate success of major space develop-
9 ment projects; and

10 (2) the Administration has devoted significant
11 efforts over the past 5 years to improving its cost es-
12 timating capabilities, but it is important that the
13 Administration continue its efforts to develop and
14 implement guidance in establishing realistic cost es-
15 timates.

16 (b) GUIDANCE AND CRITERIA.—The Administrator
17 shall provide to its acquisition programs and projects, in
18 a manner consistent with the Administration’s Space
19 Flight Program and Project Management Requirements—

20 (1) guidance on when to use an Independent
21 Cost Estimate and Independent Cost Assessment;
22 and

23 (2) criteria to use to make a determination
24 under paragraph (1).

1 **SEC. 837. FACILITIES AND INFRASTRUCTURE.**

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

4 (1) the Administration must address, mitigate,
5 and reverse, where possible, the deterioration of its
6 facilities and infrastructure, as their condition is
7 hampering the effectiveness and efficiency of re-
8 search performed by both the Administration and in-
9 dustry participants making use of Administration fa-
10 cilities, thus harming the competitiveness of the
11 United States aerospace industry;

12 (2) the Administration has a role in providing
13 laboratory capabilities to industry participants that
14 are not economically viable as commercial entities
15 and thus are not available elsewhere;

16 (3) to ensure continued access to reliable and
17 efficient world-class facilities by researchers, the Ad-
18 ministration should establish strategic partnerships
19 with other Federal agencies, institutions of higher
20 education, and industry, as appropriate; and

21 (4) decisions on whether to dispose of, main-
22 tain, or modernize existing facilities must be made
23 in the context of meeting Administration and other
24 needs, including those required to meet the activities
25 supporting the Human Exploration Roadmap under
26 section 432 of this Act, consider other national lab-

1 oratory needs as the Administrator deems appro-
2 priate.

3 (b) POLICY.—It is the policy of the United States
4 that the Administration maintain reliable and efficient fa-
5 cilities and infrastructure and that decisions on whether
6 to dispose of, maintain, or modernize existing facilities or
7 infrastructure be made in the context of meeting future
8 Administration needs.

9 (c) PLAN.—

10 (1) IN GENERAL.—The Administrator shall de-
11 velop a facilities and infrastructure plan.

12 (2) GOAL.—The goal of the plan is to position
13 the Administration to have the facilities and infra-
14 structure, including laboratories, tools, and ap-
15 proaches, necessary to meet future Administration
16 and other Federal agencies' laboratory needs.

17 (3) CONTENTS.—The plan shall identify—

18 (A) current Administration and other Fed-
19 eral agency laboratory needs;

20 (B) future Administration research and de-
21 velopment and testing needs;

22 (C) a strategy for identifying facilities and
23 infrastructure that are candidates for disposal,
24 that is consistent with the national strategic di-
25 rection set forth in—

- 1 (i) the National Space Policy;
- 2 (ii) the National Aeronautics Re-
- 3 search, Development, Test, and Evaluation
- 4 Infrastructure Plan;
- 5 (iii) the National Aeronautics and
- 6 Space Administration Authorization Act of
- 7 2005 (Public Law 109–155; 119 Stat.
- 8 2895), National Aeronautics and Space
- 9 Administration Authorization Act of 2008
- 10 (Public Law 110-422; 122 Stat. 4779),
- 11 and National Aeronautics and Space Ad-
- 12 ministration Authorization Act of 2010 (42
- 13 U.S.C. 18301 et seq.); and
- 14 (iv) the Human Exploration Roadmap
- 15 under section 432 of this Act;
- 16 (D) a strategy for the maintenance, repair,
- 17 upgrading, and modernization of Administra-
- 18 tion facilities and infrastructure, including lab-
- 19 oratories and equipment; and
- 20 (E) criteria for—
- 21 (i) prioritizing deferred maintenance
- 22 tasks;
- 23 (ii) maintaining, repairing, upgrading,
- 24 or modernizing Administration facilities
- 25 and infrastructure; and

1 (iii) implementing processes, plans,
2 and policies for guiding the Administra-
3 tion’s Centers on whether to maintain, re-
4 pair, upgrade, or modernize a facility or
5 infrastructure and for determining the type
6 of instrument to be used.

