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113TH CONGRESS
2d Session

HOUSE OF REPRESENTATIVES

REPORT
113–470

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 2014

R E P O R T

OF THE

COMMITTEE ON SCIENCE AND TECHNOLOGY

HOUSE OF REPRESENTATIVES

ON

H.R. 4412

[Including cost estimate of the Congressional Budget Office]

JUNE 5, 2014.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

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Mr. SMITH of Texas, from the Committee on Science, Space, and Technology, submitted the following

R E P O R T

[To accompany H.R. 4412]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, Space, and Technology, to whom was referred the bill (H.R. 4412) to authorize the programs of the National Aeronautics and Space Administration, and for other purposes, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

CONTENTS

39–006

I. AMENDMENT

The amendment is as follows:
Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the "National Aeronautics and Space Administration Authorization Act of 2014".

(b) TABLE OF CONTENTS.—The table of contents for 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 Administration.

(3) ORION CREW CAPSULE.—The term "Orion crew capsule" means the multipurpose crew vehicle described in section 303 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18323).

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

(5) SPACE LAUNCH SYSTEM.—The term "Space Launch System" means the follow-on Government-owned civil launch system developed, managed, and operated by the Administration to serve as a key component to expand human presence beyond low-Earth orbit, as described in section 302 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322).

TITLE I—AUTHORIZATION OF APPROPRIATIONS

SEC. 101. FISCAL YEAR 2014.

There are authorized to be appropriated to the Administration for fiscal year 2014 $17,646,500,000 as follows:

(1) For Space Exploration, $4,113,200,000, of which—

(A) $1,918,200,000 shall be for the Space Launch System, of which $318,200,000 shall be for Exploration Ground Systems;

(B) $1,197,000,000 shall be for the Orion crew capsule;

(C) $302,000,000 shall be for Exploration Research and Development; and

(D) $696,000,000 shall be for Commercial Crew Development activities.

(2) For Space Operations, $3,778,000,000, of which $2,984,100,000 shall be for the International Space Station Program.

(3) For Science, $5,151,200,000, of which—

(A) $1,826,000,000 shall be for Earth Science;

(B) $1,345,000,000 shall be for Planetary Science, of which $30,000,000 shall be for the Astrobiology Institute;

(C) $668,000,000 shall be for Astrophysics;

(D) $658,200,000 shall be for the James Webb Space Telescope; and

(E) $654,000,000 shall be for Heliophysics.

(4) For Aeronautics, $566,000,000.

(5) For Space Technology, $576,000,000.
(6) For Education, $116,600,000.
(7) For Cross-Agency Support, $2,793,000,000.
(8) For Construction and Environmental Compliance and Restoration, $515,000,000.
(9) For Inspector General, $37,500,000.

TITLE II—HUMAN SPACE FLIGHT

Subtitle A—Exploration

SEC. 201. SPACE EXPLORATION POLICY.

(a) POLICY.—Human exploration deeper into the solar system shall be a core mission of the Administration. It is the policy of the United States that the goal of the Administration's exploration program shall be to successfully conduct a crewed mission to the surface of Mars to begin human exploration of that planet. The use of the surface of the Moon, cis-lunar space, near-Earth asteroids, Lagrangian points, and Martian moons may be pursued provided they are properly incorporated into the Human Exploration Roadmap described in section 70504 of title 51, United States Code.

(b) VISION FOR SPACE EXPLORATION.—Section 20302 of title 51, United States Code, is amended by adding at the end the following:

"(c) DEFINITIONS.—In this section:

"(1) ORION CREW CAPSULE.—The term 'Orion crew capsule' means the multipurpose crew vehicle described in 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 the follow-on Government-owned civil launch system developed, managed, and operated by the Administration to serve as a key component to expand human presence beyond low-Earth orbit, as described in section 302 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322).".

(c) 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" after the 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 accelerate the development of capabilities to enable a human exploration mission to the surface of Mars and beyond through the prioritization of those technologies and capabilities best suited for such a mission in accordance with the Human Exploration Roadmap under section 70504 of title 51, United States Code.".

(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 CAPABILITIES.—

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

"(2) DEFINITION.—For purposes of this subsection, the term 'domestic commercial provider' means a person providing space transportation services or other space-related activities, the majority control of which is held by persons other than a Federal, State, local, or foreign government, foreign company, or foreign national.".

(e) REPEAL OF 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.

SEC. 202. STEPPING STONE APPROACH TO EXPLORATION.

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

"§ 70504. Stepping stone approach to exploration

"(a) IN GENERAL.—In order to maximize the cost effectiveness of the long-term space exploration and utilization activities of the United States, the Administrator shall direct the Human Exploration and Operations Mission Directorate, or its successor division, to develop a Human Exploration Roadmap to define the specific capabilities and technologies necessary to extend human presence to the surface of Mars and the sets and sequences of missions required to demonstrate such capabilities and technologies.

"(b) INTERNATIONAL PARTICIPATION.—The President should invite the United States partners in the International Space Station program and other nations, as appropriate, to participate in an international initiative under the leadership of the United States to achieve the goal of successfully conducting a crewed mission to the surface of Mars.

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

"(1) include the specific set of capabilities and technologies that contribute to extending human presence to the surface of Mars and the sets and sequences of missions necessary to demonstrate the proficiency of these capabilities and technologies with an emphasis on using or not using the International Space Station, lunar landings, cis-lunar space, trans-lunar space, Lagrangian points, and the natural satellites of Mars, Phobos and Deimos, as testbeds, as necessary, and shall include the most appropriate process for developing such capabilities and technologies;

"(2) 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 International Space Station activities, and planned international collaborative activities, potential commercial contributions, and other activities relevant to the achievement of the goal established in section 201(a) of the National Aeronautics and Space Administration Authorization Act of 2014;

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

"(4) provide a specific process for the evolution of the capabilities of the fully integrated Orion crew capsule with the Space Launch System and how these systems demonstrate the capabilities and technologies described in paragraph (1);

"(5) provide a description of the capabilities and technologies that need to be demonstrated or research data that could be gained through the utilization of the International Space Station and the status of the development of such capabilities and technologies;

"(6) describe a framework for international cooperation in the development of all technologies and capabilities required in this section, as well as an assessment of the risks posed by relying on international partners for capabilities and technologies on the critical path of development;

"(7) describe a process for utilizing nongovernmental entities for future human exploration beyond trans-lunar space and specify what, if any, synergy could be gained from—

"(A) partnerships using Space Act Agreements (as defined in section 2 of the National Aeronautics and Space Administration Authorization Act of 2014); or

"(B) other acquisition instruments;

"(8) include in the Human Exploration Roadmap an addendum from the National Aeronautics and Space Administration Advisory Council, and an addendum from the Aerospace Safety Advisory Panel, each with a statement of review of the Human Exploration Roadmap that shall include—

"(A) subjects of agreement;

"(B) areas of concern; and

"(C) recommendations; and

"(9) include in the Human Exploration Roadmap an examination of the benefits of utilizing current Administration launch facilities for trans-lunar missions.

"(d) UPDATES.—The Administrator shall update such Human Exploration Roadmap as needed but no less frequently than every 2 years and include it in the budg-

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

"(1) the achievements and goals reached in the process of developing such capabilities and technologies during the 2-year period prior to the submission of the update to Congress; and

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

"(e) DEFINITIONS.—In this section, the terms 'Orion crew capsule' and 'Space Launch System' have the meanings given such terms in section 20302.".

(b) REPORT.—

(1) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit a copy of the Human Exploration Roadmap developed under section 70504 of title 51, United States Code, to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(2) UPDATES.—The Administrator shall transmit a copy of each updated Human Exploration Roadmap to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 7 days after such Human Exploration Roadmap is updated.

SEC. 203. SPACE LAUNCH SYSTEM.

(a) FINDINGS.—Congress finds that—

(1) the Space Launch System is the most practical approach to reaching the Moon, Mars, and beyond, and Congress reaffirms the policy and minimum capability requirements for the Space Launch System contained in section 302 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322);

(2) the primary goal for the design of the fully integrated Space Launch System, including an upper stage needed to go beyond low-Earth orbit, is to safely carry a total payload to 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)); and

(3) In order to promote safety and reduce programmatic risk, the Administrator shall budget for and undertake a robust ground test and uncrewed and crewed flight test and demonstration program for the Space Launch System and the Orion crew capsule and shall budget for an operational flight rate sufficient to maintain safety and operational readiness.

(b) SENSE OF CONGRESS.—It is the sense of Congress that the President's annual budget requests for the Space Launch System and Orion crew capsule development, test, and operational phases should strive to accurately reflect the resource requirements of each of those phases, consistent with the policy established in section 201(a) of this Act.

(c) IN GENERAL.—Given the critical importance of a heavy-lift launch vehicle and crewed spacecraft to enable the achievement of the goal established in section 201(a) of this Act, as well as the accomplishment of intermediate exploration milestones and the provision of a backup capability to transfer crew and cargo to the International Space Station, the Administrator shall make the expeditious development, test, and achievement of operational readiness of the Space Launch System and the Orion crew capsule the highest priority of the exploration program.

(d) GOVERNMENT ACCOUNTABILITY OFFICE REVIEW.—Not later than 270 days after the date of enactment of this Act, the Comptroller General shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the Administration's acquisition of ground systems in support of the Space Launch System. The report shall assess the extent to which ground systems acquired in support of the Space Launch System are focused on the direct support of the Space Launch System and shall identify any ground support projects or activities that the Administration is undertaking that do not solely or primarily support the Space Launch System.

(e) UTILIZATION REPORT.—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)). This report shall also include consideration of the technical requirements of the scientific and national security communities related to such Space Launch System and shall directly assess the utility and estimated cost savings obtained by using such Space Launch System for national security and space science missions.

The Administrator shall transmit such report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 180 days after the date of enactment of this Act.

(f) NAMING COMPETITION.—Beginning not later than 180 days after the date of enactment of this Act and concluding not later than 1 year after such date of enactment, the Administrator shall conduct a well-publicized competition among students in elementary and secondary schools to name the elements of the Administration's exploration program, including—

(1) a name for the deep space human exploration program as a whole, which includes the Space Launch System, the Orion crew capsule, and future missions; and

(2) a name for the Space Launch System.

(g) ADVANCED BOOSTER COMPETITION.—

(1) REPORT.—Not later than 90 days after the date of enactment of this Act, the Associate Administrator of the Administration shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report that—

(A) describes the estimated total development cost of an advanced booster for the Space Launch System;

(B) details any reductions or increases to the development cost of the Space Launch System which may result from conducting a competition for an advanced booster; and

(C) outlines any potential schedule delay to the Space Launch System 2017 Exploration Mission–1 launch as a result of increased costs associated with conducting a competition for an advanced booster.

(2) COMPETITION.—If the Associate Administrator reports reductions pursuant to paragraph (1)(B), and no adverse schedule impact pursuant to paragraph (1)(C), then the Administration shall conduct a full and open competition for an advanced booster for the Space Launch System to meet the requirements described in section 302(c) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322(c)), to begin as soon as practicable after the development of the upper stage has been initiated.

SEC. 204. ORION CREW CAPSULE.

(a) IN GENERAL.—The Orion crew capsule shall meet the practical needs and the minimum capability requirements described in section 303 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18323).

(b) REPORT.—Not later than 60 days after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate—

(1) detailing those components and systems of the Orion crew capsule that ensure it is in compliance with section 303(b) of such Act (42 U.S.C. 18323(b));

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

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

SEC. 205. SPACE RADIATION.

(a) STRATEGY AND PLAN.—

(1) IN GENERAL.—The Administrator shall develop a space radiation mitigation and management strategy and implementation plan to enable the achievement of the goal established in section 201 that includes key research and monitoring requirements, milestones, a timetable, and an estimate of facility and budgetary requirements.

(2) COORDINATION.—The strategy shall include a mechanism for coordinating Administration research, technology, facilities, engineering, operations, and other functions required to support the strategy and plan.

(3) TRANSMITTAL.—Not later than 1 year after the date of enactment of this Act, the Administrator shall transmit the strategy and plan to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(b) SPACE RADIATION RESEARCH FACILITIES.—The Administrator, in consultation with the heads of other appropriate Federal agencies, shall assess the national capabilities for carrying out critical ground-based research on space radiation biology and shall identify any issues that could affect the ability to carry out that research.

SEC. 206. PLANETARY PROTECTION FOR HUMAN EXPLORATION MISSIONS.

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

(b) SCOPE.—The study shall—

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

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

(3) develop a methodology, if possible, for defining and classifying the degree of concern associated with each likely destination;

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

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

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

Subtitle B—Space Operations

SEC. 211. INTERNATIONAL SPACE STATION.

(a) FINDINGS.—Congress finds the following:

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

(2) The use of the private market to provide cargo and crew transportation services is currently the most expeditious process to restore domestic access to the International Space Station and low-Earth orbit.

(3) Government access to low-Earth orbit is paramount to the continued success of the International Space Station and National Laboratory.

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

(1) The United States International Space Station program shall have two primary objectives: supporting achievement of the goal established in section 201 of this Act and pursuing a research program that advances knowledge and provides benefits to the Nation. It shall continue to be the policy of the United States to, in consultation with its international partners in the International Space Station program, support full and complete utilization of the International Space Station.

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

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

(A) take all necessary measures to support the operation and full utilization of the International Space Station; and

(B) seek to minimize, to the extent practicable, the operating costs of the International Space Station.

(4) Reliance on foreign carriers for crew transfer is unacceptable, and the Nation's human space flight program must acquire the capability to launch United States astronauts on United States rockets from United States soil as soon as is safe and practically possible, whether on Government-owned and operated space transportation systems or privately owned systems that have been certified for flight by the appropriate Federal agencies.

(c) REAFFIRMATION OF POLICY.—Congress reaffirms—

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

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

(3) that the Orion crew capsule shall provide an alternative means of delivery of crew and cargo to the International Space Station, in the event other vehicles, whether commercial vehicles or partner-supplied vehicles, are unable to perform that function; and

(4) the policy stated in section 501(b) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18351(b)) that the Administration shall pursue international, commercial, and intragovernmental means to maximize International Space Station logistics supply, maintenance, and operational capabilities, reduce risks to International Space Station systems sustainability, and offset and minimize United States operations costs relating to the International Space Station.

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

"(a) POLICY STATEMENT.—It is the policy of the United States to maintain an uninterrupted capability for human space flight and operations in low-Earth orbit, and beyond, as an essential instrument of national security and the capability to ensure continued United States participation and leadership in the exploration and utilization of space.".

(e) REPEALS.—

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

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

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

(f) EXTENSION CRITERIA REPORT.—Not later than 1 year after the date of enactment of this Act, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the feasibility of extending the operation of the International Space Station that includes—

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

(2) any necessary contributions to enabling execution of the Human Exploration Roadmap developed under section 70504 of title 51, United States Code;

(3) cost estimates for operating the International Space Station to achieve the criteria required under paragraph (1);

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

(5) an assessment of how the defined criteria under paragraph (1) respond to the National Academies Decadal Survey on Biological and Physical Sciences in Space; and

(6) an identification of the actions and cost estimate needed to deorbit the International Space Station once a decision is made to deorbit the laboratory.

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

(1) IN GENERAL.—The Director of the Office of Science and Technology Policy, in consultation with the Administrator, academia, other Federal agencies, the International Space Station National Laboratory Advisory Committee, and other potential stakeholders, shall develop and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a strategic plan for conducting competitive, peer-reviewed research in physical and life sciences and related technologies on the International Space Station through at least 2020.

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

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

(B) provide a research timeline and identify resource requirements for its implementation, including the facilities and instrumentation necessary for the conduct of such research; and

(C) identify—

(i) criteria for the proposed research, including—

(I) a justification for the research to be carried out in the space microgravity environment;

(II) the use of model systems;

(III) the testing of flight hardware to understand and ensure its functioning in the microgravity environment;

(IV) the use of controls to help distinguish among the direct and indirect effects of microgravity, among other effects of the flight or space environment;

(V) approaches for facilitating data collection, analysis, and interpretation;

(VI) procedures to ensure repetition of experiments, as needed;

(VII) support for timely presentation of the peer-reviewed results of the research;

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

(IX) how these activities enable the Human Exploration Roadmap described in section 70504 of title 51, United States Code;

(ii) instrumentation required to support the measurements and analysis of the research to be carried out under the strategic plan;

(iii) the capabilities needed to support direct, real-time communications between astronauts working on research experiments onboard the International Space Station and the principal investigator on the ground;

(iv) a process for involving the external user community in research planning, including planning for relevant flight hardware and instrumentation, and for utilization of the International Space Station, free flyers, or other research platforms;

(v) the acquisition strategies the Administration plans to use to acquire any new capabilities which are not operational on the International Space Station as of the date of enactment of this Act and which have an estimated total life cycle cost of $10,000,000 or more, along with a justification of any anticipated use of less than full and open competition and written approval therefor from the Administration's Assistant Administrator for Procurement; and

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

(3) REPORT.—

(A) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Comptroller General of the United States shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the progress of the organization chosen for the management of the International Space Station National Laboratory as directed in section 504 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18354).

(B) SPECIFIC REQUIREMENTS.—The report shall assess the management, organization, and performance of such organization and shall include a review of the status of each of the 7 required activities listed in section 504(c) of such Act (42 U.S.C. 18354(c)).

SEC. 212. BARRIERS IMPEDING ENHANCED UTILIZATION OF THE ISS'S NATIONAL LABORATORY BY COMMERCIAL COMPANIES.

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

(1) enhanced utilization of the International Space Station's National Laboratory requires a full understanding of the barriers impeding such utilization and actions needed to be taken to remove or mitigate them to the maximum extent practicable; and

(2) doing so will allow the Administration to encourage commercial companies to invest in microgravity research using National Laboratory research facilities.

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

(1) identify barriers impeding enhanced utilization of the International Space Station's National Laboratory;

(2) recommend ways to encourage commercial companies to make greater use of the International Space Station's National Laboratory, including corporate investment in microgravity research; and

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

(c) TRANSMITTAL.—Not later than one year after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate the results of the assessment described in subsection (b).

SEC. 213. UTILIZATION OF INTERNATIONAL SPACE STATION FOR SCIENCE MISSIONS.

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

SEC. 214. INTERNATIONAL SPACE STATION CARGO RESUPPLY SERVICES LESSONS LEARNED.

Not later than 120 days after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate that—

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

(2) indicates whether changes are needed to the manner in which the Administration procures and manages similar services upon the expiration of the existing Commercial Resupply Services contract; and

(3) identifies any lessons learned from the Commercial Resupply Services contract that should be applied to the procurement and management of commercially provided crew transfer services to and from the International Space Station.

SEC. 215. COMMERCIAL CREW PROGRAM.

(a) SENSE OF CONGRESS.—It is the sense of Congress that once developed and certified to meet the Administration's safety and reliability requirements, United States commercially provided crew transportation systems offer the potential of serving as the primary means of transporting American astronauts and international partner astronauts to and from the International Space Station and serving as International Space Station emergency crew rescue vehicles. At the same time, the budgetary assumptions used by the Administration in its planning for the Commercial Crew Program have consistently assumed significantly higher funding levels than have been authorized and appropriated by Congress. It is the sense of Congress that credibility in the Administration's budgetary estimates for the Commercial Crew Program can be enhanced by an independently developed cost estimate. Such credibility in budgetary estimates is an important factor in understanding program risk.

(b) OBJECTIVE.—The objective of the Administration's Commercial Crew Program shall be to assist the development of at least one crew transportation system to carry Administration astronauts safely, reliably, and affordably to and from the International Space Station and to serve as an emergency crew rescue vehicle as soon as practicable within the funding levels authorized. The Administration shall not use any considerations beyond this objective in the overall acquisition strategy.

(c) SAFETY.—Consistent with the findings and recommendations of the Columbia Accident Investigation Board, the Administration shall—

(1) ensure that, in its evaluation and selection of contracts for the development of commercial crew transportation capabilities, safety is the highest priority; and

(2) seek to ensure that minimization of the probability of loss of crew shall be an important selection criterion of the Commercial Crew Transportation Capability Contract.

(d) 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.

(e) TRANSPARENCY.—Transparency is the cornerstone of ensuring a safe and reliable commercial crew transportation service to the International Space Station. The Administrator shall, to the greatest extent practicable, ensure that every commercial crew transportation services provider has provided evidence-based support for their costs and schedule.

(f) INDEPENDENT COST AND SCHEDULE ESTIMATE.—

(1) REQUIREMENT.—Not later than 30 days after the Federal Acquisition Regulation-based contract for the Commercial Crew Transportation Capability Contract is awarded, the Administrator shall arrange for the initiation of an Independent Cost and Schedule Estimate for—

(A) all activities associated with the development, test, demonstration, and certification of commercial crew transportation systems;

(B) transportation and rescue services required by the Administration for International Space Station operations through calendar year 2020 or later if Administration requirements so dictate; and

(C) the estimated date of operational readiness for the program each assumption listed in paragraph (2) of this subsection.

(2) ASSUMPTIONS.—The Independent Cost and Schedule Estimate shall provide an estimate for each of the following scenarios:

(A) An appropriation of $600,000,000 over the next 3 fiscal years.
(B) An appropriation of $700,000,000 over the next 3 fiscal years.
(C) An appropriation of $800,000,000 over the next 3 fiscal years.
(D) The funding level assumptions over the next 3 fiscal years that are included as part of commercial crew transportation capability contract awards.

(3) TRANSMITTAL.—Not later than 180 days after initiation of the Independent Cost and Schedule Estimate under paragraph (1), the Administrator shall transmit the results of the Independent Cost and Schedule Estimate to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(g) IMPLEMENTATION STRATEGIES.—

(1) REPORT.—Not later than 60 days after the completion of the Independent Cost and Schedule Estimate under subsection (f), the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report containing 4 distinct implementation strategies based on such Independent Cost and Schedule Estimate for the final stages of the commercial crew program.

(2) REQUIREMENTS.—These options shall include—

(A) a strategy that assumes an appropriation of $600,000,000 over the next 3 fiscal years;
(B) a strategy that assumes an appropriation of $700,000,000 over the next 3 fiscal years;
(C) a strategy that assumes an appropriation of $800,000,000 over the next 3 fiscal years; and
(D) a strategy that has yet to be considered previously in any budget submission but that the Administration believes could ensure the flight readiness date of 2017 for at least one provider.

(3) INCLUSIONS.—Each strategy shall include the contracting instruments the Administration will employ to acquire the services in each phase of development or acquisition and the number of commercial providers the Administration will include in the program.

SEC. 216. SPACE COMMUNICATIONS.

(a) PLAN.—The Administrator shall develop a plan, in consultation with relevant Federal agencies, for updating the Administration's space communications and navigation architecture for low-Earth orbital and deep space operations so that it is capable of meeting the Administration's communications needs over the next 20 years. The plan shall include lifecycle cost estimates, milestones, estimated performance capabilities, and 5-year funding profiles. The plan shall also include an estimate of the amounts of any reimbursements the Administration is likely to receive from other Federal agencies during the expected life of the upgrades described in the plan. At a minimum, the plan shall include a description of the following:

(1) Steps to sustain the existing space communications and navigation network and infrastructure and priorities for how resources will be applied and cost estimates for the maintenance of existing space communications network capabilities.

(2) Upgrades needed to support space communications and navigation network and infrastructure requirements, including cost estimates and schedules and an assessment of the impact on missions if resources are not secured at the level needed.

(3) Projected space communications and navigation network requirements for the next 20 years, including those in support of human space exploration missions.

(4) Projected Tracking and Data Relay Satellite System requirements for the next 20 years, including those in support of other relevant Federal agencies, and cost and schedule estimates to maintain and upgrade the Tracking and Data Relay Satellite System to meet projected requirements.

