115TH CONGRESS
1ST SESSION

S. 442

AN ACT

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

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the ''National Aeronautics and Space Administration Transition Authorization Act of 2017''.

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

SEC. 2. DEFINITIONS.

In this Act:

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

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

(3) APPROPRIATE COMMITTEES OF CONGRESS.—The term ''appropriate committees of Congress'' means—

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

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

(4) CIS-LUNAR SPACE.—The term ''cis-lunar space'' means the region of space from the Earth out to and including the region around the surface of the Moon.

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

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

(7) ISS.—The term ''ISS'' means the International Space Station.

(8) ISS MANAGEMENT ENTITY.—The term ''ISS management entity'' means the organization with which the Administrator has a cooperative agreement under section 504(a) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18354(a)).

(9) NASA.—The term ''NASA'' means the National Aeronautics and Space Administration.

(10) ORION.—The term ''Orion'' means the multipurpose crew vehicle described under section 303 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18323).

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

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

(12) UNITED STATES GOVERNMENT ASTRONAUT.—The term ''United States government astronaut'' has the meaning given the term ''government astronaut'' in section 50902 of title 51, United States Code, except it does not include an individual who is an international partner astronaut.

TITLE I—AUTHORIZATION OF APPROPRIATIONS

SEC. 101. FISCAL YEAR 2017.

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

(1) For Exploration, $4,330,000,000.

(2) For Space Operations, $5,023,000,000.

(3) For Science, $5,500,000,000.

(4) For Aeronautics, $640,000,000.

(5) For Space Technology, $686,000,000.

(6) For Education, $115,000,000.

(7) For Safety, Security, and Mission Services, $2,788,600,000.

(8) For Construction and Environmental Compliance and Restoration, $388,000,000.

(9) For Inspector General, $37,400,000.

TITLE II—SUSTAINING NATIONAL SPACE COMMITMENTS

SEC. 201. SENSE OF CONGRESS ON SUSTAINING NATIONAL SPACE COMMITMENTS.

It is the sense of Congress that—

(1) honoring current national space commitments and building upon investments in space across successive Administrations demonstrates clear continuity of purpose by the United States, in collaboration with its international, academic, and industry partners, to extend humanity's reach into deep space, including cis-lunar space, the Moon, the surface and moons of Mars, and beyond;

(2) NASA leaders can best leverage investments in the United States space program by continuing to develop a balanced portfolio for space exploration and space science, including continued development of the Space Launch System, Orion, Commercial Crew Program, space and planetary science missions such as the James Webb Space Telescope, Wide-Field Infrared Survey Telescope, and Europa mission, and ongoing operations of the ISS and Commercial Resupply Services Program;

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

(4) continuity of purpose and effective execution of core NASA programs are essential for efficient use of resources in pursuit of timely and tangible accomplishments;

(5) NASA could improve its efficiency and effectiveness by working with industry to streamline existing programs and requirements, procurement practices, institutional footprint, and bureaucracy while preserving effective program oversight, accountability, and safety;

(6) it is imperative that the United States maintain and enhance its leadership in space exploration and space science, and continue to expand freedom and economic opportunities in space for all Americans that are consistent with the Constitution of the United States; and

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

SEC. 202. FINDINGS.

Congress makes the following findings:

(1) Returns on the Nation's investments in science, technology, and exploration accrue over decades-long timeframes, and a disruption of such investments could prevent returns from being fully realized.

(2) Past challenges to the continuity of such investments, particularly threats regarding the cancellation of authorized programs with bipartisan and bicameral support, have disrupted completion of major space systems thereby—

(A) impeding planning and pursuit of national objectives in space science and human space exploration;

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

(C) degrading the aerospace industrial base.

(3) The National Aeronautics and Space Administration Authorization Act of 2005 (Public Law 109–155; 119 Stat. 2895), National Aeronautics and Space Administration Authorization Act of 2008 (Public Law 110–422; 122 Stat. 4779), and National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18301 et seq.) reflect a broad, bipartisan agreement on the path forward for NASA's core missions in science, space technology, aeronautics, human space flight and exploration, and education, that serves as the foundation for the policy updates by this Act.

(4) Sufficient investment and maximum utilization of the ISS and ISS National Laboratory with our international and industry partners is—

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

(B) imperative to continuing United States global leadership in human space exploration, science, research, technology development, and education opportunities that contribute to development of the next generation of American scientists, engineers, and leaders, and to creating the opportunity for economic development of low-Earth orbit.

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

(6) The Commercial Crew Program has made measurable progress toward reestablishing the capability to launch United States government astronauts from United States soil into low-Earth orbit by the end of 2018.

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

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

SEC. 301. OPERATION OF THE ISS.

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

(1) after 15 years of continuous human presence in low-Earth orbit, the ISS continues to overcome challenges and operate safely;

(2) the ISS is a unique testbed for future space exploration systems development, including long-duration space travel;

(3) the expansion of partnerships, scientific research, and commercial applications of the ISS is essential to ensuring the greatest return on investments made by the United States and its international space partners in the development, assembly, and operations of that unique facility;

(4) utilization of the ISS will sustain United States leadership and progress in human space exploration by—

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

(B) serving as a testbed for technologies and a platform for scientific research and development; and

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

(i) the health, well-being, and performance of humans in space; and

(ii) the development of in-space systems enabling human space exploration beyond low-Earth orbit; and

(5) the ISS provides a platform for fundamental, microgravity, discovery-based space life and physical sciences research that is critical for enabling space exploration, protecting humans in space, increasing pathways for commercial space development that depend on advances in basic research, and contributes to advancing science, technology, engineering, and mathematics research.

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

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

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

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

"SEC. 501. CONTINUATION OF THE INTERNATIONAL SPACE STATION.

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

"(b) NASA ACTION.—In furtherance of the policy set forth in subsection (a), NASA shall—

"(1) pursue international, commercial, and intragovernmental means to maximize ISS logistics supply, maintenance, and operational capabilities, reduce risks to ISS systems sustainability, and offset and minimize United States operations costs relating to the ISS;

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

"(3) utilize, if practical and cost effective, the ISS for Science Mission Directorate missions in low-Earth orbit.".

SEC. 302. TRANSPORTATION TO ISS.

(a) FINDINGS.—Congress finds that reliance on foreign carriers for United States crew transfer is unacceptable, and the Nation's human space flight program must acquire the capability to launch United States government

astronauts on vehicles using United States rockets from United States soil as soon as is safe, reliable, and affordable to do so.

(b) SENSE OF CONGRESS ON COMMERCIAL CREW PROGRAM AND COMMERCIAL RESUPPLY SERVICES PROGRAM.—It is the sense of Congress that—

(1) once developed and certified to meet the Administration's safety and reliability requirements, United States commercially provided crew transportation systems can serve as the primary means of transporting United States government astronauts and international partner astronauts to and from the ISS and serving as ISS crew rescue vehicles;

(2) previous budgetary assumptions used by the Administration in its planning for the Commercial Crew Program assumed significantly higher funding levels than were authorized and appropriated by Congress;

(3) credibility in the Administration's budgetary estimates for the Commercial Crew Program can be enhanced by an independently developed cost estimate;

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

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

(6) a stable and successful Commercial Resupply Services Program and Commercial Crew Program are critical to ensuring timely provisioning of the ISS and to reestablishing the capability to launch United States government astronauts from United States soil into orbit, ending reliance upon Russian transport of United States government astronauts to the ISS which has not been possible since the retirement of the Space Shuttle program in 2011;

(7) NASA should build upon the success of the Commercial Orbital Transportation Services Program and Commercial Resupply Services Program that have allowed private sector companies to partner with NASA to deliver cargo and scientific experiments to the ISS since 2012;

(8) the 21st Century Launch Complex Program has enabled significant modernization and infrastructure improvements at launch sites across the United States to support NASA's Commercial Resupply Services Program and other civil and commercial space flight missions; and

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

(c) REAFFIRMATION.—Congress reaffirms—

(1) its commitment to the use of a commercially developed, private sector launch and delivery system to the ISS for crew missions as expressed in the National Aeronautics and Space Administration Authorization Act of 2005 (Public Law 109–155; 119 Stat. 2895), the National Aeronautics and Space Administration Authorization Act of 2008 (Public Law 110–422; 122 Stat. 4779), and the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18301 et seq.); and

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

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

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

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

''(A) no United States Government-operated human space flight capability is available;

''(B) no United States commercial provider is available; and

''(C) it is a qualified foreign entity.

''(2) DEFINITIONS.—In this subsection:

''(A) COMMERCIAL PROVIDER.—The term 'commercial provider' means any person providing human space flight transportation services, primary control of which is held by persons other than the Federal Government, a State or local government, or a foreign government.

''(B) QUALIFIED FOREIGN ENTITY.—The term 'qualified foreign entity' means a foreign entity that is in compliance with all applicable safety standards and is not prohibited from providing space transportation services under other law.

''(C) UNITED STATES COMMERCIAL PROVIDER.—The term 'United States commercial

provider' means a commercial provider, organized under the laws of the United States or of a State, that is more than 50 percent owned by United States nationals.

''(3) ARRANGEMENTS WITH FOREIGN ENTITIES.—Nothing in this subsection shall prevent the Administrator from negotiating or entering into human space flight transportation arrangements with foreign entities to ensure safety of flight and continued ISS operations.''.

(e) COMMERCIAL CREW PROGRAM.—

(1) OBJECTIVE.—The objective of the Commercial Crew Program shall be to assist in the development and certification of commercially provided transportation that—

(A) can carry United States government astronauts safely, reliably, and affordably to and from the ISS;

(B) can serve as a crew rescue vehicle; and

(C) can accomplish subparagraphs (A) and (B) as soon as practicable.

(2) PRIMARY CONSIDERATION.—The objective described in paragraph (1) shall be the primary consideration in the acquisition strategy for the Commercial Crew Program.

(3) SAFETY.—

(A) IN GENERAL.—The Administrator shall protect the safety of government astronauts by ensuring that each commercially provided transportation system under this subsection meets all applicable human rating requirements in accordance with section 403(b)(1) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18342(b)(1)).

(B) LESSONS LEARNED.—Consistent with the findings and recommendations of the Columbia Accident Investigation Board, the Administration shall ensure that safety and the minimization of the probability of loss of crew are the critical priorities of the Commercial Crew Program.

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

(f) COMMERCIAL CARGO PROGRAM.—Section 401 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18341) is amended

by striking ''Commercial Orbital Transportation Services'' and inserting ''Commercial Resupply Services''.

(g) COMPETITION.—It is the policy of the United States that, to foster the competitive development, operation, improvement, and commercial availability of space transportation services, and to minimize the life cycle cost to the Administration, the Administrator shall procure services for Federal Government access to and return from the ISS, whenever practicable, via fair and open competition for well-defined, milestone-based, Federal Acquisition Regulation-based contracts under section 201(a) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18311(a)).

(h) TRANSPARENCY.—

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

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

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

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

(2) indicates whether changes are needed to the manner in which the Administration procures and manages similar services prior to the issuance of future Commercial Resupply Services procurement opportunities; and

(3) identifies any lessons learned from the Commercial Resupply Services contracts that should be applied to the procurement and management of commercially provided crew transfer services to and from the ISS or to other future procurements.

SEC. 303. ISS TRANSITION PLAN.

(a) FINDINGS.—Congress finds that—

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

(2) according to the National Research Council report ''Pathways to Exploration: Rationales and Approaches for a U.S. Program of Human Space

Exploration'' extending ISS beyond 2020 to 2024 or 2028 will have significant negative impacts on the schedule of crewed missions to Mars, without significant increases in funding.