7 **SEC. 838. HUMAN SPACE FLIGHT ACCIDENT INVESTIGA-**
8 **TIONS.**

9 Section 70702 of title 51, United States Code, is
10 amended—

11 (1) by amending subsection (a)(3) to read as
12 follows:

13 “(3) any other orbital or suborbital space vehi-
14 cle carrying humans that is—

15 “(A) owned by the Federal Government; or

16 “(B) being used pursuant to a contract or
17 Space Act Agreement with the Federal Govern-
18 ment for carrying a government astronaut or a
19 researcher funded by the Federal Government;
20 or”; and

21 (2) by adding at the end the following:

22 “(c) DEFINITIONS.—In this section:

23 “(1) GOVERNMENT ASTRONAUT.—The term
24 ‘government astronaut’ has the meaning given the
25 term in section 50902.

1 “(2) SPACE ACT AGREEMENT.—The term
2 ‘Space Act Agreement’ means an agreement entered
3 into by the Administration pursuant to its other
4 transactions authority under section 20113(e).”.

5 **SEC. 839. ORBITAL DEBRIS.**

6 (a) FINDINGS.—Congress finds that—

7 (1) orbital debris poses serious risks to the
8 operational space capabilities of the United States;

9 (2) an international commitment and integrated
10 strategic plan are needed to mitigate the growth of
11 orbital debris wherever possible; and

12 (3) the delay in the Office of Science and Tech-
13 nology Policy’s submission of a report on the status
14 of international coordination and development of or-
15 bital debris mitigation strategies to be inconsistent
16 with such risks.

17 (b) REPORTS.—

18 (1) COORDINATION.—Not later than 90 days
19 after the date of enactment of this Act, the Adminis-
20 trator shall submit to the appropriate committees of
21 Congress a report on the status of efforts to coordi-
22 nate with foreign countries within the Inter-Agency
23 Space Debris Coordination Committee to mitigate
24 the effects and growth of orbital debris under sec-
25 tion 1202(b)(1) of the National Aeronautics and

1 Space Administration Authorization Act of 2010 (42
2 U.S.C. 18441(b)(1)).

3 (2) MITIGATION STRATEGY.—Not later than 90
4 days after the date of enactment of this Act, the Di-
5 rector of the Office of Science and Technology Policy
6 shall submit to the appropriate committees of Con-
7 gress a report on the status of the orbital debris
8 mitigation strategy required under section
9 1202(b)(2) of the National Aeronautics and Space
10 Administration Authorization Act of 2010 (42
11 U.S.C. 18441(b)(2)).

12 **SEC. 840. REVIEW OF ORBITAL DEBRIS REMOVAL CON-**
13 **CEPTS.**

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

16 (1) orbital debris in low-Earth orbit poses sig-
17 nificant risks to spacecraft;

18 (2) such orbital debris may increase due to col-
19 lisions between existing debris objects; and

20 (3) understanding options to address and re-
21 move orbital debris is important for ensuring safe
22 and effective spacecraft operations in low-Earth
23 orbit.

24 (b) REVIEW.—

1 (1) IN GENERAL.—Not later than 270 days
2 after the date of enactment of this Act, the Adminis-
3 trator—

4 (A) in collaboration with the heads of other
5 relevant Federal agencies, shall solicit and re-
6 view concepts and options for removing orbital
7 debris from low-Earth orbit; and

8 (B) shall submit to the appropriate com-
9 mittees of Congress a report on the solicitation
10 and review under subparagraph (A), including
11 recommendations on the best options for de-
12 creasing the risks associated with orbital debris.

13 (2) REQUIREMENTS.—The solicitation and re-
14 view under paragraph (1) shall address the require-
15 ments for and feasibility of developing and imple-
16 menting each of the options.

Passed the Senate December 10 (legislative day, De-
cember 9), 2016.

Attest:

Secretary.

114TH CONGRESS
2^D SESSION

S. 3346

AN ACT

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