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

(6) Steps the Administration is taking to mitigate threats to electromagnetic spectrum use.

(b) SCHEDULE.—The Administrator shall transmit the plan developed under this section to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 1 year after the date of enactment of this Act.

TITLE III—SCIENCE

Subtitle A—General

SEC. 301. SCIENCE PORTFOLIO.

(a) BALANCED AND ADEQUATELY FUNDED ACTIVITIES.—Section 803 of the National Aeronautics and Space Administration Authorization Act of 2010 (124 Stat. 2832) is amended to read as follows:

"SEC. 803. OVERALL SCIENCE PORTFOLIO—SENSE OF THE CONGRESS.

"Congress reaffirms its sense, expressed in the National Aeronautics and Space Administration Authorization Act of 2010, that a balanced and adequately funded set of activities, consisting of research and analysis grants programs, technology development, small, medium, and large space missions, and suborbital research activities, contributes to a robust and productive science program and serves as a catalyst for innovation and discovery.".

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

SEC. 302. RADIOISOTOPE POWER SYSTEMS.

(a) SENSE OF CONGRESS.—It is the sense of Congress that conducting deep space exploration requires radioisotope power systems, and establishing continuity in the production of the material needed to power these systems is paramount to the success of these future deep space missions. It is further the sense of Congress that 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 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) TRANSMITTAL.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit the results of the analysis to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 303. CONGRESSIONAL DECLARATION OF POLICY AND PURPOSE.

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

"(10) The direction of the unique competence of the Administration to the search for life's origin, evolution, distribution, and future in the Universe. In carrying out this objective, the Administration may use any practicable ground-based, airborne, or space-based technical means and spectra of electromagnetic radiation.".

SEC. 304. UNIVERSITY CLASS SCIENCE MISSIONS.

(a) SENSE OF CONGRESS.—It is the sense of Congress that principal investigator-led small orbital science missions, including CubeSat class, University Explorer (UNEX) 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 in the program to acquire skills in systems engineering and systems integration that are critical to maintaining the Nation's leadership in space and to enhancing the United States innovation and competitiveness abroad.

(b) REVIEW OF PRINCIPAL INVESTIGATOR-LED SMALL ORBITAL SCIENCE MISSIONS.—The Administrator shall conduct a review of the science missions described in subsection (a). The review shall include—

(1) the status, capability, and availability of existing small orbital science mission programs and the extent to which each program enables the participation of university scientists and students;

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

(3) the opportunities such mission programs provide for training and education, including scientific and engineering workforce development, including for the Administration's scientific and engineering workforce; and

(4) the extent to which commercial applications such as hosted payloads, free flyers, and data buys could provide measurable benefits for such mission programs, while preserving the principle of independent peer review as the basis for mission selection.

(c) REPORT.—Not later than 270 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the review required under subsection (b) and on recommendations to enhance principal investigator-led small orbital science missions conducted by the Administration in accordance with the results of the review required by subsection (b).

SEC. 305. 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) ASSESSMENT.—The Administrator shall carry out biennial 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. The assessment shall take into consideration 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 consult with any affected Federal agency and shall take into account the potential benefits of instruments on missions that are beyond their planned mission lifetime.

"(c) REPORT.—The Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, 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 required by subsection (a) that was carried out during the previous year.".

Subtitle B—Astrophysics

SEC. 311. DECADAL CADENCE.

In carrying out section 301(b), the Administrator shall seek to ensure to the extent practicable a steady cadence of large, medium, and small astrophysics missions.

SEC. 312. EXTRASOLAR PLANET EXPLORATION STRATEGY.

(a) STRATEGY.—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. Such strategy shall—

(1) outline key scientific questions;

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

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

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

(5) make recommendations on the above as appropriate.

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

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

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

(c) REPORT TO CONGRESS.—Not later than 18 months after the date of enactment of this Act, the National Academies shall transmit a report to the Administrator, and to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, containing the strategy developed under subsection (a).

SEC. 313. JAMES WEBB SPACE TELESCOPE.

It is the sense of Congress that—

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

(2) the James Webb Space Telescope will enable American scientists to maintain their leadership in astrophysics and other disciplines;

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

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

(5) maintaining this progress will require the Administrator to 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 prior to launch.

SEC. 314. NATIONAL RECONNAISSANCE OFFICE TELESCOPE DONATION.

Not later than 90 days after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate outlining the cost of the Administration's potential plan for developing the Wide-Field Infrared Survey Telescope as described in the 2010 National Academies' astronomy and astrophysics decadal survey, including an alternative plan for the Wide-Field Infrared Survey Telescope 2.4, which includes the donated 2.4-meter aperture National Reconnaissance Office telescope. Due to the budget constraints on the Administration's science programs, this report shall include—

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

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

(3) an assessment of how the Administration's existing science missions will be affected by the utilization of the donated asset described in this section; and

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

SEC. 315. WIDE-FIELD INFRARED SURVEY TELESCOPE.

(a) SENSE OF CONGRESS.—It is the sense of Congress that the Administrator, to the extent practicable, should make progress on the technologies and capabilities

needed to position the Administration to meet the objectives of the Wide-Field Infrared Survey Telescope mission, 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. It is further the sense of Congress that the Wide-Field Infrared Survey Telescope mission has the potential to enable scientific discoveries that will transform our understanding of the universe.

(b) CONTINUITY OF DEVELOPMENT.—The Administrator shall ensure that the concept definition and pre-formulation activities of a Wide-Field Infrared Survey Telescope mission continue while the James Webb Space Telescope is being completed.

SEC. 316. STRATOSPHERIC OBSERVATORY FOR INFRARED ASTRONOMY.

The Administrator shall not use any funding appropriated to the Administration for fiscal year 2014 for the shutdown of the Stratospheric Observatory for Infrared Astronomy or for the preparation therefor.

Subtitle C—Planetary Science

SEC. 321. DECADAL CADENCE.

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

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

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

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

SEC. 322. NEAR-EARTH OBJECTS.

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

(1) Near-Earth objects pose a serious and credible threat to humankind, as many scientists believe that a major asteroid or comet was responsible for the mass extinction of the majority of the Earth's species, including the dinosaurs, approximately 65,000,000 years ago.

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

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

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

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

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

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

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

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

(2) 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.—Subsequent to the initial report the Administrator shall annually transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report that provides—

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

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

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

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

(2) 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 this Act, the Administrator shall transmit the results of the assessment carried out under subsection (g) to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 323. 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 the Survey program.

(b) REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, Transportation of the Senate a report describing how the Administration can expand collaborative partnerships to detect, track, catalogue, and categorize near-Earth objects.

SEC. 324. RESEARCH ON NEAR-EARTH OBJECT TSUNAMI EFFECTS.

(a) REPORT ON POTENTIAL TSUNAMI EFFECTS FROM NEAR-EARTH OBJECT IMPACT.—The Administrator, in collaboration with the Administrator of the National Oceanic and Atmospheric Administration and other relevant agencies, shall prepare a report identifying and describing existing research activities and further research objectives that would increase our understanding of the nature of the effects of potential tsunamis that could occur if a near-Earth object were to impact an ocean of Earth.

(b) TRANSMITTAL.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit the report required and prepared under subsection (a) to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 325. ASTROBIOLOGY STRATEGY.

(a) STRATEGY.—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. 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 transmit a report to the Administrator, and to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, containing the strategy developed under subsection (a).

SEC. 326. ASTROBIOLOGY PUBLIC-PRIVATE PARTNERSHIPS.

Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, Transportation of the Senate a report describing how the Administration can expand collaborative partnerships to study life's origin, evolution, distribution, and future in the Universe.

SEC. 327. ASSESSMENT OF MARS ARCHITECTURE.

(a) ASSESSMENT.—The Administrator shall enter into an arrangement with the National Academies to assess—

(1) the Administration's revised post-2016 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 architecture's relationship to Mars-related activities to be undertaken by agencies and organizations outside of the United States; and

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

(b) TRANSMITTAL.—Not later than 18 months after the date of enactment of this Act, the Administrator shall transmit the results of the assessment to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

Subtitle D—Heliophysics

SEC. 331. DECADAL CADENCE.

In carrying out section 301(b), the Administrator shall seek to ensure to the extent practicable a steady cadence of large, medium, and small heliophysics missions.

SEC. 332. REVIEW OF SPACE WEATHER.

(a) REVIEW.—The Director of the Office of Science and Technology Policy, in consultation with the Administrator, the Administrator of the National Oceanic and Atmospheric Administration, the Director of the National Science Foundation, and heads of other relevant Federal agencies, shall enter into an arrangement with the National Academies to provide a comprehensive study that reviews current and planned ground-based and space-based space weather monitoring requirements and capabilities, identifies gaps, and identifies options for a robust and resilient capability. The study shall inform the process of identifying national needs for future space weather monitoring, forecasts, and mitigation. The National Academies shall give consideration to international and private sector efforts and collaboration that could potentially contribute to national space weather needs. The study shall also review the current state of research capabilities in observing, modeling, and prediction and provide recommendations to ensure future advancement of predictive capability.

(b) REPORT TO CONGRESS.—Not later than 14 months after the date of enactment of this Act, the National Academies shall transmit a report containing the results of the study provided under subsection (a) to the Director of the Office of Science and Technology Policy, and to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

Subtitle E—Earth Science

SEC. 341. GOAL.

(a) SENSE OF CONGRESS.—It is the sense of Congress that the Administration is being asked to undertake important Earth science activities in an environment of increasingly constrained fiscal resources, and that any transfer of additional responsibilities to the Administration, such as climate instrument development and measurements that are currently part of the portfolio of the National Oceanic and Atmospheric Administration, should be accompanied by the provision of additional resources to allow the Administration to carry out the increased responsibilities without adversely impacting its implementation of its existing Earth science programs and priorities.

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

(c) COLLABORATION.—The Administrator shall collaborate with other Federal agencies, including the National Oceanic and Atmospheric Administration, non-government entities, and international partners, as appropriate, in carrying out the Administration's Earth science program. The Administration shall continue to develop first-of-a-kind instruments that, once proved, can be transitioned to other agencies for operations.

(d) REIMBURSEMENT.—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.

SEC. 342. DECADAL CADENCE.

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

SEC. 343. VENTURE CLASS MISSIONS.

It is the sense of Congress that the Administration's Venture class missions provide opportunities for innovation in the Earth science program, offer low-cost approaches for high-quality competitive science investigations, enable frequent flight opportunities to engage the Earth science and applications community, and serve as a training ground for students and young scientists. It is further the sense of Congress that the Administration should seek to increase the number of Venture class projects to the extent practicable as part of a balanced Earth science program.

SEC. 344. ASSESSMENT.

The Administrator shall carry out a scientific assessment of the Administration's Earth science global datasets for the purpose of identifying those datasets that are useful for understanding regional changes and variability, and for informing applied science research. The Administrator shall complete and transmit the assessment to the Committee on Science, Space, and Technology in the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 180 days after the date of enactment of this Act.

TITLE IV—AERONAUTICS

SEC. 401. SENSE OF CONGRESS.

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 and leverage resources; and

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

SEC. 402. AERONAUTICS RESEARCH GOALS.

The Administrator shall ensure that the Administration maintains a strong aeronautics research portfolio ranging from fundamental research through integrated systems research with specific research goals, including the following:

(1) ENHANCE AIRSPACE OPERATIONS AND SAFETY.—The Administration's Aeronautics Research Mission Directorate shall address research needs of the Next Generation Air Transportation System and identify critical gaps in technology which must be bridged to enable the implementation of the Next Generation Air Transportation System so that safety and productivity improvements can be achieved as soon as possible.

(2) IMPROVE AIR VEHICLE PERFORMANCE.—The Administration's Aeronautics Research Mission Directorate shall conduct research to improve aircraft per-

formance and minimize environmental impacts. The Associate Administrator for the Aeronautics Research Mission Directorate shall consider and pursue concepts to reduce noise, emissions, and fuel consumption while maintaining high safety standards, and shall conduct research related to the impact of alternative fuels on the safety, reliability and maintainability of current and new air vehicles.

(3) STRENGTHEN AVIATION SAFETY.—The Administration's Aeronautics Research Mission Directorate shall proactively address safety challenges associated with current and new air vehicles and with operations in the Nation's current and future air transportation system.

(4) DEMONSTRATE CONCEPTS AT THE SYSTEM LEVEL.—The Administration's Aeronautics Research Mission Directorate shall mature the most promising technologies to the point at which they can be demonstrated in a relevant environment and shall integrate individual components and technologies as appropriate to ensure that they perform in an integrated manner as well as they do when operated individually.

SEC. 403. UNMANNED AERIAL SYSTEMS RESEARCH AND DEVELOPMENT.

(a) IN GENERAL.—The Administrator, in consultation with the Administrator of the Federal Aviation Administration and other Federal agencies, shall carry out research and technological development to facilitate the safe integration of unmanned aerial systems into the National Airspace System, including—

(1) positioning and navigation systems;
(2) sense and avoid capabilities;
(3) secure data and communication links;
(4) flight recovery systems; and
(5) human systems integration.

(b) ROADMAP.—The Administrator shall update a roadmap for unmanned aerial systems research and development and transmit this roadmap to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 180 days after the date of enactment of this Act.

(c) COOPERATIVE UNMANNED AERIAL VEHICLE ACTIVITIES.—Section 31504 of title 51, United States Code, is amended by inserting "Operational flight data derived from these cooperative agreements shall be made available, in appropriate and usable formats, to the Administration and the Federal Aviation Administration for the development of regulatory standards." after "in remote areas.".

SEC. 404. RESEARCH PROGRAM ON COMPOSITE MATERIALS USED IN AERONAUTICS.

(a) PURPOSE OF RESEARCH.—The Administrator shall continue the Administration's cooperative research program with industry to identify and demonstrate more effective and safe ways of developing, manufacturing, and maintaining composite materials for use in airframes, subsystems, and propulsion components.

(b) CONSULTATION.—The Administrator, in overseeing the Administration's work on composite materials, shall consult with relevant Federal agencies and partners in industry to accelerate safe development and certification processes for new composite materials and design methods while maintaining rigorous inspection of new composite materials.

(c) REPORT.—Not later than 1 year after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate detailing the Administration's work on new composite materials and the coordination efforts among Federal agencies.

SEC. 405. HYPERSONIC RESEARCH.

Not later than 1 year after the date of enactment of this Act, the Administrator, in consultation with other Federal agencies, shall develop and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a research and development roadmap for hypersonic aircraft research with the objective of exploring 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. The roadmap shall prescribe appropriate agency contributions, coordination efforts, and technology milestones.

SEC. 406. 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.—Not later than 1 year after the date of enactment of this Act, the Administrator shall develop and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a roadmap that allows for flexible funding profiles for supersonic aeronautics research and development with the objective of developing and demonstrating, 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. The roadmap shall include—

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

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

(3) a research plan to address such challenges, as well as a project timeline for accomplishing relevant research goals;

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

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

SEC. 407. RESEARCH ON NEXTGEN AIRSPACE MANAGEMENT CONCEPTS AND TOOLS.

(a) IN GENERAL.—The Administrator shall, in consultation with other Federal agencies, review at least annually the alignment and timing of the Administration's research and development activities in support of the NextGen airspace management modernization initiative, and shall make any necessary adjustments by reprioritizing or retargeting the Administration's research and development activities in support of the NextGen initiative.

(b) ANNUAL REPORTS.—The Administrator shall report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate annually regarding the progress of the Administration's research and development activities in support of the NextGen airspace management modernization initiative, including details of technologies transferred to relevant Federal agencies for eventual operation implementation, consultation with other Federal agencies, and any adjustments made to research activities.

SEC. 408. ROTORCRAFT RESEARCH.

Not later than 1 year after the date of enactment of this Act, the Administrator, in consultation with other Federal agencies, shall prepare and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a roadmap for research relating to rotorcraft and other runway-independent air vehicles, with the objective of developing and demonstrating improved safety, noise, and environmental impact in a relevant environment. 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.

SEC. 409. TRANSFORMATIVE AERONAUTICS RESEARCH.

It is the sense of Congress that the Administrator, in looking strategically into the future and ensuring that the Administration's Center personnel are at the leading edge of aeronautics research, should encourage investigations into the early-stage advancement of new processes, novel concepts, and innovative technologies that have the potential to meet national aeronautics needs. The Administrator shall continue to ensure that awards for the investigation of these concepts and technologies are open for competition among Administration civil servants at its Centers, separate from other awards open only to non-Administration sources.

SEC. 410. STUDY OF UNITED STATES LEADERSHIP IN AERONAUTICS RESEARCH.

(a) STUDY.—The Administrator shall enter into an arrangement with the National Academies for a study to benchmark the position of the United States in civil aeronautics research compared to the rest of the world. The study shall—

(1) seek to define metrics by which relative leadership in civil aeronautics research can be determined;

(2) ascertain how the United States compares to other countries in the field of civil aeronautics research and any relevant trends; and

(3) provide recommendations on what can be done to regain or retain global leadership, including—

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

(B) defining appropriate roles for the Administration;

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

(D) estimating the impact on the Administration's budget should such recommendations be implemented.

(b) REPORT.—Not later than 18 months after the date of enactment of this Act, the Administrator shall provide the results of the study to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

TITLE V—SPACE TECHNOLOGY

SEC. 501. SENSE OF CONGRESS.

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

(1) enabling a new class of Administration missions beyond low-Earth orbit;

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

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

SEC. 502. SPACE TECHNOLOGY PROGRAM.

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

"§ 70507. Space Technology Program authorized

"(a) PROGRAM AUTHORIZED.—The Administrator shall establish a Space Technology Program to pursue the research and development of advanced space technologies that have the potential of delivering innovative solutions and to support human exploration of the solar system or advanced space science. The program established by the Administrator shall take into consideration the recommendations of the National Academies' review of the Administration's Space Technology roadmaps and priorities, as well as applicable enabling aspects of the Human Exploration Roadmap specified in section 70504. In conducting the space technology program established under this section, the Administrator shall—

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

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

"(3) undertake partnerships with other Federal agencies, universities, private industry, and other spacefaring nations, as appropriate.

"(b) 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 Space Technology Program.

"(c) NONDUPLICATION CERTIFICATION.—The Administrator shall include in the budget for each fiscal year, as transmitted to Congress under section 1105(a) of title 31, a certification that no project, program, or mission undertaken by the Space Technology Program is duplicative of any other project, program, or mission conducted by another office or directorate of the Administration.".

(b) COLLABORATION, COORDINATION, AND ALIGNMENT.—The Administrator shall 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 and that results from such work are shared and leveraged within the Administration. Projects, programs, and activities 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. The Administrator shall ensure that 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. The Administrator shall provide the rationale in the report specified in subsection (d).

(c) REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall provide to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report 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. The Administrator shall identify how the Administration will address any gaps between the agency's investments and the recommended technology areas, including a projection of funding requirements.

(d) 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.

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

"70507. Space Technology Program authorized.".

SEC. 503. UTILIZATION OF THE INTERNATIONAL SPACE STATION FOR TECHNOLOGY DEMONSTRATIONS.

The Administrator shall utilize the International Space Station and commercial services for space technology demonstration missions in low-Earth orbit whenever it is practical and cost effective to do so.

TITLE VI—EDUCATION

SEC. 601. EDUCATION.

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

(1) the Administration's missions are an inspiration for Americans and in particular for the next generation, and that this inspiration has a powerful effect in stimulating interest in science, technology, engineering, and mathematics (in this section referred to as "STEM") education and careers;

(2) the Administration's Office of Education and mission directorates have been effective in delivering Administration educational content because of the strong engagement of Administration scientists and engineers in the Administration's education and outreach activities; and

(3) the Administration should be a central partner in contributing to the goals of the National Science and Technology Council's Federal Science, Technology, Engineering, and Mathematics (STEM) Education 5-Year Strategic Plan.

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

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

(2) improve public literacy in STEM;

(3) employ proven strategies for improving student learning and teaching;

(4) provide curriculum support materials; and

(5) create and support opportunities for professional development for STEM teachers.

(c) ORGANIZATION.—In order to ensure the inspiration and engagement of children and the general public, the Administration shall continue its STEM education and outreach activities within the Science, Aeronautics Research, Space Operations, and Exploration Mission Directorates.

(d) CONTINUATION OF EDUCATION AND OUTREACH ACTIVITIES AND PROGRAMS.—The Administrator shall continue to carry out education and outreach programs and activities through the Office of Education and the Administration mission directorates and shall continue to engage, to the maximum extent practicable, Administration and Administration-supported researchers and engineers in carrying out those programs and activities.

(e) CONTINUATION OF SPACE GRANT PROGRAM.—The Administrator shall continue to operate the National Space Grant College and Fellowship program through a national network consisting of a State-based consortium in each State that provides flexibility to the States, with the objective of providing hands-on research, training, and education programs, with measurable outcomes, to enhance America's STEM education and workforce.

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

SEC. 602. INDEPENDENT REVIEW OF THE NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM.

(a) SENSE OF CONGRESS.—It is the sense of Congress that the National Space Grant College and Fellowship Program, which was established in the National Aeronautics and Space Administration Authorization Act of 1988 (42 U.S.C. 2486 et seq.), has been an important program by which the Federal Government has partnered with State and local governments, universities, private industry, and other organizations to enhance the understanding and use of space and aeronautics activities and their benefits through education, fostering of interdisciplinary and multidisciplinary space research and training, and supporting Federal funding for graduate fellowships in space-related fields, among other purposes.

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

(1) a review of the National Space Grant College and Fellowship Program, including its structure and capabilities for supporting science, technology, engineering, and mathematics education and training consistent with the National Science and Technology Council's Federal Science, Technology, Engineering, and Mathematics (STEM) Education 5-Year Strategic Plan; and

(2) recommendations on measures, if needed, to enhance the Program's effectiveness and mechanisms by which any increases in funding appropriated by Congress can be applied.

(c) NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM AMENDMENTS.—

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

(A) by striking "and" at the end of paragraph (5);

(B) by striking the period at the end of paragraph (6) and inserting "; and"; and

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

"(7) support outreach to primary and secondary schools to help support STEM engagement and learning at the K-12 level and to encourage K-12 students to pursue postsecondary degrees in fields related to space.".

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

(A) in subsection (a)—

(i) by redesignating paragraphs (2) and (3) as paragraphs (3) and (4), respectively; and

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

"(2) INCLUSION OF 2-YEAR INSTITUTIONS.—A space grant regional consortium designated in paragraph (1)(B) may include one or more 2-year institutions of higher education."; and

(B) in subsection (b)(1), by striking "paragraphs (2)(C) and (3)(D)" and inserting "paragraphs (3)(C) and (4)(D)".

TITLE VII—POLICY PROVISIONS

SEC. 701. ASTEROID RETRIEVAL MISSION.

(a) ASTEROID RETRIEVAL REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall provide to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the proposed Asteroid Retrieval Mission. Such report shall include—

(1) a detailed budget profile, including cost estimates for the development of all necessary technologies and spacecraft required for the mission;

(2) a detailed technical plan that includes milestones and a specific schedule;

(3) a description of the technologies and capabilities anticipated to be gained from the proposed mission that will enable future human missions to Mars which could not be gained by lunar missions;

(4) a description of the technologies and capabilities anticipated to be gained from the proposed mission that will enable future planetary defense missions, against impact threats from near-Earth objects equal to or greater than 140 meters in diameter, which could not be gained by robotic missions; and

(5) a complete assessment by the Small Bodies Assessment Group and the National Aeronautics and Space Administration Advisory Council of how the proposed mission is in the strategic interests of the United States in space exploration.