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

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

(2) decisions about the long-term future of the ISS impact the ability to conduct future deep space exploration activities, and that such decisions regarding the ISS should be considered in the context of the human exploration roadmap under section 432 of this Act.

(c) REPORTS.—Section 50111 of title 51, United States Code, is amended by adding at the end the following:

''(c) ISS TRANSITION PLAN.—

''(1) IN GENERAL.—The Administrator, in coordination with the ISS management entity (as defined in section 2 of the National Aeronautics and

Space Administration Transition Authorization Act of 2017), ISS partners, the scientific user community, and the commercial space sector, shall develop a plan to transition in a step-wise approach from the current regime that relies heavily on NASA sponsorship to a regime where NASA could be one of many customers of a low-Earth orbit non-governmental human space flight enterprise.

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

''(A) a description of the progress in achieving the Administration's deep space human exploration objectives on ISS and prospects for accomplishing future mission requirements, space exploration objectives, and other research objectives on future commercially supplied low-Earth orbit platforms or migration of those objectives to cis-lunar space;

''(B) the steps NASA is taking and will take, including demonstrations that could be

conducted on the ISS, to stimulate and facilitate commercial demand and supply of products and services in low-Earth orbit;

''(C) an identification of barriers preventing the commercialization of low-Earth orbit, including issues relating to policy, regulations, commercial intellectual property, data, and confidentiality, that could inhibit the use of the ISS as a commercial incubator;

''(D) the criteria for defining the ISS as a research success;

''(E) the criteria used to determine whether the ISS is meeting the objective under section 301(b)(2) of the National Aeronautics and Space Administration Transition Authorization Act of 2017;

''(F) an assessment of whether the criteria under subparagraphs (D) and (E) are consistent with the research areas defined in, and recommendations and schedules under, the current National Academies of Sciences, Engineering, and Medicine Decadal Survey on Biological and Physical Sciences in Space;

''(G) any necessary contributions that ISS extension would make to enabling execution of

the human exploration roadmap under section 432 of the National Aeronautics and Space Administration Transition Authorization Act of 2017;

''(H) the cost estimates for operating the ISS to achieve the criteria required under subparagraphs (D) and (E) and the contributions identified under subparagraph (G);

''(I) the cost estimates for extending operations of the ISS to 2024, 2028, and 2030;

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

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

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

''(iii) an assessment on the technical limiting factors of the service life of the

ISS, including a list of critical components and their expected service life and availability; and

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

''(K) an identification of the necessary actions and an estimate of the costs to deorbit the ISS once it has reached the end of its service life;

''(L) the impact on deep space exploration capabilities, including a crewed mission to Mars in the 2030s, if the preferred service life of the ISS is extended beyond 2024 and NASA maintains a flat budget profile; and

''(M) an evaluation of the functions, roles, and responsibilities for management and operation of the ISS and a determination of—

''(i) those functions, roles, and responsibilities the Federal Government

should retain during the lifecycle of the ISS;

''(ii) those functions, roles, and responsibilities that could be transferred to the commercial space sector;

''(iii) the metrics that would indicate the commercial space sector's readiness and ability to assume the functions, roles, and responsibilities described in clause (ii); and

''(iv) any necessary changes to any agreements or other documents and the law to enable the activities described in subparagraphs (A) and (B).

''(3) DEMONSTRATIONS.—If additional Government crew, power, and transportation resources are available after meeting the Administration's requirements for ISS activities defined in the human exploration roadmap and related research, demonstrations identified under paragraph (2) may—

''(A) test the capabilities needed to meet future mission requirements, space exploration objectives, and other research objectives described in paragraph (2)(A); and

''(B) demonstrate or test capabilities, including commercial modules or deep space habitats, Environmental Control and Life Support Systems, orbital satellite assembly, exploration space suits, a node that enables a wide variety of activity, including multiple commercial modules and airlocks, additional docking or berthing ports for commercial crew and cargo, opportunities for the commercial space sector to cost share for transportation and other services on the ISS, other commercial activities, or services obtained through alternate acquisition approaches.''.

SEC. 304. SPACE COMMUNICATIONS.

(a) PLAN.—The Administrator shall develop a plan, in consultation with relevant Federal agencies, to meet the Administration's projected space communication and navigation needs for low-Earth orbit and deep space operations in the 20-year period following the date of enactment of this Act.

(b) CONTENTS.—The plan shall include—

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

(2) the performance capabilities required to meet the Administration's projected space communication and navigation needs;

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

(4) an identification of the projected space communications and navigation network and infrastructure needs;

(5) a description of the necessary upgrades to meet the needs identified in paragraph (4), including—

(A) an estimate of the cost of the upgrades;

(B) a schedule for implementing the upgrades; and

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

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

(7) the criteria for prioritizing resources for the upgrades described in paragraph (5) and the maintenance described in paragraph (6);

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

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

(10) the measures the Administration is taking to meet space communications needs after all Tracking and Data Relay Satellite System third-generation communications satellites are operational; and

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

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

SEC. 305. INDEMNIFICATION; NASA LAUNCH SERVICES AND REENTRY SERVICES.

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

"§ 20148. Indemnification; NASA launch services and reentry services

''(a) IN GENERAL.—Under such regulations in conformity with this section as the Administrator shall prescribe taking into account the availability, cost, and terms of liability insurance, any contract between the Administration and a provider may provide that the United States will indemnify the provider against successful claims (including reasonable expenses of litigation or settlement) by third parties for death, bodily injury, or loss of or damage to property resulting from launch services and reentry services carried out under the contract that the contract defines as unusually hazardous or nuclear in nature, but only to the extent the total amount of successful claims related to the activities under the contract—

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

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

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

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

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

''(c) LIABILITY INSURANCE OF THE PROVIDER.—

''(1) IN GENERAL.—The provider under subsection (a) shall obtain liability insurance or demonstrate financial responsibility in amounts to compensate for the maximum probable loss from claims by—

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

''(B) the United States Government for damage or loss to Government property resulting from a launch service or reentry service carried out under the contract.

''(2) MAXIMUM PROBABLE LOSSES.—

"(A) IN GENERAL.—The Administrator shall determine the maximum probable losses under subparagraphs (A) and (B) of paragraph (1) not later than 90 days after the date that the provider requests such a determination and submits all information the Administrator requires.

"(B) REVISIONS.—The Administrator may revise a determination under subparagraph (A) of this paragraph if the Administrator determines the revision is warranted based on new information.

"(3) AMOUNT OF INSURANCE.—For the total claims related to one launch or reentry, a provider shall not be required to obtain insurance or demonstrate financial responsibility of more than—

"(A)(i) $500,000,000 under paragraph (1)(A); or

"(ii) $100,000,000 under paragraph (1)(B); or

"(B) the maximum liability insurance available on the world market at reasonable cost.

"(4) COVERAGE.—An insurance policy or demonstration of financial responsibility under this sub-

section shall protect the following, to the extent of their potential liability for involvement in launch services or reentry services:

"(A) The Government.

"(B) Personnel of the Government.

"(C) Related entities of the Government.

"(D) Related entities of the provider.

"(E) Government astronauts.

"(d) NO INDEMNIFICATION WITHOUT CROSS-WAIVER.—Notwithstanding subsection (a), the Administrator may not indemnify a provider under this section unless there is a cross-waiver between the Administration and the provider as described in subsection (e).

"(e) CROSS-WAIVERS.—

"(1) IN GENERAL.—The Administrator, on behalf of the United States and its departments, agencies, and instrumentalities, shall reciprocally waive claims with a provider under which each party to the waiver agrees to be responsible, and agrees to ensure that its related entities are responsible, for damage or loss to its property, or for losses resulting from any injury or death sustained by its employees or agents, as a result of activities arising out of the performance of the contract.

''(2) LIMITATION.—The waiver made by the Government under paragraph (1) shall apply only to the extent that the claims are more than the amount of insurance or demonstration of financial responsibility required under subsection (c)(1)(B).

''(f) WILLFUL MISCONDUCT.—Indemnification under subsection (a) may exclude claims resulting from the willful misconduct of the provider or its related entities.

''(g) CERTIFICATION OF JUST AND REASONABLE AMOUNT.—No payment may be made under subsection (a) unless the Administrator or the Administrator's designee certifies that the amount is just and reasonable.

''(h) PAYMENTS.—

''(1) IN GENERAL.—Upon the approval by the Administrator, payments under subsection (a) may be made from funds appropriated for such payments.

''(2) LIMITATION.—The Administrator shall not approve payments under paragraph (1), except to the extent provided in an appropriation law or to the extent additional legislative authority is enacted providing for such payments.

''(3) ADDITIONAL APPROPRIATIONS.—If the Administrator requests additional appropriations to make payments under this subsection, then the re-

quest for those appropriations shall be made in accordance with the procedures established under section 50915.

''(i) RULES OF CONSTRUCTION.—

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

''(2) OTHER AUTHORITY.—Nothing in this section may be construed as prohibiting the Administrator from indemnifying a provider or any other NASA contractor under other law, including under Public Law 85–804 (50 U.S.C. 1431 et seq.).

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

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

''(B) nothing in this section may be construed to require obligation or payment of funds in violation of sections 1341, 1342, 1349 through 1351, and 1511 through 1519 of title 31, United States Code (commonly referred to as the 'Anti-Deficiency Act').

''(j) RELATIONSHIP TO OTHER LAWS.—The Administrator may not provide indemnification under this sec-

tion for an activity that requires a license or permit under chapter 509.

''(k) DEFINITIONS.—In this section:

''(1) GOVERNMENT ASTRONAUT.—The term 'government astronaut' has the meaning given the term in section 50902.

''(2) LAUNCH SERVICES.—The term 'launch services' has the meaning given the term in section 50902.

''(3) PROVIDER.—The term 'provider' means a person that provides domestic launch services or domestic reentry services to the Government.

''(4) REENTRY SERVICES.—The term 'reentry services' has the meaning given the term in section 50902.

''(5) RELATED ENTITY.—The term 'related entity' means a contractor or subcontractor.

''(6) THIRD PARTY.—The term 'third party' means a person except—

''(A) the United States Government;

''(B) related entities of the Government involved in launch services or reentry services;

''(C) a provider;

''(D) related entities of the provider involved in launch services or reentry services; or

''(E) a government astronaut.''.

(b) CONFORMING AMENDMENT.—The table of contents for subchapter III of chapter 201 of title 51, United States Code, is amended by inserting after the item relating to section 20147 the following:

''20148. 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.

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

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

''(1) to expand permanent human presence beyond low-Earth orbit and to do so, where practical, in a manner involving international, academic, and industry partners;

''(2) crewed missions and progress toward achieving the goal in paragraph (1) to enable the potential for subsequent human exploration and the ex-

tension of human presence throughout the solar system; and

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

SEC. 412. KEY OBJECTIVES.

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

(1) in paragraph (3), by striking ''; and'' and inserting a semicolon;

(2) in paragraph (4), by striking the period at the end and inserting ''; and''; and

(3) by adding at the end the following:

''(5) to achieve human exploration of Mars and beyond through the prioritization of those technologies and capabilities best suited for such a mission in accordance with the stepping stone approach to exploration under section 70504 of title 51, United States Code.''.

SEC. 413. VISION FOR SPACE EXPLORATION.

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

(1) in subsection (a), by inserting ''in cis-lunar space or'' after ''sustained human presence'';

(2) by amending subsection (b) to read as follows:

''(b) FUTURE EXPLORATION OF MARS.—The Administrator shall manage human space flight programs, including the Space Launch System and Orion, to enable humans to explore Mars and other destinations by defining a series of sustainable steps and conducting mission planning, research, and technology development on a timetable that is technically and fiscally possible, consistent with section 70504.''; and

(3) by adding at the end the following:

''(c) DEFINITIONS.—In this section:

''(1) ORION.—The term 'Orion' means the multipurpose crew vehicle described under section 303 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18323).

''(2) SPACE LAUNCH SYSTEM.—The term 'Space Launch System' means has the meaning given the term in section 3 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18302).''.

SEC. 414. STEPPING STONE APPROACH TO EXPLORATION.

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

"§ 70504. Stepping stone approach to exploration

''(a) IN GENERAL.—The Administration—

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

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

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

zation activities leading to human habitation on the surface of Mars.

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

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

SEC. 415. UPDATE OF EXPLORATION PLAN AND PROGRAMS.

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

''(2) implement an exploration research and technology development program to enable human and robotic operations consistent with section 20302(b) of this title;''.

SEC. 416. REPEALS.

(a) SPACE SHUTTLE CAPABILITY ASSURANCE.—Section 203 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18313) is amended—

(1) by striking subsection (b);

(2) in subsection (d), by striking ''subsection (c)'' and inserting ''subsection (b)''; and

(3) by redesignating subsections (c) and (d) as subsections (b) and (c), respectively.

(b) SHUTTLE PRICING POLICY FOR COMMERCIAL AND FOREIGN USERS.—Chapter 703 of title 51, United States Code, and the item relating to that chapter in the table of chapters for that title, are repealed.

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

SEC. 417. ASSURED ACCESS TO SPACE.

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

(1) by amending subsection (a) to read as follows:

''(a) POLICY STATEMENT.—In order to ensure continuous United States participation and leadership in the exploration and utilization of space and as an essential instrument of national security, it is the policy of the United States to maintain an uninterrupted capability for human space flight and operations—

''(1) in low-Earth orbit; and

''(2) beyond low-Earth orbit once the capabilities described in section 421(f) of the National Aeronautics and Space Administration Transition Authorization Act of 2017 become available.''; and

(2) in subsection (b), by striking ''Committee on Science and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate describing the progress being made toward developing the Crew Exploration Vehicle and the Crew Launch Vehicle'' and inserting ''Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives describing the progress being made toward developing the Space Launch System and Orion''.

Subtitle B—Assuring Core Capabilities for Exploration

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

(a) FINDINGS.—Congress makes the following findings:

(1) NASA has made steady progress in developing and testing the Space Launch System and Orion exploration systems with the successful Explo-

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

(2) Through the 21st Century Launch Complex program and Exploration Ground Systems programs, NASA has made significant progress in transforming exploration ground systems infrastructure to meet NASA's mission requirements for the Space Launch System and Orion and to modernize NASA's launch complexes to the benefit of the civil, defense, and commercial space sectors.

(b) SPACE LAUNCH SYSTEM.—

(1) SENSE OF CONGRESS.—It is the sense of Congress that use of the Space Launch System and Orion, with contributions from partnerships with the private sector, academia, and the international community, is the most practical approach to reaching the Moon, Mars, and beyond.

(2) REAFFIRMATION.—Congress reaffirms the policy and minimum capability requirements for the Space Launch System under section 302 of the Na-

tional Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322).

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

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

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

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

(4) the President's annual budget requests for the Space Launch System and Orion development,

test, and operational phases should strive to accurately reflect the resource requirements of each of those phases;

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

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

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

(e) REPORT.—

(1) IN GENERAL.—Not later than 60 days after the date of enactment of this Act, the Administrator shall submit to the appropriate committees of Congress a report addressing the ability of Orion to

meet the needs and the minimum capability requirements described in section 303(b)(3) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18323(b)(3)).

(2) CONTENTS.—The report shall detail—

(A) those components and systems of Orion that ensure it is in compliance with section 303(b)(3) of that Act (42 U.S.C. 18323(b)(3));

(B) the expected date that Orion, integrated with a vehicle other than the Space Launch System, could be available to transport crew and cargo to the ISS;

(C) any impacts to the deep space exploration missions under subsection (f) of this section due to enabling Orion to meet the minimum capability requirements described in section 303(b)(3) of that Act (42 U.S.C. 18323(b)(3)) and conducting the mission described in subparagraph (B) of this paragraph; and

(D) the overall cost and schedule impacts associated with enabling Orion to meet the minimum capability requirements described in section 303(b)(3) of that Act (42 U.S.C.

18323(b)(3)) and conducting the mission described in subparagraph (B) of this paragraph.

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

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

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

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

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

(g) OTHER USES.—The Administrator shall assess the utility of the Space Launch System for use by the science community and for other Federal Government launch needs, including consideration of overall cost and schedule savings from reduced transit times and increased

science returns enabled by the unique capabilities of the Space Launch System.

(h) UTILIZATION REPORT.—

(1) IN GENERAL.—The Administrator, in consultation with the Secretary of Defense and the Director of National Intelligence, shall prepare a report that addresses the effort and budget required to enable and utilize a cargo variant of the 130-ton Space Launch System configuration described in section 302(c) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322(c)).

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

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

(B) directly assess the utility and estimated cost savings obtained by using a cargo variant of the Space Launch System for national security and space science missions.

(3) SUBMISSION TO CONGRESS.—Not later than 180 days after the date of enactment of this Act, the

Administrator shall submit the report to the appropriate committees of Congress.

Subtitle C—Journey to Mars

SEC. 431. FINDINGS ON HUMAN SPACE EXPLORATION.

Congress makes the following findings:

(1) In accordance with section 204 of the National Aeronautics and Space Administration Authorization Act of 2010 (124 Stat. 2813), the National Academies of Sciences, Engineering, and Medicine, through its Committee on Human Spaceflight, conducted a review of the goals, core capabilities, and direction of human space flight, and published the findings and recommendations in a 2014 report entitled, ''Pathways to Exploration: Rationales and Approaches for a U.S. Program of Human Space Exploration''.

(2) The Committee on Human Spaceflight included leaders from the aerospace, scientific, security, and policy communities.

(3) With input from the public, the Committee on Human Spaceflight concluded that many practical and aspirational rationales for human space flight together constitute a compelling case for continued national investment and pursuit of human space exploration toward the horizon goal of Mars.

(4) According to the Committee on Human Spaceflight, the rationales include economic benefits, national security, national prestige, inspiring students and other citizens, scientific discovery, human survival, and a sense of shared destiny.

(5) The Committee on Human Spaceflight affirmed that Mars is the appropriate long-term goal for the human space flight program.

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

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

(8) In addition to the 2014 report described in paragraph (1), there are several independently developed reports or concepts that describe potential Mars architectures or concepts and identify Mars as the long-term goal for human space exploration, including NASA's ''The Global Exploration Roadmap''

of 2013, ''NASA's Journey to Mars–Pioneering Next Steps in Space Exploration'' of 2015, NASA Jet Propulsion Laboratory's ''Minimal Architecture for Human Journeys to Mars'' of 2015, and Explore Mars' ''The Humans to Mars Report 2016''.

SEC. 432. HUMAN EXPLORATION ROADMAP.

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

(1) expanding human presence beyond low-Earth orbit and advancing toward human missions to Mars in the 2030s requires early strategic planning and timely decisions to be made in the near-term on the necessary courses of action for commitments to achieve short-term and long-term goals and objectives;

(2) for strong and sustained United States leadership, a need exists to advance a human exploration roadmap, addressing exploration objectives in collaboration with international, academic, and industry partners;

(3) an approach that incrementally advances toward a long-term goal is one in which nearer-term developments and implementation would influence future development and implementation; and

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

(b) HUMAN EXPLORATION ROADMAP.—

(1) IN GENERAL.—The Administrator shall develop a human exploration roadmap, including a critical decision plan, to expand human presence beyond low-Earth orbit to the surface of Mars and beyond, considering potential interim destinations such as cis-lunar space and the moons of Mars.

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

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

(B) opportunities for international, academic, and industry partnerships for exploration-related systems, services, research, and technology if those opportunities provide cost-

savings, accelerate program schedules, or otherwise benefit the goals and objectives developed under subparagraph (A);

(C) sets and sequences of precursor missions in cis-lunar space and other missions or activities necessary—

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

(ii) to meet the goals and objectives developed under subparagraph (A), including anticipated timelines and missions for the Space Launch System and Orion;

(D) an identification of the specific capabilities and technologies, including the Space Launch System, Orion, a deep space habitat, and other capabilities, that facilitate the goals and objectives developed under subparagraph (A);

(E) a description of how cis-lunar elements, objectives, and activities advance the human exploration of Mars;

(F) an assessment of potential human health and other risks, including radiation exposure;

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

(H) a description of those technologies already under development across the Federal Government or by other entities that facilitate the goals and objectives developed under subparagraph (A);

(I) a specific process for the evolution of the capabilities of the fully integrated Orion with the Space Launch System and a description of how these systems facilitate the goals and objectives developed under subparagraph (A) and demonstrate the capabilities and technologies described in subparagraph (D);

(J) a description of the capabilities and technologies that need to be demonstrated or research data that could be gained through the utilization of the ISS and the status of the development of such capabilities and technologies;

(K) a framework for international cooperation in the development of all capabilities and technologies identified under this section, including an assessment of the risks posed by relying on international partners for capabilities

and technologies on the critical path of development;

(L) a process for partnering with non-governmental entities using Space Act Agreements or other acquisition instruments for future human space exploration; and

(M) include information on the phasing of planned intermediate destinations, Mars mission risk areas and potential risk mitigation approaches, technology requirements and phasing of required technology development activities, the management strategy to be followed, related ISS activities, planned international collaborative activities, potential commercial contributions, and other activities relevant to the achievement of the goal established in this section.

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

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

(B) using existing commercially available technologies and capabilities or those tech-

nologies and capabilities being developed by industry for commercial purposes;

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

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

(E) developing the robotic and precursor missions and activities that will demonstrate, test, and develop key technologies and capabilities essential for achieving human missions to Mars, including long-duration human operations beyond low-Earth orbit, space suits, solar electric propulsion, deep space habitats, environmental control life support systems, Mars lander and ascent vehicle, entry, descent, land-

ing, ascent, Mars surface systems, and in-situ resource utilization;

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

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

(H) collaborating with international, academic, and industry partners, when appropriate;

(I) any risks to human health and sensitive onboard technologies, including radiation exposure;

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

(K) the recommendations and ideas of several independently developed reports or concepts that describe potential Mars architectures or concepts and identify Mars as the long-term goal for human space exploration, including the reports described under section 431.

(4) CRITICAL DECISION PLAN ON HUMAN SPACE EXPLORATION.—As part of the human exploration

roadmap, the Administrator shall include a critical decision plan—

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

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

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

(5) REPORTS.—

(A) INITIAL HUMAN EXPLORATION ROADMAP.—The Administrator shall submit to the appropriate committees of Congress—

(i) an initial human exploration roadmap, including a critical decision plan, before December 1, 2017; and

(ii) an updated human exploration roadmap periodically as the Administrator considers necessary but not less than biennially.

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

(i) the achievements and goals accomplished in the process of developing such capabilities and technologies during the 2-year period prior to the submission of the human exploration roadmap; and

(ii) the expected goals and achievements in the following 2- year period.

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

SEC. 433. ADVANCED SPACE SUIT CAPABILITY.

Not later than 90 days after the date of enactment of this Act, the Administrator shall submit to the appropriate committees of Congress a detailed plan for achieving an advanced space suit capability that aligns with the crew needs for exploration enabled by the Space Launch

System and Orion, including an evaluation of the merit of delivering the planned suit system for use on the ISS.