(b) MARS FLYBY REPORT.—Not later than 60 days after the date of enactment of this Act, an independent, private systems engineering and technical assistance organization contracted by the Human Exploration Operations Mission Directorate shall transmit to the Administrator, the Committee on Science, Space, and Technology of

the House of Representatives, and the Committee on Commerce, Science, and Transportation of the Senate a report analyzing the proposal for a Mars Flyby human spaceflight mission to be launched in 2021. Such report shall include—

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

(2) a description of the benefits in scientific knowledge and technologies demonstrated by a Mars Flyby mission to be launched in 2021 suitable for future Mars missions; and

(3) an annual budget profile, including cost estimates, for the development test, fielding, and operations plan to carry out a Mars Flyby mission through 2021 and comparison of that budget profile to the 5-year budget profile contained in the President's Budget request for fiscal year 2015.

(c) ASSESSMENT.—Not later than 60 days after transmittal of the report specified in subsection (b), the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate an assessment by the National Aeronautics and Space Administration Advisory Council of whether the proposal for a Mars Flyby Mission to be launched in 2021 is in the strategic interests of the United States in space exploration.

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

SEC. 702. TERMINATION LIABILITY.

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

(1) The International Space Station, the Space Launch System, and the Orion crew capsule will enable the Nation to continue operations in low-Earth orbit and to send its astronauts to deep space. The James Webb Space Telescope will revolutionize our understanding of star and planet formation and how galaxies evolved and advance the search for the origins of our universe. 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.

(2) In addition, 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. As a result, hundreds of millions of taxpayer dollars are unavailable for meaningful work on these programs.

(3) According to the Government Accountability Office, the Administration procures most of its goods and services through contracts, and it terminates very few of them. In fiscal year 2010, the Administration terminated 28 of 16,343 active contracts and orders—a termination rate of about 0.17 percent.

(4) Providing processes requiring congressional notification on termination of these high-priority programs would enable contractors to apply taxpayer dollars to making maximum progress in meeting the established technical goals and schedule milestones of these programs.

(b) ADMINISTRATION TERMINATION LIABILITY.—

(1) GENERAL RULE.—Termination liability costs for a covered program shall be provided only pursuant to this subsection.

(2) PROHIBITION ON RESERVING FUNDS.—The Administrator may not reserve funds from amounts appropriated for a covered program, or require the reservation of funds by the prime contractor, for potential termination liability costs with respect to a covered program.

(3) INTENT OF CONGRESS.—It is the intent of Congress that funds authorized to be appropriated for covered programs be applied in meeting established technical goals and schedule milestones.

(4) APPLICATION OF PRIOR RESERVED FUNDS.—Funds that have been reserved before the date of enactment of this Act for potential termination liability shall be promptly used to make maximum progress in meeting the established goals and milestones of the covered program.

(5) NOTIFICATION.—The Administrator shall notify the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate at least 120 days in advance of initiating termination for convenience or termination for cause of a prime contract on a covered program.

(6) SUPPLEMENTAL APPROPRIATION REQUEST.—

(A) REQUEST.—If the Administrator initiates termination of a prime contract on a covered program pursuant to paragraph (5), and sufficient unobli-

gated appropriations are not available to cover termination liability costs in the appropriations account that is funding the prime contract being terminated, the Administrator shall provide to Congress a notification that an authorization of appropriations is necessary not later than 120 days in advance of the proposed contract termination settlement for the covered program.

(B) INTENT OF CONGRESS.—It is the intent of Congress to provide additional authorization for appropriations as may be necessary to pay termination liability costs on prime contracts for covered programs if Congress deems it appropriate that the Administration terminate such prime contracts. The Administration shall be responsible for applying these additional funds for payment of all allowable and reasonable negotiated termination liability costs if the Administration terminates a prime contract for a covered program. If the Administration terminates a prime contract for a covered program for the convenience of the Federal Government, then the Federal Government is responsible for payment of all allowable and reasonable negotiated termination liability costs on the prime contract.

(c) REPORTING.—Not later than 6 months after the date of enactment of this Act, and every 6 months thereafter for the duration of the prime contracts on covered programs, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report that provides—

(1) the estimated termination liability costs for each of the prime contracts; and

(2) the basis for how such estimate was determined.

(d) DEFINITIONS.—For purposes of this section:

(1) COVERED PROGRAM.—The term "covered program" means the International Space Station, the Space Launch System, the Orion crew capsule, and the James Webb Space Telescope.

(2) PRIME CONTRACT.—The term "prime contract" means a contract entered directly between a person or entity and the Federal Government for the performance of all or the majority of the responsibilities for developing, integrating, fielding, operating, or sustaining a covered program.

(3) PRIME CONTRACTOR.—The term "prime contractor" means a person or entity contracting directly with the Federal Government on a covered program.

(4) TERMINATION LIABILITY COSTS.—The term "termination liability costs" means any costs incurred by a prime contractor, or by any subcontractor of a prime contractor, for which the Federal Government is liable as a result of termination of a prime contract by the Administrator.

SEC. 703. BASELINE AND COST CONTROLS.

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

(1) in subsection (a)(1), by striking "Procedural Requirements 7120.5c, dated March 22, 2005" and inserting "Procedural Requirements 7120.5E, dated August 14, 2012"; and

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

SEC. 704. PROJECT AND PROGRAM RESERVES.

(a) SENSE OF CONGRESS.—It is the sense of Congress that the judicious use of program and project reserves provides the Administration's project and program managers with the flexibility needed to manage projects and programs to ensure that the impacts of contingencies can be mitigated.

(b) REPORT.—Not later than 180 days after the date of enactment of this Act the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report describing—

(1) the Administration's criteria for establishing the amount of reserves held at the project and program levels;

(2) how such criteria relate to the agency's policy of budgeting at a 70-percent confidence level; and

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

SEC. 705. INDEPENDENT REVIEWS.

Not later than 270 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of

Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report describing—

(1) the Administration's procedures for conducting independent reviews of projects and programs at lifecycle milestones and how the Administration ensures the independence of the individuals who conduct those reviews prior to their assignment;

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

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

SEC. 706. 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. 707. NATIONAL AERONAUTICS AND SPACE ADMINISTRATION ADVISORY COUNCIL.

(a) STUDY.—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) qualifications for members of the Council;
(4) duration of terms of office for members of the Council;
(5) frequency of meetings of the Council;
(6) the structure of leadership and Committees of the Council; and
(7) levels of professional staffing for the Council.

In carrying out the assessment, the Academy shall also assess the impacts of broadening the Council's role to advising Congress, and any other issues that the Academy determines could potentially impact the effectiveness of the Council. The Academy shall consider the past activities of the NASA Advisory Council, as well as the activities of other analogous federal advisory bodies in conducting its assessment. The results of the assessment, including any recommendations, shall be transmitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

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

(c) SUNSET.—Subsection (b) shall expire on September 30, 2014.

SEC. 708. COST ESTIMATION.

(a) SENSE OF CONGRESS.—It is the sense of Congress that realistic cost estimating is critically important to the ultimate success of major space development projects. The Administration has devoted significant efforts over the past five 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 programs and projects and in a manner consistent with the Administration's Space Flight Program and Project Management Requirements—

(1) guidance on when an Independent Cost Estimate and Independent Cost Assessment should be used; and

(2) the criteria to be used to make such a determination.

(c) REPORT.—Not later than 270 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report—

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

(2) describing the mechanisms the Administration is using and will continue to use to ensure that adequate resources are dedicated to cost estimation;

(3) listing the steps the Administration is undertaking to advance consistent implementation of the joint cost and schedule process;

(4) identifying criteria used by programs and projects in determining when to conduct an Independent Cost Estimate and Independent Cost Assessment; and

(5) listing—

(A) the costs of each individual Independent Cost Estimate or Independent Cost Assessment activity conducted in fiscal year 2011, fiscal year 2012, and fiscal year 2013;

(B) the purpose of the activity;

(C) identification of the primary Administration unit or outside body that conducted the activity; and

(D) key findings and recommendations.

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

SEC. 709. 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 elements identified in subsection (b).

(b) ELEMENTS.—The revised regulations required by 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 assistance 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) ensure that the Administration receives 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 may be 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. 710. FACILITIES AND INFRASTRUCTURE.

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

(1) the Administration must reverse the deteriorating condition of its facilities and infrastructure, as this condition is hampering the effectiveness and efficiency of research performed by both the Administration and industry participants making use of Administration facilities, thus reducing the competitiveness of the United States aerospace industry;

(2) the Administration has a role in providing laboratory capabilities to industry participants that are 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 seek to establish strategic partnerships with other Federal agencies, academic institutions, 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 future Administration and other Federal agencies' laboratory needs, including those required to meet the activities supporting the Human Exploration Roadmap required by section 70504 of title 51, United States Code.

(b) POLICY.—It is the policy of the United States that the Administration maintain reliable and efficient facilities and that decisions on whether to dispose of, maintain,

or modernize existing facilities be made in the context of meeting future Administration needs.

(c) PLAN.—The Administrator shall develop a plan that has the goal of positioning the Administration to have the facilities, laboratories, tools, and approaches necessary to address future Administration requirements. Such plan shall identify—

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

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

(A) the National Space Policy;

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

(C) National Aeronautics and Space Administration Authorization Acts; and

(D) the Human Exploration Roadmap specified in section 70504 of title 51, United States Code;

(3) a strategy for the maintenance, repair, upgrading, and modernization of the Administration's laboratories, facilities, and equipment;

(4) criteria for prioritizing deferred maintenance tasks and also for upgrading or modernizing laboratories, facilities, and equipment and implementing processes, plans, and policies for guiding the Administration's Centers on whether to maintain, repair, upgrade, or modernize a facility and for determining the type of instrument to be used;

(5) 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

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

(d) POLICY.—Not later than 180 days after the date of enactment of this Act, the Administrator shall establish and make publically 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. This policy shall establish criteria for the use of authorities, best practices, standardized procedures, and guidelines for how to appropriately manage property, infrastructure, and facilities.

(e) TRANSMITTAL.—Not later than one year after the date of enactment of this Act, the Administrator shall transmit the plan developed under subsection (c) to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(f) ESTABLISHMENT OF CAPITAL FUND.—The Administrator shall establish a capital fund for the modernization of facilities and laboratories. The Administrator shall ensure to the maximum extent practicable that all financial savings achieved by closing outdated or surplus facilities at an Administration Center shall be made available to that Center for the purpose of modernizing the Center's facilities and laboratories and for upgrading the infrastructure at the Center.

(g) REPORT ON CAPITAL FUND.—Expenditures and other activities of the fund established under subsection (f) shall require review and approval by the Administrator and the status, including the amounts held in the capital fund, shall be reported to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate in conjunction with the Administration's annual budget request justification for each fiscal year.

SEC. 711. DETECTION AND AVOIDANCE OF COUNTERFEIT ELECTRONIC PARTS.

(a) REGULATIONS.—

(1) IN GENERAL.—Not later than 270 days after the date of enactment of this Act, the Administrator shall revise the National Aeronautics and Space Administration Supplement to the Federal Acquisition Regulation to address the detection and avoidance of counterfeit electronic parts.

(2) CONTRACTOR RESPONSIBILITIES.—The revised regulations issued pursuant to paragraph (1) shall provide that—

(A) Administration contractors who supply electronic parts or products that include electronic parts are responsible for detecting and avoiding the use or inclusion of counterfeit electronic parts or suspect counterfeit electronic parts in such products and for any rework or corrective action that may be required to remedy the use or inclusion of such parts; and

(B) the cost of counterfeit electronic parts and suspect counterfeit electronic parts and the cost of rework or corrective action that may be required to remedy the use or inclusion of such parts are not allowable costs under Administration contracts, unless—

(i) the covered contractor has an operational system to detect and avoid counterfeit parts and suspect counterfeit electronic parts that has been reviewed and approved by the Administration or the Department of Defense;

(ii) the covered contractor provides timely notice to the Administration pursuant to paragraph (4); or

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

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

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

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

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

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

(i) notification of the Administration; and

(ii) inspection, testing, and authentication of electronic parts that the Administration or an Administration contractor or 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 the Administration 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 Administration contractors and subcontractors to identify and use additional suppliers beyond those identified pursuant to subparagraph (C) provided that—

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

(ii) the contractor or subcontractor assumes responsibility for the authenticity of parts provided by such suppliers as provided in paragraph (2); and

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

(4) TIMELY NOTIFICATION.—The revised regulations issued pursuant to paragraph (1) shall require that any Administration contractor or subcontractor who becomes aware, or has reason to suspect, that any end item, component, part, or material contained in supplies purchased by the Administration, or purchased by a contractor or subcontractor for delivery to, or on behalf of, the Administration, contains counterfeit electronic parts or suspect counterfeit electronic parts, shall provide notification to the applicable Administration contracting officer within 30 calendar days.

(b) REPORT.—Not later than 120 days after the revised regulations specified in subsection (a) have been implemented, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report updating the Administration's actions to prevent counterfeit electronic parts from entering the supply chain as described in its October 2011 report pursuant to section 1206(d) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18444(d)).

(c) DEFINITION.—In this section, 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. 712. SPACE ACT AGREEMENTS.

(a) COST SHARING.—To the extent that the Administrator determines practicable, the funds provided by the Government under a funded Space Act Agreement shall not exceed the total amount provided by other parties to the Space Act Agreement.

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

(c) PUBLIC NOTICE AND COMMENT.—The Administrator shall make available for public notice and comment each proposed Space Act Agreement at least 30 days before entering into such agreement, with appropriate redactions for proprietary, sensitive, or classified information.

(d) TRANSPARENCY.—The Administrator shall publicly disclose on the Administration's website and make available in a searchable format each Space Act Agreement, with appropriate redactions for proprietary, sensitive, or classified information, not later than 60 days after such agreement is signed.

(e) ANNUAL REPORT.—

(1) REQUIREMENT.—Not later than 90 days after the end of each fiscal year, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate 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, nonreimbursable, 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 also include a list of all anticipated reimbursable, nonreimbursable, and funded Space Act Agreements for the upcoming fiscal year.

(4) CUMULATIVE PROGRAM BENEFITS.—The report shall also include, with respect to the Space Act Agreements covered by the report, a summary of—

(A) the technology areas in which research projects were conducted under such agreements;

(B) the extent to which the use of the Space Act Agreements—

(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 pursuant to such Space Act Agreements.

SEC. 713. HUMAN SPACEFLIGHT ACCIDENT INVESTIGATIONS.

Section 70702(a) of title 51, United States Code, is amended by striking paragraph (3) and inserting the following:

"(3) any other orbital or suborbital space vehicle carrying humans—

"(A) that is owned by the Federal Government; or

"(B) that is being used pursuant to a contract or Space Act Agreement, as defined in section 2 of the National Aeronautics and Space Administration Authorization Act of 2014, with the Federal Government for carrying a researcher or payload funded by the Federal Government; or".

SEC. 714. FULLEST COMMERCIAL USE OF SPACE.

(a) REPORT.—Not later than 90 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on current and continuing efforts by the Administration to "seek and encourage, to the maximum extent possible, the fullest commercial use of space," as described in section 20102(c) of title 51, United States Code.

(b) ELEMENTS.—The report required under subsection (a) shall include—

(1) an assessment of the Administration's efforts to comply with the policy;

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

(3) a description of programs, policies, and activities the Administration is using, and will continue to use, to ensure compliance;

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

(5) a summary of all current and planned activities pursuant to this policy.

(c) BARRIERS TO FULLEST COMMERCIAL USE OF SPACE.—Not later than 90 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on current and continuing efforts by the Administration to reduce impediments, bureaucracy, redundancy, and burdens to ensure the fullest commercial use of space as required by section 20102(c) of title 51, United States Code.

SEC. 715. ORBITAL DEBRIS.

(a) FINDINGS.—Congress finds that orbital debris poses serious risks to the operational space capabilities of the United States and that an international commitment and integrated strategic plan are needed to mitigate the growth of orbital debris wherever possible. Congress finds the delay in the Office of Science and Technology Policy's submission of a report on the status of international coordination and development of mitigation strategies to be inconsistent with such risks.

(b) REPORTS.—

(1) COORDINATION.—Not later than 90 days after the date of enactment of this Act, the Administrator shall provide the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate with a report on the status of efforts to coordinate with countries within the Inter-Agency Space Debris Coordination Committee to mitigate the effects and growth of orbital debris as required by 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 provide the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate with 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. 716. REVIEW OF ORBITAL DEBRIS REMOVAL CONCEPTS.

(a) SENSE OF CONGRESS.—It is the sense of Congress that the amount of orbital debris in low-Earth orbit poses risks for human activities and robotic spacecraft and that this debris may increase due to collisions between existing debris objects. Understanding options to address and remove orbital debris is important for ensuring safe and effective spacecraft operations in low-Earth orbit.

(b) REVIEW.—The Administrator, in collaboration with other relevant Federal agencies, shall solicit and review concepts and technological options for removing orbital debris from low-Earth orbit. The solicitation and review shall also address the requirements for and feasibility of developing and implementing each of the options.

(c) TRANSMITTAL.—Not later than 270 days after the date of enactment of this Act, the Administrator shall provide a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on the solicitation and review required under subsection (b).

SEC. 717. USE OF OPERATIONAL COMMERCIAL SUBORBITAL VEHICLES FOR RESEARCH, DEVELOPMENT, AND EDUCATION.

(a) POLICY.—The Administrator shall develop a policy on the use of operational commercial reusable suborbital flight vehicles for carrying out scientific and engineering investigations and educational activities.

(b) PLAN.—The Administrator shall prepare a plan on the Administration's use of operational commercial reusable suborbital flight vehicles for carrying out scientific and engineering investigations and educational activities. The plan shall—

(1) describe the purposes for which the Administration intends to use such vehicles;

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

(3) describe Administration, space flight operator, and supporting contractor responsibilities for developing standard payload interfaces and conducting payload safety analyses, payload integration and processing, payload operations,

and safety assurance for Administration-sponsored space flight participants, among other functions required to fly Administration-sponsored payloads and space flight participants on operational commercial suborbital vehicles;

(4) identify Administration-provided hardware, software, or services that may be provided to commercial reusable suborbital space flight operators on a cost-reimbursable basis, through agreements or contracts entered into under section 20113(e) of title 51, United States Code; and

(5) describe the United States Government and space flight operator responsibilities for liability and indemnification with respect to commercial suborbital vehicle flights that involve Administration-sponsored payloads or activities, Administration-supported space flight participants, or other Administration-related contributions.

(c) ASSESSMENT OF CAPABILITIES AND RISKS.—The Administrator shall assess and characterize the potential capabilities and performance of commercial reusable suborbital vehicles for addressing scientific research, including research requiring access to low-gravity and microgravity environments, for carrying out technology demonstrations related to science, exploration, or space operations requirements, and for providing opportunities for educating and training space scientists and engineers, once those vehicles become operational. The assessment shall also characterize the risks of using potential commercial reusable suborbital flights to Administration-sponsored researchers and scientific investigations and flight hardware.

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

(e) ANNUAL PROGRESS REPORTS.—In conjunction with the Administration's annual budget request justification for each fiscal year, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate describing progress in carrying out the Commercial Reusable Suborbital Research Program, including the number and type of suborbital missions planned in each fiscal year.

(f) INDEMNIFICATION AND LIABILITY.—The Administrator shall not proceed with a request for proposals, award any contract, commit any United States Government funds, or enter into any other agreement for the provision of a commercial reusable suborbital vehicle launch service for an Administration-sponsored spaceflight participant until transmittal of the plan and assessment specified in subsections (b) and (c), the liability issues associated with the use of such systems by the United States Government have been addressed, and the liability and indemnification provisions that are planned to be included in such contracts or agreements have been provided to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 718. FUNDAMENTAL SPACE LIFE AND PHYSICAL SCIENCES RESEARCH.

(a) SENSE OF CONGRESS.—It the sense of Congress that fundamental, discovery-based space life and physical sciences research is critical for enabling space exploration, protecting humans in space, and providing societal benefits, and that the space environment facilitates the advancement of understanding of the life sciences and physical sciences. Space life and physical science research contributes to advancing science, technology, engineering, and mathematics research, and provides careers and training opportunities in academia, Federal laboratories, and commercial industry. Congress encourages the Administrator to augment discovery-based fundamental research and to establish requirements reflecting the importance of such research in keeping with the priorities established in the National Academies' decadal survey entitled "Recapturing a Future for Space Exploration: Life and Physical Sciences Research for a New Era".

(b) BUDGET REQUEST.—The Administrator shall include as part of the Administration's annual budget request for each fiscal year a budget line for fundamental space life and physical sciences research, devoted to competitive, peer-reviewed grants, that is separate from the International Space Station Operations account.

(c) STRATEGIC PLAN.—

(1) DEVELOPMENT.—The Administrator, in consultation with academia, other Federal agencies, and other potential stakeholders, shall develop a strategic plan for carrying out competitive, peer-reviewed fundamental space life science and physical sciences and related technology research, among other activities, consistent with the priorities in the National Academies' decadal survey described in subsection (a).

(2) TRANSMITTAL.—Not later than 270 days after the date of enactment of this Act, the Administrator shall transmit the strategic plan developed under paragraph (1) to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 719. RESTORING COMMITMENT TO ENGINEERING RESEARCH.

(a) SENSE OF CONGRESS.—It is the sense of Congress that engineering excellence has long been a hallmark of the Administration's ability to make significant advances in aeronautics and space exploration. However, as has been noted in recent National Academies reports, increasingly constrained funding and competing priorities have led to an erosion of the Administration's commitment to basic engineering research. This research provides the basis for the technology development that enables the Administration's many challenging missions to succeed. If current trends continue, the Administration's ability to attract and maintain the best and brightest engineering workforce at its Centers as well as its ability to remain on the cutting edge of aeronautical and space technology will continue to erode and will threaten the Administration's ability to be a world leader in aeronautics research and development and space exploration.

(b) PLAN.—The Administrator shall develop a plan for restoring a meaningful basic engineering research program at the Administration's Centers, including, as appropriate, collaborations with industry, universities, and other relevant organizations. The plan shall identify the organizational approach to be followed, an initial set of basic research priorities, and a proposed budget.

(c) REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit the plan specified in subsection (b) to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 720. LIQUID ROCKET ENGINE DEVELOPMENT PROGRAM.

The Administrator shall consult with the Secretary of Defense to ensure that any next generation liquid rocket engine made in the United States for national security space launch objectives can contribute, to the extent practicable, to the space programs and missions carried out by the Administration.

SEC. 721 REMOTE SATELLITE SERVICING DEMONSTRATIONS.

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

(1) the Administration plays a key role in demonstrating the feasibility of using robotic technologies for a spacecraft that could autonomously access, inspect, repair, and refuel satellites;

(2) demonstrating this feasibility would both assist the Administration in its future missions and provide other Federal agencies and private sector entities with enhanced confidence in the feasibility to robotically refuel, inspect, repair, and maintain their satellites in both near and distant orbits; and

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

(b) REPORT.—Not later than 120 days after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate describing the Administration's—

(1) activities, tools, and techniques associated with the ultimate goal of autonomously servicing satellites using robotic spacecraft;

(2) efforts to coordinate its technology development and demonstrations with other Federal agencies and private sector entities that conduct programs, projects, or activities on on-orbit satellite inspection and servicing capabilities;

(3) efforts to leverage the work of these Federal agencies and private sector entities into the Administration's plans;

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

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

(6) demonstrations needed to increase confidence in the use of the technologies for operational missions, and the timeframe for these demonstrations.

SEC. 722. INFORMATION TECHNOLOGY GOVERNANCE.

(a) SENSE OF CONGRESS.—It is the sense of Congress that information security is central to the Administration's ability to protect information and information systems vital to its mission.