SEC. 434. ASTEROID ROBOTIC REDIRECT MISSION.

(a) FINDINGS.—Congress makes the following findings:

(1) NASA initially estimated that the Asteroid Robotic Redirect Mission would launch in December 2020 and cost no more than $1,250,000,000, excluding launch and operations.

(2) On July 15, 2016, NASA conducted its Key Decision Point–B review of the Asteroid Robotic Redirect Mission or approval for Phase B in mission formulation.

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

(4) In April 2015, the NASA Advisory Council—

(A) issued a finding that—

(i) high-performance solar electric propulsion will likely be an important part

of an architecture to send humans to Mars; and

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

(B) determined that a solar electric propulsion mission will contribute more directly to the goal of sending humans to Mars if the mission is focused entirely on development and validation of the solar electric propulsion stage; and

(C) determined that other possible motivations for acquiring and maneuvering a boulder, such as asteroid science and planetary defense, do not have value commensurate with their probable cost.

(5) The Asteroid Robotic Redirect Mission is competing for resources with other critical exploration development programs, including the Space Launch System, Orion, commercial crew, and a habitation module.

(6) In 2014, the NASA Advisory Council recommended that NASA conduct an independent cost and technical assessment of the Asteroid Robotic Redirect Mission.

(7) In 2015, the NASA Advisory Council recommended that NASA preserve the following key objectives if the program needed to be descoped:

(A) Development of high power solar electric propulsion.

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

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

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

(1) the technological and scientific goals of the Asteroid Robotic Redirect Mission have not been demonstrated to Congress to be commensurate with the cost; and

(2) alternative missions may provide a more cost effective and scientifically beneficial means to demonstrate the technologies needed for a human mission to Mars that would otherwise be demonstrated by the Asteroid Robotic Redirect Mission.

(c) EVALUATION AND REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall—

(1) conduct an evaluation of—

(A) alternative approaches to the Asteroid Robotic Redirect Mission for demonstrating the technologies and capabilities needed for a human mission to Mars that would otherwise be demonstrated by the Asteroid Robotic Redirect Mission;

(B) the scientific and technical benefits of the alternative approaches under subparagraph (A) to future human space exploration compared to scientific and technical benefits of the Asteroid Redirect Robotic Mission;

(C) the commercial benefits of the alternative approaches identified in subparagraph (A), including the impact on the development of domestic solar electric propulsion technology to bolster United States competitiveness in the global marketplace; and

(D) a comparison of the estimated costs of the alternative approaches identified in subparagraph (A); and

(2) submit to the appropriate committees of Congress a report on the evaluation under paragraph (1), including any recommendations.

SEC. 435. MARS 2033 REPORT.

(a) IN GENERAL.—Not later than 120 days after the date of enactment of this Act, the Administrator shall contract with an independent, non-governmental systems engineering and technical assistance organization to study a Mars human space flight mission to be launched in 2033.

(b) CONTENTS.—The study shall include—

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

(2) an annual budget profile, including cost estimates, for the technical development, test, fielding, and operations plan to carry out a Mars human space flight mission by 2033; and

(3) a comparison of the annual budget profile to the 5-year budget profile contained in the President's budget request for fiscal year 2017 under section 1105 of title 31, United States Code.

(c) REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall submit

to the appropriate committees of Congress a report on the study, including findings and recommendations regarding the Mars 2033 human space flight mission described in subsection (a).

(d) ASSESSMENT.—Not later than 60 days after the date the report is submitted under subsection (c), the Administrator shall submit to the appropriate committees of Congress an assessment by the NASA Advisory Council of whether the proposal for a Mars human space flight mission to be launched in 2033 is in the strategic interests of the United States in space exploration.

Subtitle D—TREAT Astronauts Act

SEC. 441. SHORT TITLE.

This subtitle may be cited as the ''To Research, Evaluate, Assess, and Treat Astronauts Act'' or the ''TREAT Astronauts Act''.

SEC. 442. FINDINGS; SENSE OF CONGRESS.

(a) FINDINGS.—Congress makes the following findings:

(1) Human space exploration can pose significant challenges and is full of substantial risk, which has ultimately claimed the lives of 24 NASA astronauts serving in the line of duty.

(2) As United States government astronauts participate in long-duration and exploration space

flight missions they may experience increased health risks, such as vision impairment, bone demineralization, and behavioral health and performance risks, and may be exposed to galactic cosmic radiation. Exposure to high levels of radiation and microgravity can result in acute and long-term health consequences that can increase the risk of cancer and tissue degeneration and have potential effects on the musculoskeletal system, central nervous system, cardiovascular system, immune function, and vision.

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

(4) Since the Administration currently provides medical monitoring, diagnosis, and treatment for United States government astronauts during their active employment, given the unknown long-term

health consequences of long-duration space exploration, the Administration has requested statutory authority from Congress to provide medical monitoring, diagnosis, and treatment to former United States government astronauts for psychological and medical conditions associated with human space flight.

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

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

(2) data relating to the health of astronauts will become increasingly valuable to improving our understanding of many diseases humans face on Earth;

(3) the Administration should provide the type of monitoring, diagnosis, and treatment described in subsection (a) only for conditions the Administration considers unique to the training or exposure to the space flight environment of United States government astronauts and should not require any former United States Government astronauts to participate in the Administration's monitoring;

(4) such monitoring, diagnosis, and treatment should not replace a former United States government astronaut's private health insurance;

(5) expanded data acquired from such monitoring, diagnosis, and treatment should be used to tailor treatment, inform the requirements for new space flight medical hardware, and develop controls in order to prevent disease occurrence in the astronaut corps; and

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

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

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

SEC. 443. MEDICAL MONITORING AND RESEARCH RELATING TO HUMAN SPACE FLIGHT.

(a) IN GENERAL.—Subchapter III of chapter 201 of title 51, United States Code, as amended by section 305

of this Act, is further amended by adding at the end the following:

"§ 20149. Medical monitoring and research relating to human space flight

''(a) IN GENERAL.—Notwithstanding any other provision of law, the Administrator may provide for—

''(1) the medical monitoring and diagnosis of a former United States government astronaut or a former payload specialist for conditions that the Administrator considers potentially associated with human space flight; and

''(2) the treatment of a former United States government astronaut or a former payload specialist for conditions that the Administrator considers associated with human space flight, including scientific and medical tests for psychological and medical conditions.

''(b) REQUIREMENTS.—

''(1) NO COST SHARING.—The medical monitoring, diagnosis, or treatment described in subsection (a) shall be provided without any deductible, copayment, or other cost sharing obligation.

''(2) ACCESS TO LOCAL SERVICES.—The medical monitoring, diagnosis, and treatment described in subsection (a) may be provided by a local health

care provider if it is unadvisable due to the health of the applicable former United States government astronaut or former payload specialist for that former United States government astronaut or former payload specialist to travel to the Lyndon B. Johnson Space Center, as determined by the Administrator.

''(3) SECONDARY PAYMENT.—Payment or reimbursement for the medical monitoring, diagnosis, or treatment described in subsection (a) shall be secondary to any obligation of the United States Government or any third party under any other provision of law or contractual agreement to pay for or provide such medical monitoring, diagnosis, or treatment. Any costs for items and services that may be provided by the Administrator for medical monitoring, diagnosis, or treatment under subsection (a) that are not paid for or provided under such other provision of law or contractual agreement, due to the application of deductibles, copayments, coinsurance, other cost sharing, or otherwise, are reimbursable by the Administrator on behalf of the former United States government astronaut or former payload specialist involved to the extent such items or services are authorized to be provided by the Administrator

for such medical monitoring, diagnosis, or treatment under subsection (a).

''(4) CONDITIONAL PAYMENT.—The Administrator may provide for conditional payments for or provide medical monitoring, diagnosis, or treatment described in subsection (a) that is obligated to be paid for or provided by the United States or any third party under any other provision of law or contractual agreement to pay for or provide such medical monitoring, diagnosis, or treatment if—

''(A) payment for (or the provision of) such medical monitoring, diagnosis, or treatment services has not been made (or provided) or cannot reasonably be expected to be made (or provided) promptly by the United States or such third party, respectively; and

''(B) such payment (or such provision of services) by the Administrator is conditioned on reimbursement by the United States or such third party, respectively, for such medical monitoring, diagnosis, or treatment.

''(c) EXCLUSIONS.—The Administrator may not—

''(1) provide for medical monitoring or diagnosis of a former United States government astronaut or former payload specialist under subsection

(a) for any psychological or medical condition that is not potentially associated with human space flight;

''(2) provide for treatment of a former United States government astronaut or former payload specialist under subsection (a) for any psychological or medical condition that is not associated with human space flight; or

''(3) require a former United States government astronaut or former payload specialist to participate in the medical monitoring, diagnosis, or treatment authorized under subsection (a).

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

''(e) REGULATIONS.—The Administrator shall promulgate such regulations as are necessary to carry out this section.

''(f) DEFINITION OF UNITED STATES GOVERNMENT ASTRONAUT.—In this section, the term 'United States government astronaut' has the meaning given the term 'government astronaut' in section 50902, except it does not include an individual who is an international partner astronaut.

''(g) DATA USE AND DISCLOSURE.—The Administrator may use or disclose data acquired in the course of medical monitoring, diagnosis, or treatment of a former United States government astronaut or a former payload specialist under subsection (a), in accordance with subsection (d). Former United States government astronaut or former payload specialist participation in medical monitoring, diagnosis, or treatment under subsection (a) shall constitute consent for the Administrator to use or disclose such data.''.

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

''20149. Medical monitoring and research relating to human space flight.''.

(c) ANNUAL REPORTS.—

(1) IN GENERAL.—Each fiscal year, not later than the date of submission of the President's annual budget request for that fiscal year under section 1105 of title 31, United States Code, the Administrator shall publish a report, in accordance with applicable Federal privacy laws, on the activities of the Administration under section 20149 of title 51, United States Code.

(2) CONTENTS.—Each report under paragraph (1) shall include a detailed cost accounting of the

Administration's activities under section 20149 of title 51, United States Code, and a 5-year budget estimate.

(3) SUBMISSION TO CONGRESS.—The Administrator shall submit to the appropriate committees of Congress each report under paragraph (1) not later than the date of submission of the President's annual budget request for that fiscal year under section 1105 of title 31, United States Code.

(d) COST ESTIMATE.—

(1) REQUIREMENT.—Not later than 90 days after the date of enactment of this Act, the Administrator shall enter into an arrangement with an independent external organization to undertake an independent cost estimate of the cost to the Administration and the Federal Government to implement and administer the activities of the Administration under section 20149 of title 51, United States Code. The independent external organization may not be a NASA entity, such as the Office of Safety and Mission Assurance.

(2) SUBMITTAL TO CONGRESS.—Not later than 1 year after the date of the enactment of this Act, the Administrator shall submit to the appropriate

committees of Congress the independent cost estimate under paragraph (1).

(e) PRIVACY STUDY.—

(1) STUDY.—The Administrator shall carry out a study on any potential privacy or legal issues related to the possible sharing beyond the Federal Government of data acquired under the activities of the Administration under section 20149 of title 51, United States Code.

(2) REPORT.—Not later than 270 days after the date of enactment of this Act, the Administrator shall submit to the appropriate committees of Congress a report containing the results of the study carried out under paragraph (1).

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

TITLE V—ADVANCING SPACE SCIENCE

SEC. 501. MAINTAINING A BALANCED SPACE SCIENCE PORTFOLIO.

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

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

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

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

SEC. 502. PLANETARY SCIENCE.