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

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

(2) the effectiveness of the Administration's decentralized information technology structure, decisionmaking processes and authorities and its ability to enforce information security; and

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

(c) REPORT.—Not later than 1 year after the date of enactment of this Act, the Comptroller General shall transmit a report detailing the results of the study conducted under subsection (b) to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 723. STRENGTHENING ADMINISTRATION SECURITY.

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

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

(2) The assessment by the National Academy of Public Administration concluded that "NASA networks are compromised", that the Administration lacked a standardized and systematic approach to export compliance, and that individuals within the Administration were not held accountable when making serious, preventable errors in carrying out Foreign National Access Management practices and other security matters.

(b) REPORT.—Not later than 90 days after the date of enactment of this Act, the Administration shall report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on how it plans to address each of the recommendations made in the security assessment by the National Academy of Public Administration.

(c) REVIEW.—Within one year of enactment of this Act, the Comptroller General of the United States shall report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate its assessment of how the Administration has complied with the recommendations of the National Academy of Public Administration.

SEC. 724. PROHIBITION ON USE OF FUNDS FOR CONTRACTORS THAT HAVE COMMITTED FRAUD OR OTHER CRIMES.

None of the funds authorized to be appropriated or otherwise made available for fiscal year 2014 or any fiscal year thereafter for the Administration may be used to enter into a contract with any offeror or any of its principals if the offeror certifies, pursuant to the Federal Acquisition Regulation, that the offeror or any of its principals—

(1) within a three-year period preceding this offer has been convicted of or had a civil judgment rendered against it for—

(A) commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) contract or subcontract;

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

(C) commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating Federal criminal tax laws, or receiving stolen property;

(2) are presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in paragraph (1); or

(3) within a three-year period preceding this offer, has been notified of any delinquent Federal taxes in an amount that exceeds $3,000 for which the liability remains unsatisfied.

SEC. 725. PROTECTION OF APOLLO LANDING SITES.

(a) ASSESSMENT.—The Director of the Office of Science and Technology Policy, in consultation with all relevant agencies of the Federal Government and other appropriate entities and individuals, shall carry out a review and assessment of the issues

involved in 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. The review and assessment shall, at a minimum, include determination of what risks to the protection and preservation of those sites and artifacts exist or may exist in the future, what measures are required to ensure such protection and preservation, the extent to which additional domestic legislation or international treaties or agreements will be required, and specific recommendations for protecting and preserving those lunar landing sites and artifacts.

(b) REPORT.—Not later than one year after the date of enactment of this Act, the Director shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate the results of the assessment required under subsection (a).

SEC. 726. ASTRONAUT OCCUPATIONAL HEALTHCARE.

(a) IN GENERAL.—The National Academies' Institute of Medicine report "Health Standards for Long Duration and Exploration Spaceflight: Ethics Principles, Responsibilities, and Decision Framework" found that the Administration has ethical responsibilities for and should adopt policies and processes related to health standards for long duration and exploration spaceflights that recognize those ethical responsibilities. In particular, the report recommended that the Administration "provide preventative long-term health screening and surveillance of astronauts and lifetime health care to protect their health, support ongoing evaluation of health standards, improve mission safety, and reduce risks for current and future astronauts".

(b) RESPONSE.—The Administration shall prepare a response to the National Academies report recommendation described in subsection (a). The response shall include the estimated budgetary resources required for the implementation of those recommendations, and any options that might be considered as part of the response.

(c) TRANSMITTAL.—The response required under subsection (b) shall be transmitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 6 months after the date of enactment of this Act.

II. PURPOSE AND SUMMARY

The purpose of H.R. 4412, sponsored by Rep. Steven Palazzo and Rep. Lamar Smith, is to reauthorize the science, aeronautics, and human space flight and exploration programs of the National Aeronautics and Space Administration (NASA) for the fiscal year 2014, and address space and aeronautics policy and programmatic issues.

III. BACKGROUND AND NEED FOR THE LEGISLATION

The NASA Authorization Acts of 2005, 2008, and 2010 provided policy and programmatic guidance for the Administration that made clear that the Administration is, and should remain, a multimission agency with a balanced portfolio of programs in science, aeronautics, and human space flight, including human and robotic exploration beyond low Earth orbit. The NASA Authorization Act of 2014 reaffirms the basic principles espoused in the prior NASA Authorization acts, while emphasizing the importance of providing a long-term goal of a human mission to the surface of Mars and the need for a Human Exploration Roadmap to define the capabilities and milestones required to achieve the goal, and maintaining U.S. leadership in NASA's space and Earth science, aeronautics research and development, and human spaceflight programs. The need for the legislation at this time is the expiration of an authorization for the Administration.

IV. HEARING SUMMARY

In the 113th Congress, the Subcommittee on Space held a hearing on February 27, 2013, titled "A Review of the Space Leadership Preservation Act" to receive testimony on this piece of legislation

that would also inform the Committee's consideration of the policies, organization, programs, and budget for re-authorizing the National Aeronautics and Space Administration in this Congress. The Subcommittee heard from four witnesses:

Panel 1

- The Honorable Frank R. Wolf
- The Honorable John Culberson

Panel 2

- Mr. A. Thomas Young, Chair of the Board for SAIC (testifying on his own behalf)
- Mr. Elliot Pulham, Chief Executive Officer, The Space Foundation

The Committee on Science, Space, and Technology then held two hearings to address efforts to track and mitigate asteroids and meteors.

The first, held on March 19, 2013, was titled, "Threats from Space: A Review of U.S. Government Efforts to Track and Mitigate Asteroids and Meteors, Part 1". The Committee heard from three witnesses:

- The Honorable John P. Holdren, Director of the Office of Science and Technology Policy for the Executive Office of the President
- Gen. William L. Shelton, Commander of the U.S. Air Force Space Command
- The Honorable Charles F. Bolden, Jr., Administrator of the National Aeronautics and Space Administration

The second hearing, held on April 10, 2013, was titled, "Threats from Space, Part II: A Review of Private Sector Efforts to Track and Mitigate Asteroids and Meteors". The Committee heard from three witnesses:

- Dr. Ed Lu, Chairman & CEO, B612 Foundation
- Dr. Donald K. Yeomans, Manager, Near-Earth Objects Program Office, Jet Propulsion Laboratory
- Dr. Michael F. A'Hearn, Vice-Chair, Committee to Review Near-Earth Object Surveys and Hazard Mitigation Strategies, National Research Council

On April 24, 2013, the Subcommittee on Space held a hearing titled, "An Overview of the National Aeronautics and Space Administration Budget for Fiscal Year 2014," to review the Administration's FY 2014 budget request for the National Aeronautics and Space Administration and examine its priorities and challenges. The Subcommittee heard from one witness:

- The Honorable Charles F. Bolden, Jr., Administrator of the National Aeronautics and Space Administration

On Thursday, May 9, 2013, the Subcommittees on Space and Research held a joint hearing titled "Exoplanet Discoveries: Have We Found Other Earths?" The purpose of the hearing was to review the recent discovery of three super-Earth sized planets by NASA's Kepler space telescope. The hearing also assessed the state of exoplanet surveying, characterization, and research; NASA's Exoplanet Exploration Program; National Science Foundation's (NSF) Division of Astronomical Science; as well as coordination within the government and with external partners. NASA and NSF both contribute to the search for exoplanets. NASA provides space-based telescopes to identify potential planets, while NSF builds ground-

based telescopes. Both agencies fund research that assists in categorizing and characterizing candidate planets. The Subcommittees heard from three witnesses:

- Dr. Laurance Doyle, Principal Investigator, Center for the Study of Life in the Universe, SETI Institute, and member of the NASA Kepler Mission Science Team
- Dr. John Grunsfeld, Associate Administrator, Science Mission Directorate, NASA
- Dr. James (Jim) Ulvestad, Division Director, Division of Astronomical Sciences, Directorate for Mathematical and Physical Sciences, NSF

On May 21, 2013, the Subcommittee on Space held a hearing titled, "Next Steps in Human Exploration to Mars and Beyond." The purpose of this hearing was to examine possible options for the next steps in human space flight and how these options move the United States closer to a human mission to Mars and beyond. In particular, the Subcommittee explored whether the Administration's proposed asteroid rendezvous mission is a better precursor for an eventual manned mission to Mars compared to Apollo-like follow-on missions to return to the Moon. The Subcommittee heard from four witnesses:

- Dr. Louis Friedman, Co-Lead, Keck Institute for Space Studies Asteroid Retrieval Mission Study and Executive Director Emeritus, The Planetary Society
- Dr. Paul Spudis, Senior Staff Scientist at the Lunar and Planetary Institute
- Dr. Steve Squyres, Goldwin Smith Professor of Astronomy at Cornell University
- Mr. Doug Cooke, Owner, Cooke Concepts and Solutions

On June 19, 2013, the Subcommittee on Space held a hearing titled, "NASA Authorization Act of 2013," to review a discussion draft of the National Aeronautics and Space Administration (NASA) Authorization Act of 2013. The Subcommittee heard from two witnesses:

- Dr. Steven M. Squyres, Goldwin Smith Professor of Astronomy, Cornell University
- Mr. A. Thomas Young, Executive Vice President (retired), Lockheed Martin Corporation

On September 20, 2013, the Subcommittee on Space held a hearing titled, "NASA Infrastructure: Enabling Discovery and Ensuring Capability," to review NASA's efforts to manage its facilities and infrastructure, the agency's current legislative authority, and its proposed legislation to provide greater flexibility to the agency. NASA is the ninth largest Federal Government real property holder; however, nearly 80 percent of the agency's facilities are 40 or more years old. A 2012 study by NASA estimated that NASA may have as many as 865 unneeded facilities, with maintenance costs of over $24 million a year. Similarly, NASA has a backlog of over $2.19 billion in deferred maintenance. The Subcommittee heard from two witnesses:

- The Honorable Paul K. Martin, Inspector General, National Aeronautics and Space Administration
- Mr. Richard Keegan, Associate Deputy Administrator, National Aeronautics and Space Administration

On December 4, 2013, the Committee on Science, Space, and Technology held a hearing titled, Astrobiology: The Search for Biosignatures in our Solar System and Beyond, to examine astrobiology research and the search for biosignatures. The hearing included a general assessment of the multi- and interdisciplinary nature of astrobiology research, including the role astrobiology plays in formulating NASA space missions. It also examined the techniques and capabilities necessary to determine the potential for the existence of biosignatures within our Solar System. With the discovery of potential Earth-like planets outside of our Solar System, the hearing also investigated what methods are being used to determine if any of these planets may harbor life. The hearing explored existing and planned astrobiology research strategies and roadmaps. The Committee heard from three witnesses:

- Dr. Mary Voytek, Senior Scientist for Astrobiology in the Science Mission Directorate at NASA headquarters
- Dr. Sara Seager, Professor of Physics and of Planetary Science at M.I.T. and 2013 recipient of a MacArthur Foundation "Genius Grant" for her work in exoplanet research
- Dr. Steven J. Dick, Baruch S. Blumberg Chair of Astrobiology, John W. Kluge Center, Library of Congress

On February 27, 2014, the Committee on Science, Space, and Technology, held a hearing titled "Mars Flyby 2021: The First Deep Space Mission for the Orion and SLS?" This hearing explored the need for a roadmap of missions to guide investments in NASA's human spaceflight programs, how a manned mission to flyby the planets Mars and Venus launching in 2021 might fit into a series of missions and how the Space Launch System (SLS) and Orion Multipurpose Crew Vehicle could contribute to that mission. The Committee heard from four witnesses:

- Dr. Scott Pace, Director of the Space Policy Institute, George Washington University
- General Lester Lyles (Ret.), Independent Aerospace Consultant and former Chairman of the National Research Council Committee on the Rationale and Goals of the U.S. Civil Space Program
- Mr. Doug Cooke, Owner, Cooke Concepts and Solutions and former NASA Associate Administrator for Exploration Systems Mission Directorate;
- Dr. Sandy Magnus, Executive Director, American Institute of Aeronautics and Astronautics

On March 27, 2014, the Subcommittee held a hearing titled, "An Overview of the National Aeronautics and Space Administration Budget for Fiscal Year 2015". The purpose of the hearing was to review the Administration's fiscal year 2015 (FY15) budget request for the National Aeronautics and Space Administration and examine its priorities and challenges. The Committee heard from one witness:

- The Honorable Charles F. Bolden, Jr., Administrator of the National Aeronautics and Space Administration.

V. Committee Consideration

The Subcommittee on Space met to consider H.R. 4412 on Wednesday, April 9, 2014. The Subcommittee considered and approved by voice vote one amendment in the nature of a substitute

offered by Mr. Palazzo and Ms. Edwards to H.R. 4412. The bill, as amended, was agreed to by voice vote, and was favorably reported to the full Committee.

On April 29, 2014, the Committee on Science, Space, and Technology met in open markup session. The Committee considered and approved by voice vote a manager's amendment offered by Ms. Edwards and Mr. Palazzo. The bill, as amended, was agreed to by voice vote and favorably reported to the House.

VI. COMMITTEE VOTES

Clause 3(b) of rule XIII of the Rules of the House of Representatives requires the Committee to list the recorded votes on the motion to report legislation and amendments thereto. A motion to order H.R. 4412 favorably reported to the House, as amended, was agreed to by voice vote.

During Full Committee consideration of H.R. 4412, the following amendments were considered:

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

Full Committee Markup
April 29, 2014

AMENDMENT ROSTER

H.R. 4412, *the "National Aeronautics and Space Administration Authorization Act of 2014"*

No.	Amendment	Summary	
1	**Amendment Offered by Rep. Edwards (MD) and Rep. Palazzo (MS) (002)**	Reflects a bipartisan agreement on funding, direction, and policy guidance for NASA.	**Agreed to by Voice Vote**

VII. Summary of Major Provisions of the Bill

This bill authorizes programs and projects at the National Aeronautics and Space Administration for FY14. Authorized NASA funding is consistent with the funding appropriated for NASA in the Consolidated Appropriations Act, 2014 (P.L. 113–76)—$17,646,500,000. NASA continues to be the world's premier space organization. This bill seeks to maintain sustainability of purpose and budget for NASA programs, and ensure that it continues to be a multi-mission agency.

Human Spaceflight: Building on the themes of previous authorizations, this bill reaffirms Congress's commitment to space exploration, both human and robotic. This legislation makes clear that a human mission to Mars is the goal for NASA's human spaceflight program and requires the development of a roadmap to achieve that goal, as well as biennial updates. In the near-term, the primary tasks for NASA human spaceflight include:

- Realizing the research potential of the International Space Station with an Office of Science & Technology Policy-led strategic plan for all science agencies to conduct research on the Station. NASA will study the feasibility of continuing its operational lifespan beyond 2020.
- Continued commitment to develop the Space Launch System and Orion Crew Vehicle and reiteration of Congressional direction that Orion serve as a backup system to support the Space Station if necessary.
- Assist in building at least one Commercial Crew system (with NASA funds) to carry American astronauts on American rockets safely, reliably, and affordably to and from the International Space Station so that we are no longer reliant on Russia for crew access.

Science Programs: Relying on guidance of the National Academy of Sciences Decadal Surveys, this bill emphasizes the importance of maintaining a steady cadence of science missions, including a Europa mission with a goal of launching by 2021. It directs NASA and the National Academy of Sciences to provide Congress with a report assessing the long-term goals of NASA's Mars Exploration Program, which includes the Mars 2020 rover. To reflect the increase in the number of newly discovered planets outside our solar system, the legislation also directs NASA and the National Academy of Sciences to provide an exoplanet exploration strategy. This bill stresses the importance of completing and expanding the Congressionally mandated near-Earth object survey to detect, track, catalogue, and characterize near-Earth objects 140 meters in diameter or larger. When additional Earth science responsibilities are transferred from other agencies to NASA, the legislation seeks to ensure that NASA will be reimbursed for the cost of new responsibilities. The bill also:

- Maintains launch date goal of the James Webb Space Telescope by 2018.
- Continues survey for potentially-hazardous Earth-crossing objects.
- Continues exciting search for planets around other stars and life on other worlds.

• Prohibits use of FY14 funds to shut down the *Stratospheric Observatory for Infrared Astronomy*.

Aeronautics: Authorizes a robust aeronautics research program, including efforts to safely integrate unmanned aerial systems into the national airspace as well as NextGen technology for future air traffic management. Directs NASA to develop a plan to better position the agency to have the facilities and infrastructure necessary to meet future requirements including those set forth in the human exploration roadmap.

Education: Requires that NASA educational and outreach activities continue within the mission directorates.

Space Act Agreements (SAA): The bill provides greater public accountability and transparency on SAAs.

Controlling Costs: Requires NASA to enforce more cost estimating discipline for its programs, and frees up funding for meaningful work rather than setting aside money for potential contract termination costs for defined programs and prohibits NASA from reserving funds from amounts appropriated for potential termination liability costs.

Liquid Rocket Engines: Requires the Administrator to consult with the Secretary of Defense to ensure that any new liquid rocket engine developed in the United States for national security space launch objectives can contribute, to the extent practicable, to NASA's space programs and missions.

VIII. COMMITTEE VIEWS

TITLE II—HUMAN SPACE FLIGHT

SUBTITLE A—EXPLORATION

The Committee supports continuing the "go-as-you-can-afford-to-pay" strategy for exploration in accordance with a stepping stone plan as described in section 202 of this bill. The Committee reiterates that Human exploration deeper into the solar system shall be a core mission of the Administration and that the goal of the Administration's exploration program shall be to conduct a human mission to the surface of Mars.

The Committee recognizes that NASA cannot accomplish every goal set forth in this or previous authorizations all at one time and continues to endorse a phased approach to development that should be clearly outlined by the Human Exploration Roadmap required under section 202.

The Committee is concerned about the absence of a unifying plan for NASA's future human exploration efforts. The plan required by this section should serve as a pathway to Mars with multiple missions or mission sets that may be used to demonstrate those technologies and capabilities necessary for deep space exploration. The Committee encourages NASA to use this plan as an opportunity to utilize assets from all of the relevant Mission Directorates to find the most efficient and effective ways to build technologies and capabilities within constrained budgets.

Additionally, to ensure that NASA has unencumbered access to domestic, fully operational, critical testing facilities required for the development of manned and unmanned space systems, the Committee encourages NASA to refrain from closing, demolishing, out-

granting or consolidating facilities deemed critical to the development, certification and operation of agency space exploration systems until the Human Exploration Roadmap in this section is completed. Without the roadmap, as well as the continuation of ongoing facilities and infrastructure reviews, NASA cannot assess what facilities it will and will not need for future exploration initiatives. The Committee recognizes the challenges facing the agency from a maintenance backlog perspective, and commends the agency for moving forward with initiatives to address those challenges; however, such decisions should be informed by future needs, including reasonable launch rate projections.

The Committee strongly supports Space Launch System (SLS) development as the enabling element for human exploration beyond low-Earth Orbit, as well as for its ability to support advanced science missions and national security priorities. In designing the SLS, NASA is directed to ensure the launch vehicle is capable of lifting a total payload of 130 tons or more into low-Earth orbit as required in the NASA Authorization Act of 2010. Additionally, the Committee believes it is important to ensure that the SLS is capable of lifting a mass sufficient to conduct robust beyond low Earth orbit missions as soon as practicable.

The Committee acknowledges the current balanced approach to the development of a heavy lift launch vehicle, a crew capsule and a supporting launch infrastructure capability whereby the management of the SLS Program resides at the Marshall Space Flight Center (MSFC), the Orion Program resides at Johnson Space Center (JSC) and the Exploration Ground Systems Program resides at Kennedy Space Center (KSC).

The Committee reaffirms past commitments to revitalizing the Kennedy Space Center and Eastern Range into a multi-user spaceport. As such, the Committee reiterates support for the 21st Century Launch Complex (21CLC).

Subsection 203(f) requires the Administrator to initiate a competition to name the overall deep space exploration program and the SLS. The Apollo program and Saturn rockets were popular names, and the public knew the Space Shuttle orbiters by name. Public recognition will be enhanced with popularly-selected names for SLS and the overall exploration program.

The Committee is pleased with the progress made thus far on the Orion crew capsule. The report required in subsection 204(b) is essential to instilling confidence in the development efforts of NASA towards deep space exploration and the Committee expects a prompt response from the Administrator.

At this point in the development of the SLS, the development of boosters is secondary to completion of an exploration upper stage. If the Administrator determines that a competition is necessary, the Committee directs NASA to conduct this competition subject to the conditions described in Section 203(g). In the analysis required, the Associate Administrator shall ensure a determination to conduct a booster competition does not in any way create financial pressure significant enough to delay the EM–1 or the EM–2 test flights, and that it does not adversely impact the development of the upper stage.

SUBTITLE B—SPACE OPERATIONS

The Committee finds the International Space Station (ISS) to be an ideal short-term test bed for future exploration systems development including long-duration space travel, therefore the ISS should be utilized to the fullest extent possible for the development of capabilities needed for the future of human exploration beyond low-Earth orbit.

It is the intent of the Committee to ensure the ISS is a research success To that end, the report on the feasibility of extending the operation of the station as required in subsection 211(f) will help inform a framework for the future of the facility. The Committee will use this plan to evaluate future investments in station and research cadence to maximize utilization of the National Lab and other government research efforts.

As directed in subsection 211(g), the Director of the Office of Science and Technology Policy (OSTP) should consider innovative options for encouraging federal agencies to conduct research on the station as often as possible. As ISS will only be available for a finite time period, a timely response will help to ensure there is maximum utilization of this important research facility.

Acquiring and maintaining an operational domestic commercial crew transportation service as soon as is safe and practicable is of the utmost importance to the Committee. The Committee is troubled by the fact that NASA has developed an acquisition strategy that has assumed funding levels in excess of authorized levels. The independent cost and schedule estimate required in subsection 215(f) is intended to ensure maximum transparency for the program and to build confidence in the acquisition approach. The Committee is concerned that the schedule for bringing domestic commercial providers of crew transportation services online has slipped multiple times. The Commercial Crew program is a public-private partnership made possible with substantial taxpayer investment. The objective of the Commercial Crew Program is to assist the private sector in developing capabilities necessary to provide safe, reliable, and affordable domestic crew access to the Station.

The Committee recognizes the vital role that space communications play in current space operations for NASA, as well as other Federal agencies, and the role space communications will play in future science and exploration missions. The Committee is concerned that NASA has not adequately funded plans to continue to support the sustainment and upgrading of space communications and navigation network and infrastructure. Without sufficient planning and investment, NASA could find itself with limited capabilities that will not meet critical mission needs. Therefore, NASA, in consultation with relevant Federal agencies, must develop and implement a long-term plan to meet all projected requirements for its space communications.

TITLE III—SCIENCE

SUBTITLE A—GENERAL

The Committee recognizes that Congress has consistently supported a balanced portfolio of scientific activities, including re-

search and analysis grant programs, technology development, small, medium, and large space missions, and suborbital research activities. Support of a well-rounded science portfolio, as guided by the decadal surveys for astronomy and astrophysics, earth science, heliophysics, and planetary science, allows for innovation and discovery in all areas of the Science Mission Directorate.

The Committee recognizes that in this financially difficult period it is necessary to assess the potential extension of existing missions to determine how such extensions will impact the start of future missions. Consequently, the NASA Administrator is directed to conduct biennial reviews within each of the Science divisions to assess the costs and benefits of extending the date of the termination of data collection for those missions that exceed their planned missions' lifetime.

SUBTITLE B—ASTROPHYSICS

The Committee recognizes that the field of extrasolar (or exoplanet) research has grown in the past 20 years, and that recent discoveries of super-Earth planets by the Kepler telescope have created greater interest in finding not only planet similar to ours, but also the prospects for finding biosignatures on these planets. With Kepler potentially unable to gather more scientific data on exoplanets, Section 312 directs NASA to work with the National Academy of Sciences to develop a strategy for how to further the research in this area.

The National Reconnaissance Office (NRO) transferred two telescopes to NASA for potential use. A recent NASA Science Definition Team issued a report on the benefits of the potential science that could be collected by the addition of the 2.4 meter aperture NRO telescope to plans for the Wide-Field Infrared Survey Telescope (WFIRST). While the report indicates that the 2.4 meter telescope would be a significant tool to conduct science, Section 314 requires a detailed report about the cost difference between the original WFIRST design plans and those of the WFIRST 2.4 that include the new telescope, as well as how much the total cost would be to store and maintain the donated assets.

The Committee recognizes that completing the James Webb Space Telescope is a priority. As its launch draws near, NASA should maintain its current level of effort regarding the pre-formulation of the WFIRST mission, which is next on the list of priorities of large space-based telescopes selected by the scientific community and recommended by the latest astronomy and astrophysics decadal survey. While significant investment and development of WFIRST cannot occur until JWST is completed, the Administrator should continue concept definition and pre-formulation activity activities for WFIRST.

The Committee was concerned with the Administration's proposal to "mothball" the Stratospheric Observatory for Infrared Astronomy (SOFIA) before an initial senior review or external review was conducted. Section 316 prohibits any FY 2014 funding from being used to shut down or prepare to shut down SOFIA

SUBTITLE C—PLANETARY SCIENCE

The Committee applauds NASA for the tremendous successes in the planetary science program and believes the program should be

made a top-priority for the agency. The National Academies' decadal surveys provide NASA and the Administration with the scientific community's consensus on priority space science missions. The Committee strongly supports the priorities laid out in the Planetary Science decadal survey, Visions and Voyages for Planetary Science in the Decade 2013–2022. However, the Committee is highly disappointed with the cuts proposed for planetary science over the last several years and the steep reduction in planned missions for the next decade.

In accordance with priorities established in the most recent decadal survey for planetary science, the agency is directed to maintain a balanced planetary science program, including at least one Flagship-class mission per decadal period. To this end, the Committee is supportive of a Europa mission with a goal of launching by 2021.

Further, the Committee believes a steady cadence of small, medium, and large missions is the best way to sustain a healthy planetary science program and maintain public interest and excitement, and strongly urges NASA to adhere to the cadence of missions recommended in the decadal survey, as possible under the funding provided. In addition to the Planetary Science decadal survey's recommendations for Discovery, New Frontiers, and Flagship missions outlined in the bill, Congress recognizes the priority the Planetary Science decadal survey has placed on planning and implementing a Mars sample return mission in the next decade. This provision does not limit consideration of that mission.

The Committee recognizes the George E. Brown, Jr., Near-Earth Object Survey, as authorized in the National Aeronautics and Space Administration Authorization Act of 2005, as the means for the discovery, tracking, cataloguing, and characterization of near-Earth objects 140 meters in diameter and larger. NASA should place a higher priority on identifying 90 percent of these "continent," "region," and "city-killer" sized asteroids by 2020. In addition to completing a catalogue of hazardous near-Earth objects, it is important for planetary defense purposes to have a warning and mitigation plan in place, both domestically, and in conjunction with global partners.

NASA is party to several well-known private partnerships with institutions, including, for example, the Minor Planet Center at the Smithsonian Astrophysical Observatory. NASA should seek to leverage the capabilities of the private sector and philanthropic organizations in order to meet the objectives stated in the George E. Brown, Jr., Near-Earth Object Survey and in Section 322.

The Committee also encourages NASA to expand its collaboration with private institutions focused on studying life's origin, evolution, distribution, and future in the Universe, including searches for natural and technological signatures of life on distant worlds.

SUBTITLE D—HELIOPHYSICS

The Committee remains concerned with the potential impacts of space weather events on national interests and critical infrastructure. Section 332 requires the Office of Science and Technology Policy to report on current and planned space weather monitoring requirements and capabilities necessary for the development of forecasts and mitigation processes. Coordination with various agencies,

international partners, and private sector efforts should be taken into account.

SUBTITLE E—EARTH SCIENCE

This title reaffirms the goal of NASA's Earth Science activities and directs the NASA Administrator to continue carrying out a balanced Earth science Program and, in doing so, collaborate with other Federal agencies. This title also directs NASA to continue to develop first-of-a-kind instruments that, once proved, can be transitioned to other agencies for operations. The title also directs NASA to seek reimbursement when assuming the development of sensors or measurements used by other agencies.

The Joint Agency Satellite Division currently manages the reimbursable satellite and instrument development activities performed by NASA for partner agencies. The division's portfolio includes the Joint Polar Satellite System (JPSS), the Geostationary Operational Environmental Satellite R–Series (GOES–R), the Deep Space Climate Observatory (DSCOVR), Jason-3, MetOp/POES, and Polar Free Flyer. The Committee recommends that NASA utilize this existing organization for all activities on behalf of other agencies.

TITLE IV—AERONAUTICS

The Committee notes the importance of a robust aeronautics research portfolio to the United States and NASA in particular. Section 401 states it is the sense of Congress that NASA should coordinate with other Federal agencies and the private sector to ensure that there is synergy across the various aeronautics research efforts and to maximize available resources without duplicating effort.

Section 403 is intended to facilitate cross-agency coordination for the safe integration of unmanned aerial systems (UAS) into the National Airspace System (NAS). At present, domestic use of UAS is limited to academic and government institutions that receive a Certificate of Waiver or Authorization and private sector entities that receive certification by the Federal Aviation Administration (FAA). However, UAS usage is poised to continue growing, and NASA and FAA must coordinate research and development to address the technical issues listed in the bill, all of which are necessary precursors to the safe integration of UAS into the NAS. This section would also require that flight data derived from university UAS research and development activities be supplied to NASA and other agencies so as to aid in the development of regulatory standards for UAS operation in the NAS.

NASA is making a concerted effort to accelerate the development and certification of new composite materials through its Integrated Systems Research Program. In Sec. 404, the Committee seeks to ensure that in doing so, NASA consults with partners in industry and across the Federal government in order to ensure that all of these research efforts build on one another so as to minimize duplication and maximize results.

Currently, the majority of hypersonic research funded by the Federal government is conducted by the Department of Defense. However, given NASA's historical work on hypersonics and the potential for NASA's hypersonic research program to be revived at

some point in the future, the Committee believes it is essential for NASA to remain involved in charting the course for Federally-funded hypersonic research. Section 405 requires the Administrator to create a roadmap for research and development in hypersonic aircraft in consultation with other Federal agencies in order to ensure that research efforts across the Federal government complement one another and are working toward a unified set of goals. Additionally, Section 406 and 408 seek to coordinate other technological research that is currently funded by NASA and other agencies, specifically supersonic and rotorcraft research.

As the FAA continues to move forward with its NextGen airspace management modernization initiative, it is imperative that NASA's research and development activities be continually tailored to support the NextGen program as it evolves to ensure that Federal funds are used efficiently and effectively. Section 407 requires the Administrator to review NASA's activities in support of NextGen in conjunction with other Federal agencies in order to synchronize NASA's research and development with the NextGen program.

TITLE V—SPACE TECHNOLOGY

In February of 2013, NASA announced the creation of a new Mission Directorate for the Space Technology program. This bill represents the first opportunity for the Committee to authorize the new Mission Directorate and to provide policy direction for its activities. The Committee supports the creation of enabling technologies for long-lead missions as well as an independent program designed specifically for solving complex problems with innovative solutions. The Committee supports the Advanced Exploration Systems program in the Human Exploration and Operations Mission Directorate and directs NASA to continue these technology development programs and activities.

The Committee authorizes the creation of the Space Technology program within the specific guidelines in Section 70507 of Title 51 as amended in Section 502. The program should continue to develop cross-cutting technologies and coordinate activities within the various mission directorates. The Administrator is encouraged to require all new proposed technology demonstrations which can be carried out in low-Earth orbit to consider utilizing the ISS internal, external, or small spacecraft deployment capabilities as a means of reducing the life cycle costs. The International Space Station, as complemented by U.S. commercial cargo transportation and research infrastructure providers, offers NASA's Space Technology Program a cost effective and rapid means of demonstrating emerging space technologies and maturing new space systems.

The Committee has included a directive that the Administrator shall ensure that efforts within the Space Technology program are not duplicative of efforts already underway in other mission directorates.

TITLE VI—EDUCATION AND OUTREACH

The Administration's latest budget request proposed consolidating NASA education activities within the Office of Education, for a second year in a row. Education activities within the Mission Directorates would be zeroed out in all but one Directorate. As a

result, numerous Science, Technology, Engineering, and Mathematics (STEM) education activities that are embedded in larger NASA research programs would likely be terminated. Sec. 601 reaffirms the importance of NASA's existing STEM education activities and requires NASA to maintain its STEM education and outreach activities within the Mission Directorates as well as the Office of Education. This section also directs the Administrator to continue to operate the National Space Grant College and Fellowship program. This section reaffirms Congress' commitment to NASA's "informal science education at science centers and planetariums." Informal education takes place outside of the classroom and plays an important role in instilling an interest in STEM education in children and adults.

Sec. 602 requires an Independent Review of the National Space Grant College and Fellowship Program in order to ensure that this program is doing all it can to support our STEM workforce and train the next generation of scientists and engineers. This section also allows the participation of two year institutions in the Space Grant program, and adds outreach to K–12 students to support STEM engagement into the Space Grant program.

TITLE VII—OTHER PROVISIONS

Members of the Committee have expressed concerns with the lack of specifics on the schedule, technical plan, budget and vision for the Asteroid Retrieval Mission; these concerns have not been addressed by the Administration. The Administration should seek input from Congress before attempting large-scale projects that involve major financial commitments from taxpayers. Additionally, the Committee encourages the Administrator to work with Congress in the future before proposing missions of this magnitude.

The purpose of Sec. 702 is to allow covered programs to utilize obligated funds for conducting meaningful work, thus enabling contractors to make maximum progress in meeting the established technical schedule goals of these programs. This will provide more stability of purpose for covered programs and facilitate progress toward Congressionally-mandated milestones.

In 2010 the President proposed the cancellation of the Constellation Program [1] after NASA Administrator Charles Bolden informed Congress that work on the Constellation Program must slow to ensure NASA would not run afoul of the Anti-Deficiency Act due to an inaccurate accounting of potential termination liability.[2]

Potential termination liability refers to an estimate of possible costs that a contractor would incur if it stopped work on a contract prior to completing performance in the event that the Government terminated the contract for convenience.[3] The Federal Acquisition Regulations (FAR) permit government agencies to manage potential termination liability on incrementally-funded, multiple year, cost-reimbursable contracts in at least two ways: the agency may require a contractor to track and account for their own potential

[1] Budget of the United States Government for Fiscal Year 2011, at 129–30, available at www.gpoaccess.gov/usbudget/fy11/index.html (last visited December 2, 2013).

[2] Letter From NASA Administrator Charles Bolden to House Science and Technology Committee Chairman Bart Gordon, June 9, 2010.

[3] Letter from NASA CFO Beth Robinson to House Science, Space, and Technology Committee Chairman Lamar Smith, February 22, 2013.

termination liability costs under the limitations of funds clause [4]; or, the agency may use a special termination costs clause which allows the contractor to ignore possible termination liability when calculating its contract funding request.[5]

Under the special termination costs clause, "NASA informs the contractor that it need not include potential termination liability in its contract funding request calculations under the limitation of funds clause, and that NASA will still pay the contractor for allowable termination costs in addition to incurred costs in the event of a contract termination, usually up to an agreed-upon ceiling amount." [6] On most NASA contracts, the vendor is ultimately responsible for tracking their termination liability to ensure there are enough funds provided on a contract to cover any potential loss as a result of cancellation for convenience.[7] However, it is not unheard of for NASA to use a special termination costs clause, and the agency used them on three contracts during the Constellation Program.[8] In the past, NASA contractors have reported, and the Government Accountability Office (GAO) has cited, inconsistent practices with regard to tracking and funding termination liability properly.[9]

Following the cancellation of the Constellation Program, GAO reviewed NASA's management of potential termination liability and found, "The Agency has not issued detailed instructions or provided guidance to direct contracting officers and others on how to monitor or track termination liability and to supplement the reliance on the relevant FAR provisions. As a result, resource analysts and financial managers inconsistently monitor and fund potential termination liability across the projects we reviewed," [10] and that "In some cases, NASA contractors said they did not view insufficient potential termination liability funding as a risk because NASA's past practice on contract terminations was to provide additional funding to the contract to cover the agreed upon termination settlement costs and they assumed this would be the continuing NASA practice." [11]

As of the beginning of calendar year 2013, contractors for the Space Launch System and Orion crew capsule carried approximately $462 million in potential termination liability costs as a result of NASA's inconsistent use of the limitation of funds clause and management of termination liability.[12] This section will provide contractors consistency and allow them to apply reserved funds to contract work.

The purpose of Sec. 703 is to ensure that the underlying provision 30104 of Title 51 is initiated when the Administrator makes

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[4] Federal Acquisition Regulations 52.232–22
[5] Federal Acquisition Regulations 249.501–70
[6] *Ibid. 3*
[7] Government Accountability Office Report GAO–11–609R, "NASA Needs to Better Assess Contract Termination Liability Risks and Ensure Consistency in Its Practices." July 12, 2011, p. 4.
[8] *Ibid. 3*
[9] *Ibid. 7*
[10] *Ibid. 7*
[11] *Ibid. 7*
[12] Briefing chart titled "NASA Ongoing Major programs," NASA response to an inquiry from the House Committee on Science, Space, and Technology, February, 2013. Document indicated $255 million in potential termination liability for Orion Multi-Purpose Crew Vehicle and $207 million in potential termination liability for Space Launch System.

a determination that a cost overrun has occurred rather than after the Administrator transmits a report detailing such determination.

Sec. 704 directs NASA to report to Congress on the criteria it uses to determine program and project reserve levels, and how that criteria complements the directive to budget at a 70 percent confidence level.

Sec. 705 directs the Administrator to transmit a report not later than 270 days after enactment of this Act describing how NASA conducts independent reviews of projects and programs and how NASA ensures the independence of members of these reviews prior to their assignment.

The Committee remains concerned with the intense efforts by foreign actors to exploit U.S. technology and intellectual property. NASA is tasked with the dual requirements to "provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof" and "establish such security requirements, restrictions, and safeguards as the Administrator deems necessary in the interest of national security." The Commercial Technology Transfer program as authorized by Section 50116(a) of Title 51 outlines goals for the program but does not include a goal that takes national security into consideration. Sac. 706 would direct the Administrator to maintain the commercial technology transfer program in a manner that provides a clear benefit to not only the domestic economy and research, but also national security.

Sec. 707 instructs the National Academy of Public Administration to assess the effectiveness of the NASA Advisory Council and provide recommendations regarding changes to the structure of the Council that may increase the Council's effectiveness. This section also directs the Council to provide advice to both the Administration and Congress, not unlike what the Aerospace Safety Advisory Panel (ASAP) and the NASA Office of the Inspector General do currently.

The Committee is concerned that NASA may not be utilizing all of the program management and oversight tools available with regards to cost estimation. The development Joint Confidence Levels (JCL) for programs and program segments provide important information for decision makers to assess the status of a program or project, as well as valuable data about the progress they are making. Sec. 708 directs the Administrator to report on the agency's efforts to implement and utilize JCLs. The section also requires the NASA Administrator to develop guidance on when and Independent Cost Estimate and Independent Cost Assessment should be used. Independent cost estimates and assessments are valuable tools in enhancing the realism of NASA's cost estimating activities.

NASA is the ninth largest Federal Government real property holder; however, nearly 80 percent of the agency's facilities are 40 or more years old.[13] A 2012 study by NASA estimated that NASA may have as many as 865 unneeded facilities, with maintenance

[13] "NASA's Efforts to Reduce Unneeded Infrastructure and Facilities." Office of Inspector General. February 12, 2013. http://oig.nasa.gov/audits/reports/FY13/IG-13-008.pdf, p.i

costs of over $24 million a year.[14] Similarly, NASA has a backlog of over $2.19 billion in deferred maintenance.[15]

The NASA Office of the Inspector General (OIG), the Government Accountability Office (GAO), the National Academies, and Congress have repeatedly highlighted the need to address NASA's aging infrastructure.

The NASA Authorization Act of 2010 required a study of NASA's institutional requirements that would identify "a strategy to evolve toward the most efficient retention, sizing, and distribution of facilities, laboratories, test capabilities, and other infrastructure consistent with NASA's missions and mandates," stating that the Administrator, "should pay particular attention to identifying and removing unneeded or duplicative infrastructure."[16] NASA's response described a strategy to translate the Agency Facilities Strategy developed in 2009 into results through the creation of an Agency Master Plan, and specifically through more integrated and prominent governance, specific facilities consolidation and renewal metrics, and a more "corporate" model for managing technical capabilities efficiently and effectively. The report noted NASA's goal of a 10 percent reduction by 2020 and a 15% reduction by 2050.

In 2009, NASA developed an Agency Facilities Strategy and subsequently developed its first Agency-wide integrated master plan, based on Center input, to implement this strategy and align funding with facilities requirements.[17] A December 2011 OIG report on the development of the Agency Master Plan found deficiencies within the individual Center plans that had the potential to limit the Agency plan's usefulness. Specifically, the OIG report found that the Center plans "(1) were developed using funding assumptions for the recapitalization program that are no longer realistic and (2) are missing essential information needed to make objective Agency-wide real property decisions. In addition, 5 of the 10 Centers did not develop master plans to reduce their real property footprint in accordance with Agency goals because of uncertain mission requirements."[18]

One of the greatest challenges facing NASA's management of its facilities and infrastructure is the lack of a comprehensive roadmap to identify long-term mission needs for human spaceflight exploration of the solar system. The most recent NASA OIG report noted that reducing infrastructure and facilities is a challenge because of the considerable changes in mission focus over the past six years due to the end of the Space Shuttle program, the initiation of the Constellation Program in 2004 and its subsequent termination in 2010, and the development of the Space Launch System and Orion crew capsule. Without a long-term goal or destination the agency is unable to determine the facilities and infrastructure necessary to implement a strategy to achieve that goal. This legislation contains a provision directing NASA to develop such a Human Exploration Roadmap. Absent a roadmap and stability of purpose for NASA's

[14] "NASA's Efforts to Reduce Unneeded Infrastructure and Facilities." Office of Inspector General. February 12, 2013. http://oig.nasa.gov/audits/reports/FY13/IG-13-008.pdf, p.i

[15] "Deferred Maintenance Assessment Report," NASA, October 1, 2012.

[16] Public Law 111–267, "NASA Authorization Act of 2010."

[17] "NASA's Efforts to Reduce Unneeded Infrastructure and Facilities." Office of Inspector General. February 12, 2013. http://oig.nasa.gov/audits/reports/FY13/IG-13-008.pdf, p.v–vi

[18] "NASA's Infrastructure and Facilities: An Assessment of the Agency's Real Property Master Planning." Office of Inspector General. December 19, 2011. http://oig.nasa.gov/audits/reports/FY12/IG-12-008.pdf, p.iii

human spaceflight exploration mission objectives, NASA will continue to be unable to determine what facility and infrastructure capabilities are needed.

As NASA seeks to manage its infrastructure challenges, it is important that it follow a rigorous process to ensure that facilities and capabilities are not lost because of short-sighted decisions and that appropriate oversight is conducted to ensure taxpayer equities are appropriately considered. Sec. 710 requires NASA to develop a detailed plan with the goal of positioning the Administration to have the facilities, laboratories, tools and approaches necessary to address NASA's needs. The plan requires the identification of future research and development needs, and the identification of candidate facilities for disposal that are consistent with future needs. The plan requires a strategic approach to addressing deferred maintenance tasks. Sec. 710 also requires publication of a NASA policy that guides the use of NASA's authorities to transfer or dispose of property so as to ensure that property transfer is transparent and follows the appropriate federal regulations. Finally, Sec. 710 requires the Administrator to establish a capital fund to facilitate the modernization of facilities and laboratories, and required annual updates to Congress on the status of the capital fund.

Reports by the Senate Armed Services Committee (SASC), the Department of Commerce (DoC) industrial base assessment, and the Government-Industry Data Exchange Program (GIDEP) demonstrate that counterfeit electronic parts are a serious and growing problem and that such parts have contaminated industry supply chains. Section 1206 of the NASA Authorization Act of 2010 directed the Administrator to develop and implement a mitigation plan to reduce the number of counterfeit electronic parts in the NASA supply chain. Reinforcing this provision, NASA requested the Committee include additional statutory language in the NASA Authorization Act of 2013 that largely mirrors Section 818 of the FY12 National Defense Authorization Act. The Committee included this legislative provision and is encouraged by NASA's proactive efforts to mitigate counterfeit electronic part intrusion into the supply chain, including efforts at NASA's Jet Propulsion Laboratory (JPL) to utilize deoxyribonucleic acid (DNA) authentication marking on items which have been determined to be at high risk for counterfeiting.

Sec. 712 creates oversight requirements, many of which are already conducted by NASA, in order to provide more transparency and accountability regarding NASA's use of Space Act Agreements.

Subsection (a) ensures that NASA enters into funded Space Act Agreements where partners contribute in total no less than the amount of funding contributed by the U.S. government, unless the Administrator determines the directive impracticable. The Committee recognizes that such cost sharing arrangement may not always be practicable, as Space Act Agreements often do not require standardized accounting measures, and Space Act Agreements may not reflect prior investments or in-kind contributions. This section brings NASA's Space Act Agreement authority in line with the Department of Defense's other transaction authority, as outline in 10 USC Section 2371(e)(1)(B).

Subsection (b) restricts the use of Space Act Agreements to instances where other contracts, grants, or cooperative agreements

(which have greater levels of oversight) are not feasible or appropriate. This provision directs the Associate Administrator for Procurement to determine the appropriateness of the use of a Space Act Agreement. This requirement is already established for funded Space Act Agreements in NAII 1050–1C, NASA's Space Act Agreement Guide, February 25, 2013.

Subsection (c) directs the Administrator to make Space Act Agreements available for public notice and comment at least 30 days prior to agreement. The Committee notes the importance of protecting not only sensitive and classified information from disclosure, but also partner proprietary information that could provide a competitive advantage or disadvantage to another party; therefore the provision allows for appropriate redactions. NASA already has an internal review and concurrence process outlined in NAII 1050–1C, NASA's Space Act Agreement Guide, February 25, 2013. The Committee does not intend for the public notice and comment period outlined in this subsection to add additional time to the review process, and believes both processes can be accomplished in parallel before a finalized agreement is signed. The Committee also does not intend for this subsection to delay Space Act Agreements, but rather to inform the public and provide for transparent agency actions. If a Space Act Agreement is modified during this process, a relevant agency official should outline the rationale for why the changes are not significant enough to warrant an extension to new public notice and comment period.

Subsection (d) requires NASA to make finalized Space Act Agreements available in a searchable format on a public website, with appropriate redactions for sensitive, classified, or proprietary information. NASA may also deem information that provides a competitive advantage or disadvantage to a party worthy of redaction. The Committee notes that this should not be a burden to the agency, and that this provision would bring the agency into compliance with the Administration's various transparency directives.

Subsection (e) outlines a yearly reporting requirement that details NASA's use of Space Act Agreements. The Committee notes the importance of protecting not only sensitive and classified information from disclosure, but also partner proprietary information that could provide a competitive advantage or disadvantage to another party; therefore the provision allows for appropriate redactions.

Section 70702(a) of Title 51 outlines a process to investigate any incident that results in the loss of any federal space vehicle, crewmember, or passenger. Sec. 713 is intended to update the existing criteria such that any accident of a suborbital or orbital space vehicle carrying a human that is being operated at the behest of the federal government should be included in the presidential accident investigation statute.