(a) FINDINGS.—Congress finds that—

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

(2) the United States leads the world in planetary science and can augment its success in that area with appropriate international, academic, and industry partnerships;

(3) a mix of small, medium, and large planetary science missions is required to sustain a steady cadence of planetary exploration; and

(4) robotic planetary exploration is a key component of preparing for future human exploration.

(b) MISSION PRIORITIES.—

(1) IN GENERAL.—In accordance with the priorities established in the most recent Planetary Science Decadal Survey, the Administrator shall ensure, to the greatest extent practicable, the completion of a balanced set of Discovery, New Frontiers, and Flagship missions at the cadence recommended by the most recent Planetary Science Decadal Survey.

(2) MISSION PRIORITY ADJUSTMENTS.—Consistent with the set of missions described in paragraph (1), and while maintaining the continuity of scientific data and steady development of capabilities and technologies, the Administrator may seek, if necessary, adjustments to mission priorities, schedule, and scope in light of changing budget projections.

SEC. 503. JAMES WEBB SPACE TELESCOPE.

It is the sense of Congress that—

(1) the James Webb Space Telescope will—

(A) significantly advance our understanding of star and planet formation, and improve our knowledge of the early universe; and

(B) support United States leadership in astrophysics;

(2) consistent with annual Government Accountability Office reviews of the James Webb Space Telescope program, the Administrator should continue robust surveillance of the performance of the James Webb Space Telescope project and continue to improve the reliability of cost estimates and contractor performance data and other major space flight projects in order to enhance NASA's ability to successfully deliver the James Webb Space Telescope on-time and within budget;

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

(4) the Administrator should ensure that integrated testing is appropriately timed and sufficiently comprehensive to enable potential issues to be identified and addressed early enough to be handled within the James Webb Space Telescope's development schedule and prior to its launch.

SEC. 504. WIDE-FIELD INFRARED SURVEY TELESCOPE.

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

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

(2) the Administrator, to the extent practicable, should make progress on the technologies and capabilities needed to position the Administration to meet the objectives, as outlined in the 2010 National Academies' Astronomy and Astrophysics Decadal Survey, in a way that maximizes the scientific productivity of meeting those objectives for the resources invested.

(b) CONTINUITY OF DEVELOPMENT.—The Administrator shall ensure that the concept definition and preformulation activities of the WFIRST mission continue while the James Webb Space Telescope is being completed.

SEC. 505. MARS 2020 ROVER.

It is the sense of Congress that—

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

(2) the Mars 2020 mission—

(A) should significantly increase our understanding of Mars;

(B) should help determine whether life previously existed on that planet; and

(C) should provide opportunities to gather knowledge and demonstrate technologies that address the challenges of future human expeditions to Mars.

SEC. 506. EUROPA.

(a) FINDINGS.—Congress makes the following findings:

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

(2) In 2012, using the Hubble Space Telescope, NASA scientists observed water vapor around the south polar region of Europa, which provides potential evidence of water plumes in that region.

(3) For decades, the Europa mission has consistently ranked as a high priority mission for the scientific community.

(4) The Europa mission was ranked as the top priority mission in the previous Planetary Science Decadal Survey and ranked as the second-highest

priority in the current Planetary Science Decadal Survey.

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

(1) the Europa mission could provide another avenue in which to capitalize on our Nation's current investment in the Space Launch System that would significantly reduce the transit time for such a deep space mission; and

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

SEC. 507. CONGRESSIONAL DECLARATION OF POLICY AND PURPOSE.

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

''(10) The search for life's origin, evolution, distribution, and future in the universe.''.

SEC. 508. EXTRASOLAR PLANET EXPLORATION STRATEGY.

(a) STRATEGY.—

(1) IN GENERAL.—The Administrator shall enter into an arrangement with the National Academies to develop a science strategy for the study and exploration of extrasolar planets, including the use of the Transiting Exoplanet Survey Satellite, the

James Webb Space Telescope, a potential Wide-Field Infrared Survey Telescope mission, or any other telescope, spacecraft, or instrument, as appropriate.

(2) REQUIREMENTS.—The strategy shall—

(A) outline key scientific questions;

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

(C) indicate the extent to which the mission priorities in existing decadal surveys address the key extrasolar planet research and exploration goals;

(D) identify opportunities for coordination with international partners, commercial partners, and not-for-profit partners; and

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

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

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

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

(c) REPORT TO CONGRESS.—Not later than 18 months after the date of enactment of this Act, the National Academies shall submit to the Administrator and to the appropriate committees of Congress a report containing the strategy developed under subsection (a).

SEC. 509. ASTROBIOLOGY STRATEGY.

(a) STRATEGY.—

(1) IN GENERAL.—The Administrator shall enter into an arrangement with the National Academies to develop a science strategy for astrobiology that would outline key scientific questions, identify the most promising research in the field, and indicate the extent to which the mission priorities in existing decadal surveys address the search for life's origin, evolution, distribution, and future in the Universe.

(2) RECOMMENDATIONS.—The strategy shall include recommendations for coordination with international partners.

(b) USE OF STRATEGY.—The Administrator shall use the strategy developed under subsection (a) in planning

and funding research and other activities and initiatives in the field of astrobiology.

(c) REPORT TO CONGRESS.—Not later than 18 months after the date of enactment of this Act, the National Academies shall submit to the Administrator and to the appropriate committees of Congress a report containing the strategy developed under subsection (a).

SEC. 510. ASTROBIOLOGY PUBLIC-PRIVATE PARTNERSHIPS.

Not later than 180 days after the date of enactment of this Act, the Administrator shall submit to the appropriate committees of Congress a report describing how the Administration can expand collaborative partnerships to study life's origin, evolution, distribution, and future in the universe.

SEC. 511. NEAR-EARTH OBJECTS.

Section 321 of the National Aeronautics and Space Administration Authorization Act of 2005 (51 U.S.C. note prec. 71101) is amended by adding at the end the following:

''(e) PROGRAM REPORT.—The Director of the Office of Science and Technology Policy and the Administrator shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives, not later than 1 year after the date of enact-

ment of the National Aeronautics and Space Administration Transition Authorization Act of 2017, an initial report that provides—

''(1) recommendations for carrying out the Survey program and an associated proposed budget;

''(2) an analysis of possible options that the Administration could employ to divert an object on a likely collision course with Earth; and

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

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

''(1) a summary of all activities carried out under subsection (d) since the date of enactment of the National Aeronautics and Space Administration Transition Authorization Act of 2017, including the

progress toward achieving 90 percent completion of the survey described in subsection (d); and

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

''(g) ASSESSMENT.—The Administrator, in collaboration with other relevant Federal agencies, shall carry out a technical and scientific assessment of the capabilities and resources—

''(1) to accelerate the survey described in subsection (d); and

''(2) to expand the Administration's Near-Earth Object Program to include the detection, tracking, cataloguing, and characterization of potentially hazardous near-Earth objects less than 140 meters in diameter.

''(h) TRANSMITTAL.—Not later than 270 days after the date of enactment of the National Aeronautics and Space Administration Transition Authorization Act of 2017, the Administrator shall transmit the results of the assessment under subsection (g) to the Committee on Commerce, Science, and Transportation of the Senate and

the Committee on Science, Space, and Technology of the House of Representatives.''.

SEC. 512. NEAR-EARTH OBJECTS PUBLIC-PRIVATE PARTNERSHIPS.

(a) SENSE OF CONGRESS.—It is the sense of Congress that the Administration should seek to leverage the capabilities of the private sector and philanthropic organizations to the maximum extent practicable in carrying out the Near-Earth Object Survey Program in order to meet the goal of that program under section 321(d)(1) of the National Aeronautics and Space Administration Authorization Act of 2005 (51 U.S.C. note prec. 71101(d)(1)).

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

SEC. 513. ASSESSMENT OF SCIENCE MISSION EXTENSIONS.

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

''§ 30504. Assessment of science mission extensions

''(a) ASSESSMENTS.—

''(1) IN GENERAL.—The Administrator shall carry out triennial reviews within each of the Science

divisions to assess the cost and benefits of extending the date of the termination of data collection for those missions that exceed their planned missions' lifetime.

''(2) CONSIDERATIONS.—In conducting an assessment under paragraph (1), the Administrator shall consider whether and how extending missions impacts the start of future missions.

''(b) CONSULTATION AND CONSIDERATION OF POTENTIAL BENEFITS OF INSTRUMENTS ON MISSIONS.—When deciding whether to extend a mission that has an operational component, the Administrator shall—

''(1) consult with any affected Federal agency; and

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

''(c) REPORTS.—The Administrator shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives, at the same time as the submission to Congress of the Administration's annual budget request for each fiscal year, a report detailing any assessment under subsection (a) that was carried out during the previous year.''.

SEC. 514. STRATOSPHERIC OBSERVATORY FOR INFRARED ASTRONOMY.

The Administrator may not terminate science operations of the Stratospheric Observatory for Infrared Astronomy before December 31, 2017.

SEC. 515. RADIOISOTOPE POWER SYSTEMS.

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

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

(2) establishing continuity in the production of the material needed for radioisotope power systems is essential to maintaining the availability of such systems for future deep space exploration missions; and

(3) Federal agencies supporting the Administration through the production of such material should do so in a cost effective manner so as not to impose excessive reimbursement requirements on the Administration.

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

(1) the requirements of the Administration for radioisotope power system material that is needed to

carry out planned, high priority robotic missions in the solar system and other surface exploration activities beyond low-Earth orbit; and

(2) the risks to missions of the Administration in meeting those requirements, or any additional requirements, due to a lack of adequate radioisotope power system material.

(c) CONTENTS OF ANALYSIS.—The analysis conducted under subsection (b) shall—

(1) detail the Administration's current projected mission requirements and associated timeframes for radioisotope power system material;

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

(A) the planned use of advanced thermal conversion technology such as advanced thermocouples and Stirling generators and converters; and

(B) the risks and implications of, and contingencies for, any delays or unanticipated technical challenges affecting or related to the Administration's mission plans for the anticipated use of advanced thermal conversion technology;

(3) assess the risk to the Administration's programs of any potential delays in achieving the schedule and milestones for planned domestic production of radioisotope power system material;

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

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

(6) detail how the Administration and other Federal agencies will manage, operate, and fund production facilities and the design and development of all radioisotope power systems used by the Administration and other Federal agencies as necessary;

(7) specify the steps the Administration will take, in consultation with the Department of Energy, to preserve the infrastructure and workforce necessary for production of radioisotope power systems and ensure that its reimbursements to the Department of Energy associated with such preservation are equitable and justified; and

(8) detail how the Administration has implemented or rejected the recommendations from the

National Research Council's 2009 report titled ''Radioisotope Power Systems: An Imperative for Maintaining U.S. Leadership in Space Exploration.''

(d) REPORT TO CONGRESS.—Not later than 180 days after the date of enactment of this Act, the Administrator shall submit the results of the analysis to the appropriate committees of Congress.

SEC. 516. ASSESSMENT OF MARS ARCHITECTURE.

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

(1) the Administration's Mars exploration architecture and its responsiveness to the strategies, priorities, and guidelines put forward by the National Academies' planetary science decadal surveys and other relevant National Academies Mars-related reports;

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

(3) the Mars exploration architecture's relationship to Mars-related activities to be undertaken by foreign agencies and organizations; and

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

(b) REPORT TO CONGRESS.—Not later than 18 months after the date of enactment of this Act, the Administrator shall submit the results of the assessment to the appropriate committees of Congress.

SEC. 517. COLLABORATION.