The NASA Authorization Act of 2010 directed the Administrator to coordinate with the various space agencies of the Inter-Agency Space Debris Coordination Committee. To date, Congress has not received a formal update on this process and directs the Administrator to provide a progress report on these efforts. Additionally, the Office of Science and Technology Policy was directed in Section 1202(b)(2) of the same act to "[coordinate] with the Director of the National Security Council and using the President's Council of Ad-

visors on Science and Technology coordinating mechanism, shall develop an overall strategy for review by the President, with recommendations for proposed international collaborative efforts to address this challenge." To date, there has been no report provided to Congress on this strategy. Sec. 715 directs the Director of the Office of Science and Technology Policy to provide the plan required under 42 U.S.C. 18441(b)(2).

The Committee is concerned about recent geopolitical changes that have the potential of creating instability in the supply of the RD–180 and NK–33 engines. The provision in Section 720 directs the NASA Administrator to consult with the Secretary of Defense to ensure that any next generation liquid engine developed for National Security can contribute, to the extent practicable, to NASA's space programs and missions.

IX. Committee Oversight Findings

Pursuant to clause 3(c)(1) of rule XIII of the Rules of the House of Representatives, the Committee held an oversight hearing and made findings that are reflected in the descriptive portions of this report.

X. Statement on General Performance Goals and Objectives

In accordance with clause 3(c)(4) of rule XIII of the Rules of the House of Representatives, the performance goals and objectives of the Committee are reflected in the descriptive portions of this report, including the goal to reauthorize the science, aeronautics, and human space flight and exploration programs of the National Aeronautics and Space Administration (NASA), and address space and aeronautics policy and programmatic issues.

XI. New Budget Authority, Entitlement Authority, and Tax Expenditures

In compliance with clause 3(c)(2) of rule XIII of the Rules of the House of Representatives, the Committee adopts as its own the estimate of new budget authority, entitlement authority, or tax expenditures or revenues contained in the cost estimate prepared by the Director of the Congressional Budget Office pursuant to section 402 of the Congressional Budget Act of 1974.

XII. Advisory on Earmarks

In compliance with clause 9(e), 9(f), and 9(g) of rule XXI, the Committee finds that H.R. 4412, the "National Aeronautics and Space Administration Authorization Act of 2014", contains no earmarks.

XIII. Committee Cost Estimate

The Committee adopts as its own the cost estimate prepared by the Director of the Congressional Budget Office pursuant to section 402 of the Congressional Budget Act of 1974.

XIV. Congressional Budget Office Cost Estimate

Pursuant to clause 3(c)(3) of rule XIII of the Rules of the House of Representatives, the following is the cost estimate provided by

the Congressional Budget Office pursuant to section 402 of the Congressional Budget Act of 1974.

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, May 15, 2014.

Hon. LAMAR SMITH,
Chairman, Committee on Science, Space, and Technology,
House of Representatives, Washington, DC.

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the enclosed cost estimate for H.R. 4412, the National Aeronautics and Space Administration Authorization Act of 2014.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contact is Martin von Gnechten.

Sincerely,

ROBERT A. SUNSHINE
For Douglas W. Elmendorf.

Enclosure.

H.R. 4412—National Aeronautics and Space Administration Authorization Act of 2014

Summary: H.R. 4412 would authorize the appropriation of about $17.6 billion for 2014 for activities of the National Aeronautics and Space Administration (NASA). The amount appropriated to NASA for 2014 is also about $17.6 billion. For the purpose of this estimate, CBO assumes that no further appropriations will be provided to NASA for fiscal year 2014 and we therefore estimate that no additional discretionary costs would result from enacting H.R. 4412.

CBO estimates that enacting H.R. 4412 would increase direct spending by adding about $600 million over the 2015–2024 period to outlays for certain NASA contracts. Because the legislation would increase direct spending, pay-as-you-go procedures apply. Enacting the legislation would not affect revenues.

H.R. 4412 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA).

Estimated cost to the Federal Government: The estimated budgetary effect of H.R. 4412 is shown in the following table. The costs of this legislation fall within budget functions 250 (general science, space, technology) and 400 (transportation).

	By fiscal year, in millions of dollars—					
	2015	2016	2017	2018	2019	2015–2019
CHANGES IN DIRECT SPENDING						
Estimated Budget Authority	600	0	0	0	0	600
Estimated Outlays	400	200	0	0	0	600

Basis of estimate: For this estimate, CBO assumes that H.R. 4412 will be enacted near the end of 2014. Appropriations for 2014 have been enacted, and that funding amount is roughly the same as the authorization contained in H.R. 4412. For the purpose of this estimate, CBO assumes there will not be any further appropriations for this fiscal year. As a result, there is no estimated discretionary cost associated with H.R. 4412.

Section 702 addresses how NASA should budget for termination liability in the event contracts for certain programs, including the

International Space Station, the Space Launch System, the James Webb Space Telescope, and the Orion crew capsule, are terminated. Based on information provided by NASA, CBO estimates that contracts involving those programs are currently funded at about $2 billion per year. NASA has obligated but not expended roughly $600 million under such contracts to cover federal obligations in the event that those contracts are terminated. Those obligations include the federal government's liability for such items as severance pay, undelivered work, and rent for unexpired leases.

Under the bill, NASA (and its contractors) would be prohibited from reserving any appropriated funds to pay for federal liabilities in the event of a contract termination. Instead, work would proceed under the contract, and all appropriated amounts would be spent to pay for that work.

In most years, few NASA contracts are terminated for any reason.[1] Hence, CBO estimates that provisions in H.R. 4412 prohibiting the reservation of funds for potential termination liability costs would increase outlays because we expect that NASA would spend the roughly $600 million that it would otherwise reserve for contract termination liabilities. Under the legislation, we expect that those amounts would be spent on ongoing costs to fulfill the terms of those contracts in 2015 and 2016.

However, under H.R. 4412, NASA would still be liable for potential termination liability costs and would not be able to use previously appropriated funds to pay them. In CBO's view, the bill would create new budget authority equivalent to the potential termination liability, roughly $600 million. CBO estimates that the chances of spending that amount because of contract termination would be small. Under current law, CBO estimates there is the same small chance that some of the $600 million previously appropriated for potential termination liability will be spent. Thus, CBO estimates that there would be no change in contract termination costs under the bill.

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

CBO ESTIMATE OF PAY-AS-YOU-GO EFFECTS FOR H.R. 4412, AS ORDERED REPORTED BY THE HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY ON APRIL 29, 2014

	By fiscal year, in millions of dollars—												
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2014–2019	2014–2024
NET INCREASE IN THE DEFICIT													
Statutory Pay-As-You-Go Impact	0	400	200	0	0	0	0	0	0	0	0	600	600

Intergovernmental and private-sector impact: H.R. 4412 contains no intergovernmental or private-sector mandates as defined in UMRA.

[1] Government Accountability Office, *NASA Needs to Better Assess Contract Termination Liability Risks and Ensure Constancy in Its Practices,* GAO–11–609R (Washington, DC: July 21, 2011).

Previous CBO estimate: On February 18, 2014, CBO transmitted a cost estimate for H.R. 2687, the National Aeronautics and Space Administration Authorization Act of 2013, as ordered reported by the House Committee on Science, Space, and Technology on July 18, 2013. Many provisions in H.R. 2687 are similar to those in H.R. 4412. However, the bills authorize different amounts over different periods (H.R. 2687 would authorize funding for 2015 in addition to 2014) and include several different policy provisions. In addition to the provision prohibiting the reservation of funds for potential termination liability found in H.R. 4412, H.R. 2687 also would prohibit the government from terminating contracts for the specified programs for the convenience of the government. The CBO cost estimates reflect those differences.

Estimate prepared by: Federal Costs: Martin von Gnechten; Impact on State, Local, and Tribal Governments: J'nell L. Blanco; Impact on the Private Sector: Amy Petz.

Estimate approved by: Peter H. Fontaine, Assistant Director for Budget Analysis.

XV. Federal Mandates Statement

The Committee adopts as its own the estimate of Federal mandates prepared by the Director of the Congressional Budget Office pursuant to section 423 of the Unfunded Mandates Reform Act.

XVI. Compliance with H. Res. 5

A. Directed Rule Making. This bill does not direct any executive branch official to conduct any specific rule-making proceedings.

B. Duplication of Existing Programs. This bill does not establish or reauthorize a program of the federal government known to be duplicative of another program. Such program was not included in any report from the Government Accountability Office to Congress pursuant to section 21 of Public Law 111–139 or identified in the most recent Catalog of Federal Domestic Assistance published pursuant to the Federal Program Information Act (Public Law 95–220, as amended by Public Law 98–169) as relating to other programs.

XVII. Federal Advisory Committee Statement

No advisory committees within the meaning of section 5(b) of the Federal Advisory Committee Act were created by this legislation.

XVIII. Applicability to Legislative Branch

The Committee finds that the legislation does not relate to the terms and conditions of employment or access to public services or accommodations within the meaning of section 102(b)(3) of the Congressional Accountability Act.

XIX. Section-by-Section Analysis

Section 1. Short Title; Table of Contents

This Act may be cited as the "National Aeronautics and Space Administration Authorization Act of 2014".

Section 2. Definitions.

This section provides relevant definitions within the Act.

TITLE I—AUTHORIZATION OF APPROPRIATIONS

Sec. 101. Fiscal year 2014

This section authorizes NASA at levels in line with the Consolidated Appropriations Act, 2014 (P.L. 113–76).

TITLE II—HUMAN SPACE FLIGHT

SUBTITLE A—EXPLORATION

Sec. 201. Space exploration policy

Section 201 states that exploration deeper into the solar system shall be a core mission of NASA. It further states that it is the policy of the United States that the goal of NASA's human exploration program shall be to successfully conduct a crewed mission to the surface of Mars to begin human exploration of that planet. This section adds relevant definitions to title 51 and also adds language to title 42 regarding the acceleration of development of capabilities to enable a human exploration mission to the surface of Mars and beyond through the prioritization of those technologies and capabilities best suited for such a mission in accordance with the Human Exploration Roadmap under title 51. This section states that non-United States human space flight capabilities should only be used as a contingency when no domestic commercial or public-private partnership provider that meets NASA's safety and affordability requirements is available.

Sec. 202. Stepping stone approach to exploration

This section requires the development of a Human Exploration Roadmap defining the capabilities and technologies necessary to extend human presence to the surface of Mars. This section establishes requirements for the content of the roadmap. The roadmap must be transmitted to Congress, updated no less frequently than every two years, and include addenda from the NASA Advisory Council and Aerospace Safety Advisory Panel, each with a statement of review. The roadmap must also include an examination of the benefits of utilizing current Administration launch facilities for trans-lunar missions.

Sec. 203. Space Launch System

Section 203 contains findings regarding the importance of the Space Launch System (SLS) and describes its intended uses. It includes a sense of Congress stating that the President's budget requests for the SLS and Orion multipurpose crew vehicle development, test, and operational phases should strive to accurately reflect the resource requirements of each of those phases. This section requires the Administrator to make expeditious development, test, and achievement of operational readiness of the SLS and the Orion crew capsule the highest priority of the exploration program. It requires a Government Accountability Office review of NASA's acquisition of ground systems in support of the SLS, and establishes requirements for the review. This section requires the Administrator to report on the effort and budget required to enable and utilize a cargo variant of the SLS configuration. This section further requires NASA to conduct a competition among students in elementary and secondary schools to name the elements of NASA's

exploration program. Section 203 requires a report to Congress describing the estimated cost of an advanced booster for SLS, detailing changes in development costs that may result from conducting a competition for an advanced booster, and outlining potential schedule delay resulting from a competition. It directs NASA to conduct a competition for an advanced booster if the Associate Administrator reports the results would be cost reductions and no adverse schedule impact in the required report. It directs NASA to conduct a competition for an advanced booster as soon as practicable after the development of the upper stage, if the Associate Administrator reports the results would be cost reduction and no adverse schedule impact in the required report.

Sec. 204. Orion crew capsule

Section 204 states that Orion must meet the practical needs and the minimum capability requirements described in law. It requires a report to Congress detailing the components and systems of Orion that ensure it is in compliance with the law and the expected date that Orion will be available to transport crew and cargo to the ISS, as well as certification that the requirements of the law will be met in time for the first crewed test flight in the year 2021.

Sec. 205. Space radiation

This section requires the Administrator to develop a space radiation mitigation and management strategy and implementation plan. The strategy and plan must be submitted to Congress. The Administrator, in consultation with the heads of other agencies, must assess the national capabilities for carrying out critical ground-based research on space radiation biology.

Sec. 206. Planetary protection for human exploration missions

This section requires the Administrator to contract with the National Academies for a study to explore the planetary protection ramifications of future missions by astronauts. The study must be submitted to Congress.

SUBTITLE B—SPACE OPERATIONS

Sec. 211. International Space Station (ISS)

This section contains findings regarding the importance of the International Space Station (ISS) and the need for access to the ISS. This section states that the ISS shall have two primary objectives: supporting the goal established in Section 201 of this Act and pursuing a research program that advances knowledge and provides benefits to the Nation. It shall continue to 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. Section 211 states that the ISS shall be utilized to the maximum extent practicable for the development of capabilities and technologies needed for the future of human exploration beyond low-Earth orbit. This section requires the Administrator to take all necessary steps to support the operation and full utilization of the ISS and seek to minimize the operating costs of the ISS. It further states that reliance on foreign carriers for crew and cargo is unacceptable and the Nation's human space flight program must ac-

quire the capability to launch American astronauts on American rockets from American soil as soon as is safe and practically possible. It reaffirms Congress' commitment to the development of a commercially developed launch and delivery system to the ISS for crew missions. This section reaffirms that NASA shall make use of the United States' commercially provided ISS crew transfer and crew rescue services to the maximum extent practicable. Section 211 reaffirms that the Orion crew capsule shall provide an alternative means to deliver crew and cargo to the International Space Station, in the event other vehicles are unable to perform that function. It also reaffirms that NASA shall pursue means to maximize ISS logistics capabilities, reduce risks to ISS systems sustainability, and minimize United States operations costs relating to the ISS. This section amends the law to state that it is the policy of the United States to maintain an uninterrupted capability for human space flight and operations in low-Earth orbit and beyond as an essential instrument of national security and the capability to ensure continued United States participation and leadership in the exploration and utilization of space. This section requires the Administrator to submit a report to Congress on the feasibility of extending the operation of the ISS and also requires the Director of the Office of Science and Technology Policy to develop and transmit to Congress a strategic plan for conducting research in the physical and life sciences and related technologies on the ISS through at least 2020. Finally, this section requires the Comptroller General to submit a report to Congress on the progress of the chosen not-for-profit entity for management of the National Laboratory.

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

Section 212 includes a sense of Congress regarding the importance of enhanced utilization of the ISS National Laboratory. This section requires the Administrator to contract with the National Academies for an assessment (to be transmitted to Congress) to identify barriers impeding enhanced utilization of the ISS National Laboratory, recommend ways to encourage companies to make greater use of the ISS National Laboratory, and identify any legislative changes that may be required.

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

This section directs the Administrator to utilize the ISS for Science Mission Directorate missions in low-Earth orbit wherever it is practical and cost effective to do so.

Sec. 214. International Space Station cargo resupply services lessons learned

This section requires the Administrator to transmit a report to Congress that identifies lessons learned from the Commercial Resupply Services contract, indicates whether changes are needed to NASA's procurement and management of similar services upon expiration of the existing contract, and identifies any lessons learned that should be applied to the procurement and management of commercial crew services.

Sec. 215. Commercial Crew Program

Section 215 states it is the sense of Congress that United States commercially-provided crew transportation systems offer the potential of serving as the primary means of transporting American astronauts to and from the ISS and serving as ISS emergency crew rescue vehicles. It is the sense of Congress that credibility in the Administration's budgetary estimates for the Commercial Crew Program can be enhanced by an independently developed cost estimate. This section states that the objective of the Commercial Crew Program shall be to assist the development of at least one crew transportation system to carry NASA astronauts safely, reliably, and affordably to and from the ISS and to serve as an emergency crew rescue vehicle as soon as practicable under the funding levels authorized in this Act. This section requires NASA to ensure that, consistent with the findings and recommendations of the Columbia Accident Investigation Board, safety is the highest priority in its evaluation and selection of contracts for the development of commercial crew transportation capabilities. It requires the Administrator to strive through the competitive selection process to minimize the Program's lifecycle cost to NASA. Section 215 requires the Administrator to ensure that every crew transportation services provider has provided evidence-based support for their costs and schedule. This section requires the Administrator to arrange for the initiation of an Independent Cost and Schedule Estimate that meets specified requirements. This estimate must be provided to Congress. This section also requires the Administrator to transmit an implementation plan based on the estimate with four distinct options for the final stage of the Commercial Crew program: a strategy that assumes an appropriation of $600 million over three years; a strategy that assumes an appropriation of $700 million over three years; a strategy that assumes an appropriation of $800 million over three years; and a strategy that has yet to be considered previously, but that NASA believes could ensure the flight readiness date of 2017 for at least one provider or decrease the program cost. Each strategy shall include the contracting instruments NASA will employ to acquire the services in each phase of development or acquisition and the number of commercial providers NASA will include in the program.

Sec. 216. Space communications

This section directs the Administrator to develop a plan (to be transmitted to Congress) for updating NASA's space communications architecture for both low-Earth orbit operations and deep space exploration so that it is capable of meeting NASA's needs over the next twenty years. The plan shall include life-cycle cost estimates, milestones, estimated performance capabilities, and five year funding profits. This section specifies additional requirements for the plan.

TITLE III—SCIENCE

SUBTITLE A—GENERAL

Sec. 301. Science portfolio

Section 301 amends the law to state that a balanced and adequately funded set of activities contributes to a robust and productive science program that serves as a catalyst for innovation and discovery. This section states that unless otherwise directed by Congress, NASA shall take into account the current decadal surveys from the National Academies when submitting the President's budget request to Congress.

Sec. 302. Radioisotope power systems

This section requires the Administrator to conduct and transmit to Congress an analysis of NASA requirements for radioisotope power system material needed to carry out high priority robotic missions in the solar system and other surface exploration activities beyond low-Earth orbit, as well as the risks to NASA missions in meeting those requirements due to a lack of adequate domestic production of radioisotope power system material.

Sec. 303. Congressional declaration of policy and purpose

This section amends current law to add the search for life's origin, evolution, distribution, and future in the Universe to the list of objectives of NASA's activities.

Sec. 304. University class science missions

Section 304 includes a sense of Congress regarding the value of principal investigator-led small orbital science mission. This section directs the Administrator to conduct a review of these missions. The Administrator must transmit a report on the review to Congress.

Sec. 305. Assessment of science mission extensions

Section 305 amends the law to require biennial reviews within each of the Science divisions to assess the benefits of extending the date of termination of data collection for missions that exceed their planned mission lifetimes. This section requires consultation by relevant agencies for missions with an operational component. This section requires a report to Congress detailing the assessment required.

SUBTITLE B—ASTROPHYSICS

Sec. 311. Decadal cadence

This section states that the Administrator shall seek to ensure to the extent practicable a steady cadence of large, medium, and small missions when following the guidance provided by the decadal surveys.

Sec. 312. Extrasolar planet exploration strategy

Section 312 requires the Administrator to contract with the National Academies to develop a strategy for the study and exploration of extrasolar planets that would provide a foundation for

NASA roadmaps, strategic plans, and activities related to exoplanet research and exploration.

Sec. 313. James Webb Space Telescope

This section states that it is the sense of Congress that the James Webb Space Telescope (JWST) program will revolutionize our understanding of star and planet formation and how galaxies evolved and advance the search for the origins of the universe; the JWST program will enable American scientists to maintain their leadership in astrophysics and other disciplines; the JWST program is making steady progress towards a launch in 2018; the on-time and on-budget delivery of JWST is a high congressional priority; and maintaining this progress will require the Administrator to ensure that integrated testing is appropriately timed and sufficiently comprehensive to enable potential issues to be identified and addressed early enough to handle within JWST's development schedule.

Sec. 314. National Reconnaissance Office telescope donation

Section 314 requires the Administrator to report to Congress on NASA's plan for developing the Wide-Field Infrared Survey Telescope including a plan for the Wide-Field Infrared Survey Telescope 2.4, which includes the donated 2.4-meter aperture National Reconnaissance Office telescope.

Sec. 315. Wide-Field Infrared Survey Telescope

This section includes a sense of Congress stating that the Administrator should, to the extent practicable, make progress on the technologies and capabilities needed to position NASA to meet the objectives of the WFIRST mission, as outlined in the National Academies' 2010 decadal survey, in a way that maximizes the scientific productivity of meeting those objectives. This section requires the Administrator to ensure that the concept definition and pre-formulation activities for the Wide-Field Infrared Survey Telescope continue while the James Webb Space Telescope is completed.

Sec. 316. Stratospheric Observatory for Infrared Astronomy

Section 316 prohibits the Administrator from using funding appropriated to NASA for FY14 for the shutdown of the Stratospheric Observatory for Infrared Astronomy or any preparation thereof.

SUBTITLE C—PLANETARY SCIENCE

Sec. 321. Decadal cadence

This section states that when following the guidance provided by the decadal surveys, the Administrator shall seek to ensure to the greatest extent practicable that NASA carries out a balanced set of programs in accordance with the priorities established in the most recent decadal survey, including: a Discovery-class mission at least once every 24 months; a New Frontiers-class mission at least once every 60 months; and a Flagship-class mission at least once per decadal survey period, including a Europa mission with a goal of launching by 2021.

Sec. 322. Near Earth objects

Section 322 requires the Administrator to continue to discover, track, catalogue, and characterize the physical characteristic of near-Earth objects equal to or greater than 140 meters in diameter in order to assess the threat of such near-Earth objects to Earth. It shall be the goal of the Survey to achieve 90 percent completion of its near-Earth object catalogue by 2020. Section 322 reaffirms the policy in title 51 relating to detecting, tracking, cataloguing, and characterizing asteroids and comets. This section requires the Office of Science and Technology Policy to transmit to Congress an initial report that provides the following: recommendations and a proposed budget to carry out the Survey program; an analysis of possible options NASA could employ to divert an object on a likely collision course with Earth; and 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. It further requires the Administrator to transmit an annual report that provides a summary of all activities and expenditures taken with regards to the Survey since the enactment of this act. This section requires a technical and scientific assessment of the capabilities and resources to accelerate the Survey and expand NASA's Near-Earth Object program to include detection, tracking, cataloging, and characterizing potentially hazardous near-Earth objects less than 140 meters in diameter.

Sec. 323. Near-Earth Object public-private partnerships

This section states it is the sense of Congress that NASA should seek to leverage the capabilities of private sector and philanthropic organizations in carrying out the Near-Earth Object Survey program in order to meet the goal of the Survey program. It requires the Administrator to transmit a report to Congress describing how the Administration can expand collaborative partnerships to detect, catalogue, and categorize near-Earth asteroids.

Sec. 324. Research on near-Earth object tsunami effects

Section 324 requires the Administrator to prepare a report (to be transmitted to Congress) identifying and describing existing research activities and further research objectives that would increase our understanding of the nature of the effects of potential tsunamis that could occur if a near-Earth object were to impact an ocean.

Sec. 325. Astrobiology strategy

This section would require the Administrator to contract with the National Academies to develop a science strategy for astrobiology to be used in planning and funding research and other activities and initiatives in the field of astrobiology. This section would also require the Administrator to transmit a report containing the strategy to Congress.

Sec. 326. Astrobiology public-private partnerships

Section 326 requires a report to Congress describing how NASA can expand collaborative public-private partnerships to study life's origin, evolution, distribution, and future in the Universe.