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

TITLE VI—AERONAUTICS

SEC. 601. SENSE OF CONGRESS ON AERONAUTICS.

It is the sense of Congress that—

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

(2) aeronautics research is essential to the Administration's mission, continues to be an important

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

(3) the Administrator should coordinate and consult with relevant Federal agencies and the private sector to minimize duplication of efforts and leverage resources; and

(4) carrying aeronautics research to a level of maturity that allows the Administration's research results to be transferred to the users, whether private or public sector, is critical to their eventual adoption.

SEC. 602. TRANSFORMATIVE AERONAUTICS RESEARCH.

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

SEC. 603. HYPERSONIC RESEARCH.

(a) ROADMAP FOR HYPERSONIC RESEARCH.—Not later than 1 year after the date of enactment of this Act, the Administrator, in consultation with the heads of other relevant Federal agencies, shall develop and submit to the

appropriate committees of Congress a research and development roadmap for hypersonic aircraft research.

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

(c) CONTENTS.—The roadmap shall recommend appropriate Federal agency contributions, coordination efforts, and technology milestones.

SEC. 604. SUPERSONIC RESEARCH.

(a) FINDINGS.—Congress finds that—

(1) the ability to fly commercial aircraft over land at supersonic speeds without adverse impacts on the environment or on local communities could open new global markets and enable new transportation capabilities; and

(2) continuing the Administration's research program is necessary to assess the impact in a relevant environment of commercial supersonic flight operations and provide the basis for establishing appropriate sonic boom standards for such flight operations.

(b) ROADMAP FOR SUPERSONIC RESEARCH.—

(1) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Administrator shall develop and submit to the appropriate committees of Congress a roadmap that allows for flexible funding profiles for supersonic aeronautics research and development.

(2) OBJECTIVE.—The objective of the roadmap is to develop and demonstrate, in a relevant environment, airframe and propulsion technologies to minimize the environmental impact, including noise, of supersonic overland flight in an efficient and economical manner.

(3) CONTENTS.—The roadmap shall include—

(A) the baseline research as embodied by the Administration's existing research on supersonic flight;

(B) a list of specific technological, environmental, and other challenges that must be overcome to minimize the environmental impact, including noise, of supersonic overland flight;

(C) a research plan to address the challenges under subparagraph (B), including a project timeline for accomplishing relevant research goals;

(D) a plan for coordination with stakeholders, including relevant government agencies and industry; and

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

SEC. 605. ROTORCRAFT RESEARCH.

(a) ROADMAP FOR ROTORCRAFT RESEARCH.—Not later than 1 year after the date of enactment of this Act, the Administrator, in consultation with the heads of other relevant Federal agencies, shall prepare and submit to the appropriate committees of Congress a roadmap for research relating to rotorcraft and other runway-independent air vehicles.

(b) OBJECTIVE.—The objective of the roadmap is to develop and demonstrate improved safety, noise, and environmental impact in a relevant environment.

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

TITLE VII—SPACE TECHNOLOGY

SEC. 701. SPACE TECHNOLOGY INFUSION.

(a) SENSE OF CONGRESS ON SPACE TECHNOLOGY.—It is the sense of Congress that space technology is critical—

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

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

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

(b) SENSE OF CONGRESS ON PROPULSION TECHNOLOGY.—It is the sense of Congress that advancing propulsion technology would improve the efficiency of trips to Mars and could shorten travel time to Mars, reduce astronaut health risks, and reduce radiation exposure, consumables, and mass of materials required for the journey.

(c) POLICY.—It is the policy of the United States that the Administrator shall develop technologies to support the Administration's core missions, as described in section 2(3) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C.

18301(3)), and support sustained investments in early stage innovation, fundamental research, and technologies to expand the boundaries of the national aerospace enterprise.

(d) PROPULSION TECHNOLOGIES.—A goal of propulsion technologies developed under subsection (c) shall be to significantly reduce human travel time to Mars.

SEC. 702. SPACE TECHNOLOGY PROGRAM.

(a) SPACE TECHNOLOGY PROGRAM AUTHORIZED.—The Administrator shall conduct a space technology program (referred to in this section as the ''Program'') to research and develop advanced space technologies that could deliver innovative solutions across the Administration's space exploration and science missions.

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

(1) the recommendations of the National Academies' review of the Administration's Space Technology roadmaps and priorities; and

(2) the applicable enabling aspects of the stepping stone approach to exploration under section 70504 of title 51, United States Code.

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

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

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

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

(d) SMALL BUSINESS PROGRAMS.—The Administrator shall organize and manage the Administration's Small Business Innovation Research Program and Small Business Technology Transfer Program within the Program.

(e) NONDUPLICATION CERTIFICATION.—The Administrator shall submit a budget for each fiscal year, as transmitted to Congress under section 1105(a) of title 31, United States Code, that avoids duplication of projects, programs, or missions conducted by Program with other projects, programs, or missions conducted by another office or directorate of the Administration.

(f) COLLABORATION, COORDINATION, AND ALIGNMENT.—

(1) IN GENERAL.—The Administrator shall—

(A) ensure that the Administration's projects, programs, and activities in support of technology research and development of advanced space technologies are fully coordinated and aligned;

(B) ensure that the results the projects, programs, and activities under subparagraph (A) are shared and leveraged within the Administration; and

(C) ensure that the organizational responsibility for research and development activities in support of human space exploration not initiated as of the date of enactment of this Act is established on the basis of a sound rationale.

(2) SENSE OF CONGRESS.—It is the sense of Congress that projects, programs, and missions being conducted by the Human Exploration and Operations Mission Directorate in support of research and development of advanced space technologies and systems focusing on human space exploration should continue in that Directorate.

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

(1) comparing the Administration's space technology investments with the high-priority technology areas identified by the National Academies in the National Research Council's report on the Administration's Space Technology Roadmaps; and

(2) including—

(A) identification of how the Administration will address any gaps between the agency's investments and the recommended technology areas, including a projection of funding requirements; and

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

(h) ANNUAL REPORT.—The Administrator shall include in the Administration's annual budget request for each fiscal year the rationale for assigning organizational responsibility for, in the year prior to the budget fiscal year, each initiated project, program, and mission focused on research and development of advanced technologies for human space exploration.

TITLE VIII—MAXIMIZING EFFICIENCY

Subtitle A—Agency Information Technology and Cybersecurity

SEC. 811. INFORMATION TECHNOLOGY GOVERNANCE.

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

(1) ensure the NASA Chief Information Officer, Mission Directorates, and Centers have appropriate roles in the management, governance, and oversight processes related to information technology operations and investments and information security programs for the protection of NASA systems;

(2) ensure the NASA Chief Information Officer has the appropriate resources and insight to oversee NASA information technology and information security operations and investments;

(3) provide an information technology program management framework to increase the efficiency and effectiveness of information technology investments, including relying on metrics for identifying and reducing potential duplication, waste, and cost;

(4) improve the operational linkage between the NASA Chief Information Officer and each NASA

mission directorate, center, and mission support office to ensure both agency and mission needs are considered in agency-wide information technology and information security management and oversight;

(5) review the portfolio of information technology investments and spending, including information technology-related investments included as part of activities within NASA mission directorates that may not be considered information technology, to ensure investments are recognized and reported appropriately based on guidance from the Office of Management and Budget;

(6) consider appropriate revisions to the charters of information technology boards and councils that inform information technology investment and operation decisions; and

(7) consider whether the NASA Chief Information Officer should have a seat on any boards or councils described in paragraph (6).

(b) GAO STUDY.—

(1) STUDY.—The Comptroller General of the United States shall conduct a study of the effectiveness of the Administration's Information Technology Governance in ensuring information technology re-

sources are aligned with agency missions and are cost effective and secure.

(2) CONTENTS.—The study shall include an assessment of—

(A) the resources available for overseeing Administration-wide information technology operations, investments, and security measures and the NASA Chief Information Officer's visibility and involvement into information technology oversight and access to those resources;

(B) the effectiveness and challenges of the Administration's information technology structure, decision making processes and authorities, including impacts on its ability to implement information security; and

(C) the impact of NASA Chief Information Officer approval authority over information technology investments that exceed a defined monetary threshold, including any potential impacts of such authority on the Administration's missions, flights programs and projects, research activities, and Center operations.

(3) REPORT.—Not later than 1 year after the date of enactment of this Act, the Comptroller General shall submit to the appropriate committees of

Congress a report detailing the results of the study under paragraph (1), including any recommendations.

SEC. 812. INFORMATION TECHNOLOGY STRATEGIC PLAN.

(a) IN GENERAL.—Subject to subsection (b), the Administrator shall develop an information technology strategic plan to guide NASA information technology management and strategic objectives.

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

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

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

(c) CONTENTS.—The strategic plan shall address, in a manner that reflects the unique nature of NASA's mission and expertise—

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

(2) a plan for how NASA will submit to Congress of a list of information technology projects, including completion dates and risk level in accordance with guidance from the Office of Management and Budget;

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

(4) coordination by the NASA Chief Information Officer with centers and mission directorates to ensure that information technology policies are effectively and efficiently implemented across the agency;

(5) a plan to increase the efficiency and effectiveness of information technology investments, including a description of how unnecessarily duplicative, wasteful, legacy, or outdated information technology across NASA will be identified and eliminated, and a schedule for the identification and elimination of such information technology;

(6) a plan for improving the information security of agency information and agency information systems, including improving security control assessments and role-based security training of employees; and

(7) submission by NASA to Congress of information regarding high risk projects and cybersecurity risks.

(d) CONGRESSIONAL OVERSIGHT.—The Administrator shall submit to the appropriate committees of Con-

gress the strategic plan under subsection (a) and any updates thereto.

SEC. 813. CYBERSECURITY.

(a) FINDING.—Congress finds that the security of NASA information and information systems is vital to the success of the mission of the agency.

(b) INFORMATION SECURITY PLAN.—

(1) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Administrator shall implement the information security plan developed under paragraph (2) and take such further actions as the Administrator considers necessary to improve the information security system in accordance with this section.

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

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

(A) reflects the unique nature of NASA's mission and expertise;

(B) is informed by policies, standards, guidelines, and directives on information security required for Federal agencies;

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

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

(4) CONTENTS.—The plan shall address—

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

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

(C) a description of the information security system management controls and common controls that are necessary to ensure compliance with information security-related requirements;

(D) an identification and assignment of roles, responsibilities, and management commitment for information security at the agency;

(E) coordination among organizational entities, including between each center, facility, mission directorate, and mission support office,

and among agency entities responsible for different aspects of information security;

(F) the need to protect the information security of mission-critical systems and activities and high-impact and moderate-impact information systems; and

(G) a schedule of frequent reviews and updates, as necessary, of the plan.

SEC. 814. SECURITY MANAGEMENT OF FOREIGN NATIONAL ACCESS.

The Administrator shall notify the appropriate committees of Congress when the agency has implemented the information technology security recommendations from the National Academy of Public Administration on foreign national access management, based on reports from January 2014 and March 2016.

SEC. 815. CYBERSECURITY OF WEB APPLICATIONS.

Not later than 180 days after the date of enactment of this Act, the Administrator shall, in a manner that reflects the unique nature of NASA's mission and expertise—

(1) develop a plan, including such actions and milestones as are necessary, to fully remediate security vulnerabilities of NASA web applications within a timely fashion after discovery; and

(2) provide an update on its plan to implement the recommendation from the NASA Inspector General in the audit report dated July 10, 2014, (IG–14–023) to remove from the Internet or otherwise secure all NASA web applications in development or testing mode.

Subtitle B—Collaboration Among Mission Directorates and Other Matters

SEC. 821. COLLABORATION AMONG MISSION DIRECTORATES.