Sec. 327. Assessment of Mars architecture

This section requires the Administrator to contract with the National Academies to assess NASA's revised post-2016 Mars exploration architecture and its responsiveness to the National Academies' planetary science decadal surveys and other relevant National Academies Mars-related reports; the long-term goals of NASA's Mars Exploration Program and the program's ability to optimize the science return; the Mars architecture's relationship to Mars-related activities to be undertaken by agencies and organizations outside of the United States; and the extent to which the Mars architecture represents a reasonably balanced mission portfolio. The results of the assessment must be transmitted to Congress.

SUBTITLE D—HELIOPHYSICS

Sec. 331. Decadal cadence

This section states that the Administrator shall seek to ensure to the extent practicable a steady cadence of large, medium, and small heliophysics missions when following the guidance provided by the decadal surveys.

Sec. 332. Review of space weather

Section 332 directs the Director of the Office of Science and Technology Policy to enter into an arrangement with the National Academies to provide a comprehensive study, which will be transmitted to Congress, that reviews current and planned ground-based and space-based space weather monitoring requirements and capabilities, identifies gaps, and identifies options for a robust and resilient capability. The study shall inform the process of identifying national needs for future space weather monitoring, forecasts, and mitigation.

SUBTITLE E—EARTH SCIENCE

Sec. 341. Goal

Section 341 states it is the sense of Congress that NASA is being asked to undertake important Earth science activities in an environment of increasingly constrained fiscal resources, and that any transfer of additional responsibilities to NASA should be accompanied by the provision of additional resources to allow NASA to carry out the increased responsibilities without adversely impacting its implementation of its existing Earth science programs and priorities. This section directs the Administrator to continue to carry out a balanced Earth science program consistent with the recommendations and priorities established in the National Academies' Earth Science Decadal Survey. It instructs the Administrator to collaborate with other Federal agencies, non-government entities, and international partners, as appropriate, in carrying out NASA's Earth science program. This section directs NASA to continue to develop first-of-a-kind instruments that, once proved, can be transitioned to other agencies for operations. Finally, this section states that whenever responsibilities for the development of sensors or for measurements are transferred to NASA from another

agency, the Administrator shall seek, to the extent possible, to be reimbursed for the assumption of such responsibilities.

Sec. 342. Decadal cadence

This section directs the Administrator to seek to ensure to the extent practical a steady cadence of large, medium, and small Earth science missions.

Sec. 343. Venture class missions

Section 343 states it is the sense of Congress that the Administration's Venture class missions provide opportunities for innovation in the Earth Science program, offer low-cost approaches for high-quality competitive science investigations, enable frequent flight opportunities to engage the Earth science and applications community, and serve as a training ground for students and young scientists. It further states it is the sense of Congress that NASA should seek to increase the number of Venture class projects as part of a balanced Earth science program.

Sec. 343. Assessment

This section directs the Administrator to carry out a scientific assessment of NASA's Earth science global datasets to identify those datasets that are useful for understanding regional changes and variability, and for informing applied science research. The assessment must be transmitted to Congress.

TITLE IV—AERONAUTICS

Sec. 401. Sense of Congress

Section 401 states that it is the sense of Congress that 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. It further states that aeronautics research is essential to NASA's mission and should be supported and that the Administrator should coordinate with other stakeholders to minimize duplication and leverage resources. This section states that carrying aeronautics research to a level of maturity that allows NASA's research results to be transitioned to the users is critical to their eventual adoption.

Sec. 402. Aeronautics research goals

This section instructs the Administrator to ensure that NASA maintains a strong aeronautics research portfolio, ranging from fundamental research through integrated systems research, with specific research goals including: enhance airspace operations and safety; improve air vehicle performance; strengthen aviation safety; and demonstrate concepts at the system level.

Sec. 403. Unmanned aerial systems research and development

Section 403 requires the Administrator to direct research and technological development to facilitate the safe integration of unmanned aerial systems into the National Airspace System. It requires the Administrator to update and transmit to Congress a roadmap for unmanned aerial systems research and development.

This section requires that operational flight data from specified cooperative agreements be made available to NASA and the FAA for the development of regulatory standards.

Sec. 404. Research program on composite materials used in aeronautics

Section 404 requires the Administrator to continue NASA's cooperative research program with industry to identify and demonstrate more effective and safe ways of developing, manufacturing, and maintaining composite materials. This section states that the Administrator, in overseeing NASA's work on composite materials, shall consult with relevant Federal agencies and partners in industry to accelerate safe development and certification processes for new composite materials and design methods while maintaining rigorous inspection of new composite materials. It requires the Administrator to transmit to Congress a report detailing the work of NASA on new composite materials and the coordination efforts among agencies.

Sec. 405. Hypersonic research

This section requires the Administrator to develop and transmit to Congress a roadmap for hypersonic aircraft research.

Sec. 406. Supersonic research

Section 406 includes findings regarding the importance of supersonic overland flight and continuing NASA's research program in supersonic flight. It requires the Administrator to develop and transmit to Congress a roadmap for supersonic aeronautics research and development with the goal of developing and demonstrating, in a relevant environment, airframe and propulsion technologies to minimize the environmental impact of supersonic overland flight in an efficient and economical manner.

Sec. 407. Research on NextGen airspace management concepts and tools

This section requires the Administrator, in consultation with the relevant federal agencies, to review NASA's research and development activities in support of NextGen and make any necessary adjustments to NASA's research and development activities in support of NextGen. It also requires the Administrator to report to Congress regarding the progress of NASA's research and development activities in support of the NextGen airspace management modernization initiative, including details of technology transfer to other agencies, consultation with other agencies, and any adjustments made to research activities.

Sec. 408. Rotorcraft research

Section 408 requires the Administrator to prepare and transmit to Congress a plan for research relating to rotorcraft and other runway-independent air vehicles. The plan must 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.

Sec. 409. Transformative aeronautics research

This section states that it is the sense of Congress that the Administrator should encourage investigations into the early-stage advance of new processes, novel concepts, and innovative technology that have the potential to meet national aeronautics needs.

Sec. 410. Study of United States leadership in aeronautics research

Section 410 requires the Administrator to enter into an arrangement with the National Academies for a study to assess the position of the United States in civil aeronautics research compared to the rest of the world. This section establishes requirements for the study. The study must be transmitted to Congress.

TITLE V—SPACE TECHNOLOGY

Sec. 501. Sense of Congress

This section contains a sense of Congress regarding the importance of space technology development.

Sec. 502. Space Technology Program

Section 502 authorizes a Space Technology Program to pursue the development of technologies that enable exploration of the solar system or advanced space science through various elements of NASA. This section also states that the Administrator shall organize and manage NASA's Small Business Innovation Research program and Small Business Technology Transfer program within the Space Technology Program. Additionally, this section requires the Administrator to certify that no project within the Space Technology Program is also under development in any established mission directorate. It requires the Administrator to ensure that NASA's work in space technology is fully coordinated and aligned and results from such work are shared and leveraged within NASA. Work being conducted by the Human Exploration and Operations Mission Directorate in support of advanced space technologies and systems focusing on human space exploration should continue. This section requires a report to Congress comparing NASA's space technology investments with the high-priority technology areas identified by the National Academies in the National Research Council's report on NASA's Space Technology Roadmaps. It requires an annual submission with the budget for each fiscal year describing 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.

Sec. 503. Utilization of the International Space Station for Technology Demonstrations

This section requires the Administrator to utilize the ISS and commercial services for Space Technology Demonstration missions in low-Earth orbit wherever it is practical and cost effective to do so.

TITLE VI—EDUCATION

Sec. 601. Education

Section 601 states it is the sense of Congress that NASA's missions are an inspiration for Americans and that this inspiration has a powerful effect in stimulating interest in science, technology, engineering, and mathematics (STEM) education and careers. This section further states it is the sense of Congress that NASA's Office of Education and mission directorates have been effective in delivering NASA's educational content because of the strong engagement of NASA scientists and engineers in NASA's education and outreach activities. It includes a sense of Congress that NASA should be a central partner in contributing to the goals of the National Science and Technology Council's Federal Science, Technology, Engineering, and Mathematics (STEM) Education 5-Year Strategic Plan. Section 601 directs NASA to continue its education and outreach efforts to: increase student interest and participation in STEM education; improve public literacy in STEM; employ proven strategies for improving student learning and teaching; provide curriculum support materials; and create and support opportunities for professional development for STEM teachers. It states that in order to ensure the inspiration and engagement of children and the general public, the Administrator should continue to carry out education and outreach programs and activities through the Office of Education and NASA's mission directorates and to continue to engage, to the maximum extent practicable, NASA and NASA-supported researchers and engineers in carrying out those programs and activities. This section requires the Administrator to continue to operate the National Space Grant College and Fellowship program through a national network consisting of a State-based consortium in each state. It reaffirms Congress' commitment to informal science education and science centers and planetariums as set forth in the NASA Authorization Act of 2005.

Sec. 602. Independent review of the National Space Grant College and Fellowship Program

Section 602 includes a sense of Congress regarding the importance of the Space Grant Program. This section directs the Administrator to arrange for a review of the Space Grant Program by the National Academies. It expands the Space Grant Program to support outreach to primary and secondary schools to help support STEM engagement and learning at the K–12 level and to encourage K–12 students to pursue postsecondary degrees in fields related to space. This section would also permit a space grant regional consortium to include one or more 2-year institutions of higher education.

TITLE VII—POLICY PROVISIONS

Sec. 701. Asteroid Retrieval Mission

Section 701 requires the Administrator to report to Congress on the proposed Asteroid Retrieval Mission including a detailed budget profile; a detailed technical plan; a description of the technologies and capabilities anticipated to be gained that will enable future missions to Mars that could not be gained by lunar missions;

a description of the technologies and capabilities anticipated to be gained from the proposed mission that will enable future planetary defense missions; and a review by the Small Bodies Assessment Group and the NASA Advisory Council. This section requires a report conducted by an independent, private systems engineering and technical assistance organization analyzing the proposal for a Mars Flyby human spaceflight mission to be launched in 2021. The report must be transmitted to Congress.

Sec. 702. Termination liability

This section directs that funds set aside for contract termination liability shall be utilized for conducting meaningful work, thus enabling contractors to make maximum progress in meeting the established technical and schedule goals of these programs.

Sec. 703. Baseline and Cost Controls

Section 703 amends requirements associated with Baseline and Cost Controls to make the reporting more timely.

Sec. 704. Project and program reserves

This section states that it is the sense of Congress that the judicious use of program and project reserves provides NASA managers with the flexibility needed to manage projects and programs to ensure that the impacts of contingencies can be mitigated. It requires the Administrator to report to Congress on NASA's criteria for establishing the amount of reserves at the project and program levels; how such criteria relate to NASA's policy of budgeting at a 70 percent confidence level; NASA's criteria for waiving the policy of budgeting at a 70 percent confidence level, and strategies for controlling costs when a waiver is granted.

Sec. 705. Independent reviews

Section 705 requires the Administrator to report to Congress on NASA's procedure for independent reviews of projects and programs at lifecycle milestones and how NASA ensures the independence of the individuals conducting those reviews as well as the independence of internal and external entities that review projects and programs at lifecycle milestones.

Sec. 706. Commercial technology transfer program

This section adds "protecting national security" to the considerations used to evaluate when to transfer technology.

Sec. 707. NASA Advisory Council

Section 707 requires the Administrator to contract with the National Academy of Public Administrator for an assessment of the effectiveness of the NASA Advisory Council. The assessment must make recommendations for Congress for any changes to: the functions of the Council; the appointment of members to the Council; qualifications for members of the Council; duration of terms of office for members of the Council; frequency of meetings of the Council; the structure of leadership and Committees of the Council; and levels of professional staffing for the Council. The Academy must also assess the impacts of broadening the Council's role to advising Congress, and any other issues that that the Academy determines

could potentially impact the effectiveness of the Council. The assessment must be transmitted to Congress. It amends current law to state that in the performance of its functions, the Administrator is authorized to appoint such advisory committees as may be appropriate for purposes of consultation and advice to the Administration and Congress. The inclusion of "Congress" will sunset on September 30, 2014.

Sec. 708. Cost estimation

This section states that it is the sense of Congress that realistic cost estimating is important to the success of major development projects, and that it is important that NASA continue its efforts to develop and implement guidance in establishing realistic cost estimates. It requires the Administrator to provide guidance on when an Independent Cost Estimate and Independent Cost Assessment should be used and the criteria to be used to make such a determination to program and projects. Section 708 requires a report to Congress on the implementation of more effective cost estimation practices.

Sec. 709. Avoiding organizational conflicts of interest in major NASA acquisition programs

This section requires the Administrator to revise the NASA 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 specified concerns.

Sec. 710. Facilities and infrastructure

Section 710 states that it is the sense of Congress that NASA must reverse the deteriorating condition of its facilities and infrastructure; NASA has a role in providing laboratory capabilities to industry participants that are economically viable as commercial entities and thus are not available elsewhere; NASA should seek to establish strategic partnerships with other Federal agencies, academic institutions, and industry, as appropriate; and decisions on whether to dispose of, maintain, or modernize existing facilities must be made in the context of meeting future NASA and other Federal agencies' laboratory needs, including those required to meet the activities supporting the Roadmap required by Sec 202. It further states that it is the policy of the United States that NASA maintain reliable and efficient facilities and that decisions on whether to dispose of, maintain, or modernize existing facilities be made in the context of meeting future NASA needs. This section requires the Administrator to develop a plan that has the goal of positioning NASA to have the facilities, laboratories, tools, and approaches necessary to address future NASA requirements. It requires the Administrator to establish and make publically available a policy that guides the agency's use of existing authorities to outgrant, lease, excess to the General Services Administration, sell, decommission, demolish, or otherwise transfer property, facilities, or infrastructure. This section requires the Administrator to establish a capital fund for the modernization of facilities and laboratories.

Sec. 711. Detection and avoidance of counterfeit electronic parts

Section 711 requires NASA to revise the NASA Supplement for the Federal Acquisition Regulation to address the detection and avoidance of counterfeit electronic parts. The revised regulations must provide that contractors who supply electronic parts or products including electronic parts are responsible for detecting and avoiding the use or inclusion of counterfeit electronic parts or suspect counterfeit parts in such products, and for any corrective actions that may be required to remedy the use of such parts. The costs of counterfeit electronic parts and the cost of corrective action are not allowable costs under Agency contracts except under specified exemptions. It sets requirements for acquisition of electronic parts by NASA contractors and subcontractors to ensure authenticity. It requires that any contractor or subcontractor who becomes aware of a possible counterfeit part must notify NASA within 30 calendar days. This section requires the Administrator to submit a report to Congress updating NASA's actions to prevent counterfeit electronic parts from entering the supply chain.

Sec. 712. Space Act Agreements

Section 712 sets the following conditions for Space Act Agreements: funds provided by the government under a funded Space Act Agreement should not exceed the total amount provided by other parties to the agreement or other transaction; a Space Act Agreement may be used only when the use of a standard contract, grant, or cooperative agreement is not feasible or appropriate; Space Act Agreements must be available for public notice and comment prior to agreement; the Administrator shall publically disclose on NASA's website and make available in a searchable format all Space Act Agreements with appropriate redactions for proprietary information in a timely manner; and the Administrator must submit to Congress an annual report on the use of Space Act Agreement authority by NASA during the previous fiscal year. The report must include a list of anticipated agreements for the upcoming fiscal year. The report must also include a discussion of the benefits NASA has accumulated by using Space Act Agreements.

Sec. 713. Human spaceflight accident investigations

This section amends current law such that any accident of a suborbital or orbital space vehicle carrying a human that is being operated at the behest of the Federal government shall be included in the presidential accident investigation statute.

Sec. 714. Fullest commercial use of space

Section 714 requires the Administrator to transmit a report to Congress on current and continuing efforts by NASA to "seek and encourage, to the maximum extent possible, the fullest commercial use of space." This section also requires a report to Congress on current and continuing efforts by NASA to reduce impediments, bureaucracy, redundancy, and burdens to ensure the fullest commercial use of space.

Sec. 715. Orbital debris

Section 715 includes findings regarding the dangers of orbital debris. This section requires the Administrator to report to Congress

on the status of efforts to coordinate with countries within the Inter-Agency Space Debris Coordination Committee to mitigate the effects and growth of orbital debris. It requires the Director of the Office of Science and Technology Policy to report to Congress on the status of the orbital debris mitigation strategy required by law.

Sec. 716. Review of orbital debris removal concepts

This section states it is the sense of Congress that the amount of orbital debris in low-Earth orbit poses risks for human activities and robotic spacecraft and that this debris may increase due to collisions between existing debris objects. It requires the Administrator to solicit and review concepts and technological options for removing orbital debris from low-Earth orbit. The solicitation and review shall also address the requirements for and feasibility of developing and implementing each of the options. The review must be transmitted to Congress.

Sec. 717. Use of operational commercial suborbital vehicles for research, development, and education

Section 717 requires the Administrator to develop a policy on the use of operational commercial reusable suborbital flight vehicles for carrying out scientific and engineering investigations and educational activities. This section requires the Administrator to prepare a plan on NASA's use of operational commercial reusable suborbital flight vehicles for carrying out scientific and engineering investigations and educational activities. The Administrator must also assess and characterize the potential capabilities and performance of commercial reusable suborbital vehicles for addressing scientific research. The plan and assessment must be transmitted to Congress. The Administrator must report to Congress annually describing progress in carrying out the Commercial Reusable Suborbital Research Program, including the number and type of suborbital missions planned in each fiscal year. This section prohibits the Administrator from proceeding with requests for proposals or contracts until the liability issues in the plan have been addressed.

Sec. 718. Fundamental space life and physical sciences research

Section 718 states it is the sense of Congress that fundamental, discovery-based space life and physical sciences research is critical for enabling space exploration, protecting humans in space, and providing societal benefits. It directs the Administrator to include a budget line for such research in the annual budget request. This section directs the Administrator to develop and transmit to Congress a strategic plan for competitive, peer reviewed fundamental space life science and physical sciences and related technology research.

Sec. 719. Restoring commitment to engineering research

This section states it is the sense of Congress that engineering excellence has long been a hallmark of NASA's ability to make significant advances in aeronautics and space exploration. The sense of Congress expresses concern that constrained funding and competing priorities have led to an erosion of NASA's commitment to basic engineering research, and that this trend could have negative effects on the engineering workforce. This section directs the Ad-

ministrator to develop a plan for restoring a meaningful basic engineering research program to NASA's Centers. The plan must be transmitted to Congress.

Sec. 720. Liquid rocket engine development program

Section 720 directs the Administrator to consult with the Secretary of Defense to ensure that any next generation liquid rocket engine made in the U.S. for national security space launch objectives can contribute, to the extent practicable, to the space programs and missions carried out by NASA.

Sec. 721. Remote satellite servicing demonstration

This section states it is the sense of Congress that NASA plays a key role in demonstrating the feasibility of using robotic technologies for a spacecraft that could autonomously service satellites, that demonstrating this feasibility would both assist the NASA in its future missions and provide other agencies and the private sector with enhanced confidence in the feasibility to robotically service satellites, and the capability to service satellites robotically could add years of functional life to satellites. It requires the Administrator to report to Congress regarding specified aspects of robotic satellite servicing technology and technology development.

Sec. 722. Information Technology Governance

Section 722 includes a sense of Congress stating that information security is central to NASA's ability to protect information and information systems vital to its mission. This section requires an assessment of NASA's Information Technology Governance by the Comptroller General. The results of the assessment must be transmitted to Congress.

Sec. 723. Strengthening administration security

Section 723 includes findings regarding the need to strengthen NASA's security, particularly with regard to Foreign National Access Management. This section requires a report to Congress on how NASA plans to address each of the recommendations made in the National Academy of Public Administration's (NAPA) review of NASA security. This section requires the Comptroller General to report to Congress on its assessment of how NASA has complied with the recommendations.

Sec. 724. Prohibition on use of funds for contractors that have committed fraud or other crimes

This section prohibits any funds authorized or appropriated for NASA from being used to enter into a contract with an offeror or any of its principals if the offeror or any of its principals has been convicted within a three-year period preceding the offer of: fraud related to Federal contracts; violation Federal or State antitrust statutes; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating Federal tax laws, or receiving stolen property. It also forbids contracts with offerors if the offeror or principal is presently indicted for any of those crimes, or has been notified of delinquent Federal taxes in an amount that exceeds $3,000 for which the liability remains unsatisfied.

Sec. 725. Protection of Apollo landing sites

Section 725 instructs the Director of Office of Science and Technology Policy to carry out a review and assessment of the issues involved in protecting and preserving historically important Apollo Program lunar landing sites and Apollo Program artifacts residing on the lunar surface. This section requires the Director to transmit the results of the assessment to Congress.

Sec. 726. Astronaut occupational healthcare

This section directs the Administrator to prepare a response to the National Academies report recommendations on health standards for long duration and exploration spaceflight and transmit the response to Congress.

XX. CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3(e) of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

TITLE 51, UNITED STATES CODE

TITLE 51—NATIONAL AND COMMERCIAL SPACE PROGRAMS

Subtitle I—General

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Subtitle VII—Access to Space

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SUBTITLE II—GENERAL PROGRAM AND POLICY PROVISIONS

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CHAPTER 201—NATIONAL AERONAUTICS AND SPACE PROGRAM

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

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§ 20102. Congressional declaration of policy and purpose

(a) * * *

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(d) OBJECTIVES OF AERONAUTICAL AND SPACE ACTIVITIES.—The aeronautical and space activities of the United States shall be conducted so as to contribute materially to one or more of the following objectives:

(1) * * *

* * * * * * *

(10) The direction of the unique competence of the Administration to the search for life's origin, evolution, distribution, and future in the Universe. In carrying out this objective, the Administration may use any practicable ground-based, airborne, or space-based technical means and spectra of electromagnetic radiation.

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SUBCHAPTER II—COORDINATION OF AERONAUTICAL AND SPACE ACTIVITIES

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§ 20113. Powers of the Administration in performance of functions

(a) * * *

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(g) ADVISORY COMMITTEES.—In the performance of its functions, the Administration is authorized to appoint such advisory committees as may be appropriate for purposes of consultation and advice to the Administration *and Congress*.

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CHAPTER 203—RESPONSIBILITIES AND VISION

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§ 20302. Vision for space exploration

(a) * * *

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(c) DEFINITIONS.—In this section:

(1) ORION CREW CAPSULE.— The term "Orion crew capsule" means the multipurpose crew vehicle described in 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 the follow-on Government-owned civil launch system developed, managed, and operated by the Administration to serve as a key component to expand human presence beyond low-Earth orbit, as described in section 302 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322).

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SUBTITLE III—ADMINISTRATIVE PROVISIONS

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CHAPTER 301—APPROPRIATIONS, BUDGETS, AND ACCOUNTING

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§ 30104. Baselines and cost controls

(a) DEFINITIONS.—In this section:

(1) DEVELOPMENT.— The term "development" means the phase of a program following the formulation phase and beginning with the approval to proceed to implementation, as defined in the Administration's [Procedural Requirements 7120.5c, dated March 22, 2005] *Procedural Requirements 7120.5E, dated August 14, 2012*.

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(f) THIRTY PERCENT THRESHOLD.—If the Administrator determines under subsection (e) that the development cost of a program will exceed the estimate provided in the Baseline Report of the program by more than 30 percent, then, [beginning 18 months after the date the Administrator transmits a report under subsection (e)(1)(A)] *beginning 18 months after the Administrator makes such determination* , the Administrator shall not expend any additional funds on the program, other than termination costs, unless Congress has subsequently authorized continuation of the program by law. An appropriation for the specific program enacted subsequent to a report being transmitted shall be considered an authorization for purposes of this subsection. If the program is continued, the Administrator shall submit a new Baseline Report for the program no later than 90 days after the date of enactment of the Act under which Congress has authorized continuation of the program.