The Administrator shall encourage an interdisciplinary approach among all NASA mission directorates and divisions, whenever appropriate, for projects or missions—

(1) to improve coordination, and encourage collaboration and early planning on scope;

(2) to determine areas of overlap or alignment;

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

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

SEC. 822. NASA LAUNCH CAPABILITIES COLLABORATION.

(a) FINDINGS.—Congress makes the following findings:

(1) The Launch Services Program is responsible for the acquisition, management, and technical oversight of commercial launch services for NASA's science and robotic missions.

(2) The Commercial Crew Program is responsible for the acquisition, management, and technical oversight of commercial crew transportation systems.

(3) The Launch Services Program and Commercial Crew Program have worked together to gain exceptional technical insight into the contracted launch service providers that are common to both programs.

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

(5) Co-location of the Launch Services Program and Commercial Crew Program has enabled the Commercial Crew Program to efficiently obtain the launch vehicle technical expertise of and provide engineering and analytical support to the Commercial Crew Program.

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

(1) the Launch Services Program and Commercial Crew Program each benefit from communication

and coordination of launch manifests, technical information, and common launch vehicle insight between the programs; and

(2) such communication and coordination is enabled by the co-location of the programs.

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

SEC. 823. DETECTION AND AVOIDANCE OF COUNTERFEIT PARTS.

(a) FINDINGS.—Congress makes the following findings:

(1) A 2012 investigation by the Committee on Armed Services of the Senate of counterfeit electronic parts in the Department of Defense supply chain from 2009 through 2010 uncovered 1,800 cases and over 1,000,000 counterfeit parts and exposed the threat such counterfeit parts pose to service members and national security.

(2) Since 2010, the Comptroller General of the United States has identified in 3 separate reports the risks and challenges associated with counterfeit

parts and counterfeit prevention at both the Department of Defense and NASA, including inconsistent definitions of counterfeit parts, poorly targeted quality control practices, and potential barriers to improvements to these practices.

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

(c) REGULATIONS.—

(1) IN GENERAL.—Not later than 270 days after the date of enactment of this Act, the Administrator shall revise the NASA Supplement to the Federal Acquisition Regulation to improve the detection and avoidance of counterfeit electronic parts in the supply chain.

(2) CONTRACTOR RESPONSIBILITIES.—In revising the regulations under paragraph (1), the Administrator shall—

(A) require each covered contractor—

(i) to detect and avoid the use or inclusion of any counterfeit parts in electronic parts or products that contain electronic parts;

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

(iii) including a subcontractor, to notify the applicable NASA contracting officer not later than 30 calendar days after the date the covered contractor becomes aware, or has reason to suspect, that any end item, component, part or material contained in supplies purchased by NASA, or purchased by a covered contractor or subcontractor for delivery to, or on behalf of, NASA, contains a counterfeit electronic part or suspect counterfeit electronic part; and

(B) prohibit the cost of counterfeit electronic parts, suspect counterfeit electronic parts, and any corrective action described under subparagraph (A)(ii) from being included as allowable costs under agency contracts, unless—

(i)(I) the covered contractor has an operational system to detect and avoid counterfeit electronic parts and suspect counterfeit electronic parts that has been

reviewed and approved by NASA or the Department of Defense; and

(II) the covered contractor has provided the notice under subparagraph (A)(iii); or

(ii) the counterfeit electronic parts or suspect counterfeit electronic parts were provided to the covered contractor as Government property in accordance with part 45 of the Federal Acquisition Regulation.

(3) SUPPLIERS OF ELECTRONIC PARTS.—In revising the regulations under paragraph (1), the Administrator shall—

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

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

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

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

(ii) to obtain electronic parts that are not in production or currently available in stock from suppliers that meet qualification requirements established under subparagraph (C);

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

(i) notification of the agency; and

(ii) inspection, testing, and authentication of electronic parts that NASA or a covered contractor, including a subcontractor, obtains from any source other than a source described in subparagraph (A);

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

(D) authorize a covered contractor, including a subcontractor, to identify and use addi-

tional suppliers beyond those identified under subparagraph (C) if—

(i) the standards and processes for identifying such suppliers comply with established industry standards;

(ii) the covered contractor assumes responsibility for the authenticity of parts provided by such suppliers under paragraph (2); and

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

(d) DEFINITIONS.—In this section:

(1) COVERED CONTRACTOR.—The term ''covered contractor'' means a contractor that supplies an electronic part, or a product that contains an electronic part, to NASA.

(2) ELECTRONIC PART.—The term ''electronic part'' means a discrete electronic component, including a microcircuit, transistor, capacitor, resistor, or diode, that is intended for use in a safety or mission critical application.

SEC. 824. EDUCATION AND OUTREACH.

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

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

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

(3) the Administration's Education and Communication Offices, Mission Directorates, and Centers have been effective in delivering educational content because of the strong engagement of Administration scientists and engineers in the Administration's education and outreach activities;

(4) the Administration's education and outreach programs, including the Experimental Program to Stimulate Competitive Research (EPSCoR) and the Space Grant College and Fellowship Program, reflect the Administration's successful commitment to growing and diversifying the national science and engineering workforce; and

(5) in order to grow and diversify the Nation's engineering workforce, it is vital for the Administration to bolster programs, such as High Schools United with NASA to Create Hardware (HUNCH) program, that conduct outreach activities to under-

served rural communities, vocational schools, and tribal colleges and universities and encourage new participation in the STEM workforce.

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

(1) IN GENERAL.—The Administrator shall continue engagement with the public and education opportunities for students via all the Administration's mission directorates to the maximum extent practicable.

(2) REPORT.—Not later than 60 days after the date of enactment of this Act, the Administrator shall submit to the appropriate committees of Congress a report on the Administration's near-term outreach plans for advancing space law education.

SEC. 825. LEVERAGING COMMERCIAL SATELLITE SERVICING CAPABILITIES ACROSS MISSION DIRECTORATES.

(a) FINDINGS.—Congress makes the following findings:

(1) Refueling and relocating aging satellites to extend their operational lifetimes is a capacity that NASA will substantially benefit from and is important for lowering the costs of ongoing scientific, national security, and commercial satellite operations.

(2) The technologies involved in satellite servicing, such as dexterous robotic arms, propellant transfer systems, and solar electric propulsion, are all critical capabilities to support a human exploration mission to Mars.

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

(1) satellite servicing is a vital capability that will bolster the capacity and affordability of NASA's ongoing scientific and human exploration operations while simultaneously enhancing the ability of domestic companies to compete in the global marketplace; and

(2) future NASA satellites and spacecraft across mission directorates should be constructed in a manner that allows for servicing in order to maximize operational longevity and affordability.

(c) LEVERAGING OF CAPABILITIES.—The Administrator shall—

(1) identify orbital assets in both the Science Mission Directorate and the Human Exploration and Operations Mission Directorate that could benefit from satellite servicing-related technologies; and

(2) work across all NASA mission directorates to evaluate opportunities for the private sector to

perform such services or advance technical capabilities by leveraging the technologies and techniques developed by NASA programs and other industry programs.

SEC. 826. FLIGHT OPPORTUNITIES.

(a) DEVELOPMENT OF PAYLOADS.—

(1) IN GENERAL.—In order to conduct necessary research, the Administrator shall continue and, as the Administrator considers appropriate, expand the development of technology payloads for—

(A) scientific research; and

(B) investigating new or improved capabilities.

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

(A) flight testing;

(B) payload development; and

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

(b) REAFFIRMATION OF POLICY.—Congress reaffirms that the Administrator should provide flight opportunities for payloads to microgravity environments and suborbital altitudes as authorized by section 907 of the

National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18405).

SEC. 827. SENSE OF CONGRESS ON SMALL CLASS LAUNCH MISSIONS.

It is the sense of Congress that—

(1) Venture Class Launch Services contracts awarded under the Launch Services Program will expand opportunities for future dedicated launches of CubeSats and other small satellites and small orbital science missions; and

(2) principal investigator-led small orbital science missions, including CubeSat class, Small Explorer (SMEX) class, and Venture class, offer valuable opportunities to advance science at low cost, train the next generation of scientists and engineers, and enable participants to acquire skills in systems engineering and systems integration that are critical to maintaining the Nation's leadership in space and to enhancing United States innovation and competitiveness abroad.

SEC. 828. BASELINE AND COST CONTROLS.

Section 30104(a)(1) of title 51, United States Code, is amended by striking ''Procedural Requirements 7120.5c, dated March 22, 2005'' and inserting ''Procedural Requirements 7120.5E, dated August 14, 2012''.

SEC. 829. COMMERCIAL TECHNOLOGY TRANSFER PROGRAM.

Section 50116(a) of title 51, United States Code, is amended by inserting ", while protecting national security" after "research community".

SEC. 830. AVOIDING ORGANIZATIONAL CONFLICTS OF INTEREST IN MAJOR ADMINISTRATION ACQUISITION PROGRAMS.

(a) REVISED REGULATIONS REQUIRED.—Not later than 270 days after the date of enactment of this Act, the Administrator shall revise the Administration Supplement to the Federal Acquisition Regulation to provide uniform guidance and recommend revised requirements for organizational conflicts of interest by contractors in major acquisition programs in order to address the elements identified in subsection (b).

(b) ELEMENTS.—The revised regulations under subsection (a) shall, at a minimum—

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

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

(B) the ownership of business units performing systems engineering and technical as-

sistance functions, professional services, or management support services in relation to major acquisition programs by contractors who simultaneously own business units competing to perform as either the prime contractor or the supplier of a major subsystem or component for such programs;

(C) the award of major subsystem contracts by a prime contractor for a major acquisition program to business units or other affiliates of the same parent corporate entity, and particularly the award of subcontracts for software integration or the development of a proprietary software system architecture; or

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

(2) require the Administration to request advice on systems architecture and systems engineering matters with respect to major acquisition programs from objective sources independent of the prime contractor;

(3) require that a contract for the performance of systems engineering and technical assistance functions for a major acquisition program contains

a provision prohibiting the contractor or any affiliate of the contractor from participating as a prime contractor or a major subcontractor in the development of a system under the program; and

(4) establish such limited exceptions to the requirement in paragraphs (2) and (3) as the Administrator considers necessary to ensure that the Administration has continued access to advice on systems architecture and systems engineering matters from highly qualified contractors with domain experience and expertise, while ensuring that such advice comes from sources that are objective and unbiased.

SEC. 831. PROTECTION OF APOLLO LANDING SITES.

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

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

(1) a determination of what risks to the protection and preservation of those sites and artifacts exist or may exist in the future;

(2) a determination of what measures are required to ensure such protection and preservation;

(3) a determination of the extent to which additional domestic legislation or international treaties or agreements will be required; and

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

(c) REPORT.—Not later than 1 year after the date of enactment of this Act, the Director shall submit to the appropriate committees of Congress the results of the assessment.

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

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

SEC. 833. TERMINATION LIABILITY.

It is the sense of Congress that—

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

(2) the James Webb Space Telescope will revolutionize our understanding of star and planet formation and how galaxies evolved, and will advance the search for the origins of our universe;

(3) as a result of their unique capabilities and their critical contribution to the future of space exploration, these systems have been designated by Congress and the Administration as priority investments;

(4) contractors are currently holding program funding, estimated to be in the hundreds of millions of dollars, to cover the potential termination liability should the Government choose to terminate a program for convenience;

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

(6) according to the Government Accountability Office, the Administration procures most of its goods and services through contracts, and it terminates very few of them;

(7) in fiscal year 2010, the Administration terminated 28 of 16,343 active contracts and orders, a termination rate of about 0.17 percent; and

(8) the Administration should vigorously pursue a policy on termination liability that maximizes the utilization of its appropriated funds to make maximum progress in meeting established technical goals

and schedule milestones on these high-priority programs.

SEC. 834. INDEPENDENT REVIEWS.

Not later than 270 days after the date of enactment of this Act, the Administrator shall submit to the appropriate committees of Congress a report describing—

(1) the Administration's procedures for conducting independent reviews of projects and programs at lifecycle milestones;

(2) how the Administration ensures the independence of the individuals who conduct those reviews prior to their assignment;

(3) the internal and external entities independent of project and program management that conduct reviews of projects and programs at life cycle milestones; and

(4) how the Administration ensures the independence of such entities and their members.

SEC. 835. NASA ADVISORY COUNCIL.

(a) ASSESSMENT.—The Administrator shall enter into an arrangement with the National Academy of Public Administration to assess the effectiveness of the NASA Advisory Council and to make recommendations to Congress for any change to—

(1) the functions of the Council;

(2) the appointment of members to the Council;

(3) the qualifications for members of the Council;

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

(5) the frequency of meetings of the Council;

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

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

(b) CONSIDERATIONS.—In carrying out the assessment under subsection (a), the National Academy of Public Administration shall—

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

(2) consider the past activities of the Council and the activities of other analogous Federal advisory bodies; and

(3) any other issues that the National Academy of Public Administration determines could potentially impact the effectiveness of the Council.

(c) REPORT.—The National Academy of Public Administration shall submit to the appropriate committees

of Congress the results of the assessment, including any recommendations.

(d) CONSULTATION AND ADVICE.—

(1) IN GENERAL.—Section 20113(g) of title 51, United States Code, is amended by inserting ''and Congress'' after ''advice to the Administration''.

(2) SUNSET.—Effective September 30, 2017, section 20113(g) of title 51, United States Code, is amended by striking ''and Congress''.

SEC. 836. COST ESTIMATION.

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

(1) realistic cost estimating is critically important to the ultimate success of major space development projects; and

(2) the Administration has devoted significant efforts over the past 5 years to improving its cost estimating capabilities, but it is important that the Administration continue its efforts to develop and implement guidance in establishing realistic cost estimates.

(b) GUIDANCE AND CRITERIA.—The Administrator shall provide to its acquisition programs and projects, in a manner consistent with the Administration's Space Flight Program and Project Management Requirements—

(1) guidance on when to use an Independent Cost Estimate and Independent Cost Assessment; and

(2) criteria to use to make a determination under paragraph (1).

SEC. 837. FACILITIES AND INFRASTRUCTURE.

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

(1) the Administration must address, mitigate, and reverse, where possible, the deterioration of its facilities and infrastructure, as their condition is hampering the effectiveness and efficiency of research performed by both the Administration and industry participants making use of Administration facilities, thus harming the competitiveness of the United States aerospace industry;

(2) the Administration has a role in providing laboratory capabilities to industry participants that are not economically viable as commercial entities and thus are not available elsewhere;

(3) to ensure continued access to reliable and efficient world-class facilities by researchers, the Administration should establish strategic partnerships with other Federal agencies, State agencies, FAA-li-

censed spaceports, institutions of higher education, and industry, as appropriate; and

(4) decisions on whether to dispose of, maintain, or modernize existing facilities must be made in the context of meeting Administration and other needs, including those required to meet the activities supporting the human exploration roadmap under section 432 of this Act, considering other national laboratory needs as the Administrator deems appropriate.

(b) POLICY.—It is the policy of the United States that the Administration maintain reliable and efficient facilities and infrastructure and that decisions on whether to dispose of, maintain, or modernize existing facilities or infrastructure be made in the context of meeting future Administration needs.

(c) PLAN.—

(1) IN GENERAL.—The Administrator shall develop a facilities and infrastructure plan.

(2) GOAL.—The goal of the plan is to position the Administration to have the facilities and infrastructure, including laboratories, tools, and approaches, necessary to meet future Administration and other Federal agencies' laboratory needs.

(3) CONTENTS.—The plan shall identify—

(A) current Administration and other Federal agency laboratory needs;

(B) future Administration research and development and testing needs;

(C) a strategy for identifying facilities and infrastructure that are candidates for disposal, that is consistent with the national strategic direction set forth in—

(i) the National Space Policy;

(ii) the National Aeronautics Research, Development, Test, and Evaluation Infrastructure Plan;

(iii) the National Aeronautics and Space Administration Authorization Act of 2005 (Public Law 109–155; 119 Stat. 2895), National Aeronautics and Space Administration Authorization Act of 2008 (Public Law 110–422; 122 Stat. 4779), and National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18301 et seq.); and

(iv) the human exploration roadmap under section 432 of this Act;

(D) a strategy for the maintenance, repair, upgrading, and modernization of Administra-

tion facilities and infrastructure, including laboratories and equipment;

(E) criteria for—

(i) prioritizing deferred maintenance tasks;

(ii) maintaining, repairing, upgrading, or modernizing Administration facilities and infrastructure; and

(iii) implementing processes, plans, and policies for guiding the Administration's Centers on whether to maintain, repair, upgrade, or modernize a facility or infrastructure and for determining the type of instrument to be used;

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

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

(d) REQUIREMENT TO ESTABLISH POLICY.—

(1) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Administrator shall establish and make publicly available a

policy that guides the Administration's use of existing authorities to out-grant, lease, excess to the General Services Administration, sell, decommission, demolish, or otherwise transfer property, facilities, or infrastructure.

(2) CRITERIA.—The policy shall include criteria for the use of authorities, best practices, standardized procedures, and guidelines for how to appropriately manage property, facilities, and infrastructure.

(e) SUBMISSION TO CONGRESS.—Not later than 1 year after the date of enactment of this Act, the Administrator shall submit to the appropriate committees of Congress the plan developed under subsection (c).

SEC. 838. HUMAN SPACE FLIGHT ACCIDENT INVESTIGATIONS.

Section 70702 of title 51, United States Code, is amended—

(1) by amending subsection (a)(3) to read as follows:

''(3) any other orbital or suborbital space vehicle carrying humans that is—

''(A) owned by the Federal Government; or

''(B) being used pursuant to a contract or Space Act Agreement with the Federal Govern-

ment for carrying a government astronaut or a researcher funded by the Federal Government; or''; and

(2) by adding at the end the following:

''(c) DEFINITIONS.—In this section:

''(1) GOVERNMENT ASTRONAUT.—The term 'government astronaut' has the meaning given the term in section 50902.

''(2) SPACE ACT AGREEMENT.—The term 'Space Act Agreement' means an agreement entered into by the Administration pursuant to its other transactions authority under section 20113(e).''.

SEC. 839. ORBITAL DEBRIS.

(a) FINDINGS.—Congress finds that—

(1) orbital debris poses serious risks to the operational space capabilities of the United States;

(2) an international commitment and integrated strategic plan are needed to mitigate the growth of orbital debris wherever possible; and

(3) the delay in the Office of Science and Technology Policy's submission of a report on the status of international coordination and development of orbital debris mitigation strategies is inconsistent with such risks.

(b) REPORTS.—

(1) COORDINATION.—Not later than 90 days after the date of enactment of this Act, the Administrator shall submit to the appropriate committees of Congress a report on the status of efforts to coordinate with foreign countries within the Inter-Agency Space Debris Coordination Committee to mitigate the effects and growth of orbital debris under section 1202(b)(1) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18441(b)(1)).

(2) MITIGATION STRATEGY.—Not later than 90 days after the date of enactment of this Act, the Director of the Office of Science and Technology Policy shall submit to the appropriate committees of Congress a report on the status of the orbital debris mitigation strategy required under section 1202(b)(2) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18441(b)(2)).

SEC. 840. REVIEW OF ORBITAL DEBRIS REMOVAL CONCEPTS.

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

(1) orbital debris in low-Earth orbit poses significant risks to spacecraft;

(2) such orbital debris may increase due to collisions between existing debris objects; and

(3) understanding options to address and remove orbital debris is important for ensuring safe and effective spacecraft operations in low-Earth orbit.

(b) REVIEW.—

(1) IN GENERAL.—Not later than 270 days after the date of enactment of this Act, the Administrator—

(A) in collaboration with the heads of other relevant Federal agencies, shall solicit and review concepts and options for removing orbital debris from low-Earth orbit; and

(B) shall submit to the appropriate committees of Congress a report on the solicitation and review under subparagraph (A), including recommendations on the best options for decreasing the risks associated with orbital debris.

(2) REQUIREMENTS.—The solicitation and review under paragraph (1) shall address the requirements for and feasibility of developing and implementing each of the options.

SEC. 841. SPACE ACT AGREEMENTS.

(a) SENSE OF CONGRESS.—It is the sense of Congress that, when used appropriately, Space Act Agreements can provide significant value in furtherance of NASA's mission.

(b) FUNDED SPACE ACT AGREEMENTS.—To the extent appropriate, the Administrator shall seek to maximize the value of contributions provided by other parties under a funded Space Act Agreement in order to advance NASA's mission.

(c) NON-EXCLUSIVITY.—

(1) IN GENERAL.—The Administrator shall, to the greatest extent practicable, issue each Space Act Agreement—

(A) except as provided in paragraph (2), on a nonexclusive basis;

(B) in a manner that ensures all non-government parties have equal access to NASA resources; and

(C) exercising reasonable care not to reveal unique or proprietary information.

(2) EXCLUSIVITY.—If the Administrator determines an exclusive arrangement is necessary, the Administrator shall, to the greatest extent practicable, issue the Space Act Agreement—

(A) utilizing a competitive selection process when exclusive arrangements are necessary; and

(B) pursuant to public announcements when exclusive arrangements are necessary.

(d) TRANSPARENCY.—The Administrator shall publicly disclose on the Administration's website and make available in a searchable format each Space Act Agreement, including an estimate of committed NASA resources and the expected benefits to agency objectives for each agreement, with appropriate redactions for proprietary, sensitive, or classified information, not later than 60 days after such agreement is signed by the parties.

(e) ANNUAL REPORTS.—

(1) REQUIREMENT.—Not later than 90 days after the end of each fiscal year, the Administrator shall submit to the appropriate committees of Congress a report on the use of Space Act Agreement authority by the Administration during the previous fiscal year.

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

(A) an indication of whether the agreement is a reimbursable, non-reimbursable, or funded Space Act Agreement;

(B) a description of—

(i) the subject and terms;

(ii) the parties;

(iii) the responsible—

(I) Mission Directorate;

(II) Center; or

(III) headquarters element;

(iv) the value;

(v) the extent of the cost sharing among Federal Government and non-Federal sources;

(vi) the time period or schedule; and

(vii) all milestones; and

(C) an indication of whether the agreement was renewed during the previous fiscal year.

(3) ANTICIPATED AGREEMENTS.—The report shall include a list of all anticipated reimbursable, non-reimbursable, and funded Space Act Agreements for the upcoming fiscal year.

(4) CUMULATIVE PROGRAM BENEFITS.—The report shall include, with respect to each Space Act Agreement covered by the report, a summary of—

(A) the technology areas in which research projects were conducted under that agreement;

(B) the extent to which the use of that agreement—

(i) has contributed to a broadening of the technology and industrial base available for meeting Administration needs; and

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

(C) the total amount of value received by the Federal Government during the fiscal year under that agreement.

Passed the Senate February 17 (legislative day, February 16), 2017.

Attest:

Secretary.

115TH CONGRESS
1ST SESSION

S. 442

AN ACT

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