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CHAPTER 305—MANAGEMENT AND REVIEW

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[§ 30504. Assessment of science mission extensions

[(a) ASSESSMENT.—The Administrator shall carry out biennial 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 have exceeded their planned mission lifetime.

[(b) CONSULTATION AND CONSIDERATION OF POTENTIAL BENEFITS OF INSTRUMENTS ON MISSIONS.—For those missions that have an operational component, the National Oceanic and Atmospheric Administration or any other affected agency shall be consulted and the potential benefits of instruments on missions that are beyond their planned mission lifetime taken into account.]

§ 30504. Assessment of science mission extensions

(a) ASSESSMENT.—The Administrator shall carry out biennial 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. The assessment shall take into consideration 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 consult with any affected Federal agency and shall take into account the potential benefits of instruments on missions that are beyond their planned mission lifetime.

(c) REPORT.—The Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, 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 required by subsection (a) that was carried out during the previous year.

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CHAPTER 315—MISCELLANEOUS

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§ 31504. Cooperative unmanned aerial vehicle activities

The Administrator, in cooperation with the Administrator of the National Oceanic and Atmospheric Administration and in coordination with other agencies that have existing civil capabilities, shall continue to utilize the capabilities of unmanned aerial vehicles as appropriate in support of Administration and interagency cooperative missions. The Administrator may enter into cooperative agreements with universities with unmanned aerial vehicle programs and related assets to conduct collaborative research and development activities, including development of appropriate applications of small unmanned aerial vehicle technologies and systems in remote areas. *Operational flight data derived from these cooperative agreements shall be made available, in appropriate and usable formats, to the Administration and the Federal Aviation Administration for the development of regulatory standards.*

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SUBTITLE IV—AERONAUTICS AND SPACE RESEARCH AND EDUCATION

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CHAPTER 403—NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM

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§ 40301. Purposes

The purposes of this chapter are to—

(1) * * *

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

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

(7) support outreach to primary and secondary schools to help support STEM engagement and learning at the K-12 level and to encourage K-12 students to pursue postsecondary degrees in fields related to space.

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§ 40306. Space grant college and space grant regional consortium

(a) DESIGNATION AND QUALIFICATIONS.—

(1) * * *

(2) INCLUSION OF 2-YEAR INSTITUTIONS.— A space grant regional consortium designated in paragraph (1)(B) may include one or more 2-year institutions of higher education.

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

(A) * * *

* * * * * * *

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

(A) * * *

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

(1) the qualifications required to be met under [paragraphs (2)(C) and (3)(D)] *paragraphs (3)(C) and (4)(D)* of subsection (a); and

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SUBTITLE V—PROGRAMS TARGETING COMMERCIAL OPPORTUNITIES

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CHAPTER 501—SPACE COMMERCE

SUBCHAPTER I—GENERAL

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SUBCHAPTER III—FEDERAL ACQUISITION OF SPACE TRANSPORTATION SERVICES

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[50133. Shuttle privatization.]

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SUBCHAPTER II—PROMOTION OF COMMERCIAL SPACE OPPORTUNITIES

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§ 50116. Commercial technology transfer program

(a) IN GENERAL.—The Administrator shall execute a commercial technology transfer program with the goal of facilitating the exchange of services, products, and intellectual property between the Administration and the private sector. This program shall place at least as much emphasis on encouraging the transfer of Administration technology to the private sector ("spinning out") as on encouraging use of private sector technology by the Administration. This program shall be maintained in a manner that provides clear benefits for the Administration, the domestic economy, and the research community*, while protecting national security*.

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SUBCHAPTER III—FEDERAL ACQUISITION OF SPACE TRANSPORTATION SERVICES

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[§ 50133. Shuttle privatization

[The Administrator shall prepare for an orderly transition from the Federal operation, or Federal management of contracted operation, of space transportation systems to the Federal purchase of commercial space transportation services for all nonemergency space transportation requirements for transportation to and from Earth orbit, including human, cargo, and mixed payloads. In those preparations, the Administrator shall take into account the need for short-term economies, as well as the goal of restoring the Administration's research focus and its mandate to promote the fullest possible commercial use of space. As part of those preparations, the Administrator shall plan for the potential privatization of the space shuttle program. Such plan shall keep safety and cost effectiveness as high priorities. Nothing in this section shall prohibit the Administration from studying, designing, developing, or funding upgrades or modifications essential to the safe and economical operation of the space shuttle fleet.]

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SUBTITLE VII—ACCESS TO SPACE

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[CHAPTER 701—USE OF SPACE SHUTTLE OR ALTERNATIVES

[§ 70101. Recovery of fair value of placing Department of Defense payloads in orbit with space shuttle

[Notwithstanding any other provision of law, or any interagency agreement, the Administrator shall charge such prices as are necessary to recover the fair value of placing Department of Defense payloads into orbit by means of the space shuttle.

[§ 70102. Space shuttle use policy

[(a) USE POLICY.—

[(1) IN GENERAL.—

[(A) POLICY.— It shall be the policy of the United States to use the space shuttle—

[(i) for purposes that require a human presence;

[(ii) for purposes that require the unique capabilities of the space shuttle; or

[(iii) when other compelling circumstances exist.

[(B) DEFINITION OF COMPELLING CIRCUMSTANCES.— In this paragraph, the term "compelling circumstances" includes, but is not limited to, occasions when the Administrator determines, in consultation with the Secretary of Defense and the Secretary of State, that important national security or foreign policy interests would be served by a shuttle launch.

[(2) USING AVAILABLE CARGO SPACE FOR SECONDARY PAYLOADS.— The policy stated in paragraph (1) shall not preclude the use of available cargo space, on a space shuttle mission otherwise consistent with the policy described in paragraph (1), for the purpose of carrying secondary payloads (as defined by the Administrator) that do not require a human presence if such payloads are consistent with the requirements of research, development, demonstration, scientific, commercial, and educational programs authorized by the Administrator.

[(b) ANNUAL REPORT.—At least annually, the Administrator shall submit to Congress a report certifying that the payloads scheduled to be launched on the space shuttle for the next 4 years are consistent with the policy set forth in subsection (a)(1). For each payload scheduled to be launched from the space shuttle that does not require a human presence, the Administrator shall, in the certified report to Congress, state the specific circumstances that justified the use of the space shuttle. If, during the period between scheduled reports to Congress, any additions are made to the list of certified payloads intended to be launched from the shuttle, the Administrator shall inform Congress of the additions and the reasons therefor within 45 days of the change.

[(c) ADMINISTRATION PAYLOADS.—The report described in subsection (b) shall also include those Administration payloads designed solely to fly on the space shuttle which have begun the phase C/D of its development cycle.

[§ 70103. Commercial payloads on space shuttle

[(a) DEFINITIONS.—In this section:

[(1) LAUNCH VEHICLE.— The term "launch vehicle" means any vehicle constructed for the purpose of operating in, or placing a payload in, outer space.

[(2) PAYLOAD.— The term "payload" means an object which a person undertakes to place in outer space by means of a launch vehicle, and includes subcomponents of the launch vehicle specifically designed or adapted for that object.

[(b) IN GENERAL.—Commercial payloads may not be accepted for launch as primary payloads on the space shuttle unless the Administrator determines that—

[(1) the payload requires the unique capabilities of the space shuttle; or

[(2) launching of the payload on the space shuttle is important for either national security or foreign policy purposes.

[CHAPTER 703—SHUTTLE PRICING POLICY FOR COMMERCIAL AND FOREIGN USERS

[§ 70301. Congressional findings and declarations

[Congress finds and declares that—

[(1) the Space Transportation System is a vital element of the United States space program, contributing to the United States leadership in space research, technology, and development;

[(2) the Space Transportation System is the primary space launch system for both United States national security and civil government missions;

[(3) the Space Transportation System contributes to the expansion of United States private sector investment and involvement in space and therefore should serve commercial users;

[(4) the availability of the Space Transportation System to foreign users for peaceful purposes is an important means of promoting international cooperative activities in the national interest and in maintaining access to space for activities which enhance the security and welfare of humankind;

[(5) the United States is committed to maintaining world leadership in space transportation;

[(6) making the Space Transportation System fully operational and cost effective in providing routine access to space will maximize the national economic benefits of the system; and

[(7) national goals and the objectives for the Space Transportation System can be furthered by a stable and fair pricing policy for the Space Transportation System.

[§ 70302. Purpose, policy, and goals

[The purpose of this chapter is to set, for commercial and foreign users, the reimbursement pricing policy for the Space Transportation System that is consistent with the findings included in section 70301 of this title, encourages the full and effective use of space, and is designed to achieve the following goals:

[(1) The preservation of the role of the United States as a leader in space research, technology, and development.

[(2) The efficient and cost effective use of the Space Transportation System.

[(3) The achievement of greatly increased commercial space activity.

[(4) The enhancement of the international competitive position of the United States.

[§ 70303. Definition of additive cost

[In this chapter, the term "additive cost" means the average direct and indirect costs to the Administration of providing additional flights of the Space Transportation System beyond the costs associated with those flights necessary to meet the space transportation needs of the United States Government.

[§ 70304. Duties of Administrator

[(a) ESTABLISHMENT AND IMPLEMENTATION OF REIMBURSEMENT RECOVERY SYSTEM.—The Administrator shall establish and implement a pricing system to recover reimbursement in accordance with the pricing policy under section 70302 of this title from each commercial or foreign user of the Space Transportation System, which, except as provided in subsections (c), (d), and (e), shall include a base price of not less than $74,000,000 for each flight of the Space Transportation System in 1982 dollars.

[(b) REPORTS TO CONGRESS.—Each year the Administrator shall submit to the President of the Senate, the Speaker of the House of Representatives, the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Science and Technology of the House of Representatives a report, transmitted contemporaneously with the annual budget request of the President, which shall inform Congress how the policy goals contained in section 70302 of this title are being furthered by the shuttle price for foreign and commercial users.

[(c) REDUCTION OF BASE PRICE.—

[(1) AUTHORITY TO REDUCE.— If at any time the Administrator finds that the policy goals contained in section 70302 of this title are not being achieved, the Administrator shall have authority to reduce the base price established in subsection (a) after 45 days following receipt by the President of the Senate, the Speaker of the House of Representatives, the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Science and Technology of the House of Representatives of a notice by the Administrator containing a description of the proposed reduction together with a full and complete statement of the facts and circumstances which necessitate such proposed reduction.

[(2) MINIMUM PRICE.— In no case shall the minimum price established under paragraph (1) be less than additive cost.

[(d) LOW OR NO-COST FLIGHTS.—The Administrator may set a price lower than the price determined under subsection (a) or (c), or provide no-cost flights, for any commercial or foreign user of the Space Transportation System that is involved in research, development, or demonstration programs with the Administration.

[(e) CUSTOMER INCENTIVES.—Notwithstanding the provisions of subsection (a), the Administrator shall have the authority to offer

reasonable customer incentives consistent with the policy goals in section 70302 of this title.]

CHAPTER 705—EXPLORATION INITIATIVES

§ 70501. Space shuttle follow-on

[(a) POLICY STATEMENT.—It is the policy of the United States to possess the capability for human access to space on a continuous basis.]

(a) POLICY STATEMENT.—It is the policy of the United States to maintain an uninterrupted capability for human space flight and operations in low-Earth orbit, and beyond, as an essential instrument of national security and the capability to ensure continued United States participation and leadership in the exploration and utilization of space.

* * * * * * *

[§ 70504. Stepping stone approach to exploration

[In order to maximize the cost-effectiveness of the long-term exploration and utilization activities of the United States, the Administrator shall take all necessary steps, including engaging international partners, to ensure that activities in its lunar exploration program shall be designed and implemented in a manner that gives strong consideration to how those activities might also help meet the requirements of future exploration and utilization activities beyond the Moon. The timetable of the lunar phase of the long-term international exploration initiative shall be determined by the availability of funding. However, 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.]

§ 70504. Stepping stone approach to exploration

(a) IN GENERAL.—In order to maximize the cost effectiveness of the long-term space exploration and utilization activities of the United States, the Administrator shall direct the Human Exploration and Operations Mission Directorate, or its successor division, to develop a Human Exploration Roadmap to define the specific capabilities and technologies necessary to extend human presence to the surface of Mars and the sets and sequences of missions required to demonstrate such capabilities and technologies.

(b) INTERNATIONAL PARTICIPATION.—The President should invite the United States partners in the International Space Station program and other nations, as appropriate, to participate in an international initiative under the leadership of the United States to achieve the goal of successfully conducting a crewed mission to the surface of Mars.

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

(1) include the specific set of capabilities and technologies that contribute to extending human presence to the surface of Mars and the sets and sequences of missions necessary to demonstrate the proficiency of these capabilities and technologies with an emphasis on using or not using the International Space Station, lunar landings, cis-lunar space, trans-lunar space, Lagrangian points, and the natural satellites of Mars, Phobos and Deimos, as testbeds, as necessary, and shall include the most appropriate process for developing such capabilities and technologies;

(2) 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 International Space Station activities, and planned international collaborative activities, potential commercial contributions, and other activities relevant to the achievement of the goal established in section 201(a) of the National Aeronautics and Space Administration Authorization Act of 2014;

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

(4) provide a specific process for the evolution of the capabilities of the fully integrated Orion crew capsule with the Space Launch System and how these systems demonstrate the capabilities and technologies described in paragraph (1);

(5) provide a description of the capabilities and technologies that need to be demonstrated or research data that could be gained through the utilization of the International Space Station and the status of the development of such capabilities and technologies;

(6) describe a framework for international cooperation in the development of all technologies and capabilities required in this section, as well as an assessment of the risks posed by relying on international partners for capabilities and technologies on the critical path of development;

(7) describe a process for utilizing nongovernmental entities for future human exploration beyond trans-lunar space and specify what, if any, synergy could be gained from—

(A) partnerships using Space Act Agreements (as defined in section 2 of the National Aeronautics and Space Administration Authorization Act of 2014); or

(B) other acquisition instruments;

(8) include in the Human Exploration Roadmap an addendum from the National Aeronautics and Space Administration Advisory Council, and an addendum from the Aerospace Safety Advisory Panel, each with a statement of review of the Human Exploration Roadmap that shall include—

(A) subjects of agreement;

(B) areas of concern; and

(C) recommendations; and

(9) include in the Human Exploration Roadmap an examination of the benefits of utilizing current Administration launch facilities for trans-lunar missions.

(d) UPDATES.—The Administrator shall update such Human Exploration Roadmap as needed but no less frequently than every 2 years and include it in the budget for that fiscal year transmitted to Congress under section 1105(a) of title 31, and describe—

(1) the achievements and goals reached in the process of developing such capabilities and technologies during the 2-year period prior to the submission of the update to Congress; and

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

(e) DEFINITIONS.—In this section, the terms "Orion crew capsule" and "Space Launch System" have the meanings given such terms in section 20302.

* * * * * * *

[§ 70507. Technology development

[The Administrator shall establish an intra-Directorate long-term technology development program for space and Earth science within the Science Mission Directorate for the development of new technology. The program shall be independent of the flight projects under development. The Administration shall have a goal of funding the intra-Directorate technology development program at a level of 5 percent of the total Science Mission Directorate annual budget. The program shall be structured to include competitively awarded grants and contracts.**]**

§ 70507. Space Technology Program authorized

(a) PROGRAM AUTHORIZED.—The Administrator shall establish a Space Technology Program to pursue the research and development of advanced space technologies that have the potential of delivering innovative solutions and to support human exploration of the solar system or advanced space science. The program established by the Administrator shall take into consideration the recommendations of the National Academies' review of the Administration's Space Technology roadmaps and priorities, as well as applicable enabling aspects of the Human Exploration Roadmap specified in section 70504. In conducting the space technology program established under this section, the Administrator shall—

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

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

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

(b) 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 Space Technology Program.

(c) NONDUPLICATION CERTIFICATION.—The Administrator shall include in the budget for each fiscal year, as transmitted to Congress under section 1105(a) of title 31, a certification that no project, program, or mission undertaken by the Space Technology Program is duplicative of any other project, program, or mission conducted by another office or directorate of the Administration.

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CHAPTER 707—HUMAN SPACE FLIGHT INDEPENDENT INVESTIGATION COMMISSION

* * * * * * *

§ 70702. Establishment of Commission

(a) ESTABLISHMENT.—The President shall establish an independent, nonpartisan Commission within the executive branch to investigate any incident that results in the loss of—

(1) * * *

* * * * * * *

[(3) any other United States space vehicle carrying humans that is owned by the Federal Government or that is being used pursuant to a contract with the Federal Government; or**]**

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

(A) that is owned by the Federal Government; or

(B) that is being used pursuant to a contract or Space Act Agreement, as defined in section 2 of the National Aeronautics and Space Administration Authorization Act of 2014, with the Federal Government for carrying a researcher or payload funded by the Federal Government; or

* * * * * * *

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 2010

* * * * * * *

TITLE II—POLICY, GOALS, AND OBJECTIVES FOR HUMAN SPACE FLIGHT AND EXPLORATION

SEC. 201. UNITED STATES HUMAN SPACE FLIGHT POLICY.

[(a) USE OF NON-UNITED STATES HUMAN SPACE FLIGHT TRANSPORTATION CAPABILITIES.—It is the policy of the United States that reliance upon and use of non-United States human space flight capabilities shall be undertaken only as a contingency in circumstances where no United States-owned and operated human space flight capability is available, operational, and certified for flight by appropriate Federal agencies.**]**

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

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

(2) DEFINITION.— For purposes of this subsection, the term "domestic commercial provider" means a person providing space transportation services or other space-related activities, the majority control of which is held by persons other than a Federal, State, local, or foreign government, foreign company, or foreign national.

* * * * * * *

SEC. 202. GOALS AND OBJECTIVES.

(a) * * *

(b) KEY OBJECTIVES.—The key objectives of the United States for human expansion into space shall be—

(1) * * *

* * * * * * *

(3) to maximize the role that human exploration of space can play in advancing overall knowledge of the universe, supporting United States national and economic security and the United States global competitive posture, and inspiring young people in their educational pursuits; **[**and**]**

(4) to build upon the cooperative and mutually beneficial framework established by the ISS partnership agreements and experience in developing and undertaking programs and meeting objectives designed to realize the goal of human space flight set forth in subsection (a)**[**.**]***; and*

(5) to accelerate the development of capabilities to enable a human exploration mission to the surface of Mars and beyond through the prioritization of those technologies and capabilities best suited for such a mission in accordance with the Human Exploration Roadmap under section 70504 of title 51, United States Code.

SEC. 203. ASSURANCE OF CORE CAPABILITIES.

(a) * * *

[(b) SPACE SHUTTLE CAPABILITY ASSURANCE.—

[(1) DEVELOPMENT OF FOLLOW-ON SPACE TRANSPORTATION SYSTEMS.— The Administrator shall proceed with the development of follow-on space transportation systems in a manner that ensures that the national capability to restart and fly Space Shuttle missions can be initiated if required by the Congress, in an Act enacted after the date of enactment of this Act, or by a Presidential determination transmitted to the Congress, before the last Space Shuttle mission authorized by this Act is completed.

[(2) REQUIRED ACTIONS.— In carrying out the requirement in paragraph (1), the Administrator shall authorize refurbishment of the manufactured external tank of the Space Shuttle, designated as ET-94, and take all actions necessary to enable its readiness for use in the Space Launch System development as a critical skills and capability retention effort or for test pur-

poses, while preserving the ability to use this tank if needed for an ISS contingency if deemed necessary under paragraph (1).]

[(c)] *(b)* SENSE OF CONGRESS REGARDING HUMAN SPACE FLIGHT CAPABILITY ASSURANCE.—It is the sense of Congress that the Administrator shall proceed with the utilization of the ISS, technology development, and follow-on transportation systems (including the Space Launch System, multi-purpose crew vehicle, and commercial crew and cargo transportation capabilities) under titles III and IV of this Act in a manner that ensures—

(1) * * *

* * * * * * *

[(d)] *(c)* LIMITATION.—Nothing in [subsection (c)] *subsection (b)* shall apply to or affect any capability authorized by any other title of this Act

* * * * * * *

TITLE VIII—SPACE SCIENCE

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[SEC. 803. OVERALL SCIENCE PORTFOLIO-SENSE OF THE CONGRESS.

[Congress reaffirms its sense that a balanced and adequately funded set of activities, consisting of research and analysis grants programs, technology development, small, medium, and large space missions, and suborbital research activities, contributes to a robust and productive science program and serves as a catalyst for innovation.]

SEC. 803. OVERALL SCIENCE PORTFOLIO—SENSE OF THE CONGRESS.

Congress reaffirms its sense, expressed in the National Aeronautics and Space Administration Authorization Act of 2010, that a balanced and adequately funded set of activities, consisting of research and analysis grants programs, technology development, small, medium, and large space missions, and suborbital research activities, contributes to a robust and productive science program and serves as a catalyst for innovation and discovery.

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XXI. PROCEEDINGS OF THE SUBCOMMITTEE ON SPACE MARKUP ON H.R. 4412, THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 2014

WEDNESDAY, APRIL 9, 2014

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON SPACE,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Subcommittee met, pursuant to call, at 9:09 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Steven Palazzo [Chairman of the Subcommittee] presiding.

Chairman PALAZZO. The Space Subcommittee of the Committee on Science, Space, and Technology will come to order.

Without objection, the Chair is authorized to declare recesses of the Subcommittee at any time. I recognize myself for an opening statement.

The bill and amendment before the Subcommittee this morning reflect a true bipartisan agreement. I want to thank my colleague, the Ranking Member Ms. Edwards, for her hard work, determination, and patience in putting together this consensus agreement with me. The Ranking Member and I don't always see eye-to-eye, but the provisions contained in the agreement are a testament that Republicans and Democrats can work together in an effective manner for the good of the Nation.

The agreement before us today will enable NASA to continue its proud tradition as the preeminent civilian space agency in the world. The agreement is not perfect, nor is it complete, but it is a reflection of good-faith efforts on both sides to continue working together to write common-sense policy.

Congress has been consistent in its support for the Space Launch System, Orion crew capsule, Commercial Crew Program and the James Webb Space Telescope. These priorities are clearly reflected in the agreement and represent yet another affirmation of policy already contained in Federal law.

The agreement before us today makes absolutely clear that NASA's goal for the human space flight program should be to send humans to Mars. It is also the Committee's intent to be clear that proposals that cannot be proven essential to a Mars mission be re-

moved from this portfolio. For this purpose, the agreement provides a framework for the development of an exploration roadmap, which is critical to ensure every taxpayer dollar is spent effectively and efficiently. A clear and detailed roadmap is a reasonable and necessary requirement for future development efforts at NASA.

The bill seeks to limit U.S. dependence on Russia for access to low-Earth orbit and the International Space Station. As the Administrator said last week before this Subcommittee, and again yesterday, budgets are about choices. I could not agree more. That is why this bill allows NASA to better focus its efforts on once more launching American astronauts on American rockets from American soil.

The development of the deep space capabilities is of the utmost importance for this Subcommittee. Members on both sides of the aisle have expressed disappointment in the Administration's insufficient budget requests for the Space Launch System and Orion crew capsule. This agreement makes it clear that SLS and Orion are top priorities for Congress and the American people.

Additionally, the agreement contains continued direction for the on-time and on-budget development of the James Webb Space Telescope. The completion of the James Webb Space Telescope has been a top priority, and we expect NASA will continue to treat it as such.

I am proud of the good work this Subcommittee has done. I am sure my colleagues would agree that finding bipartisan agreement in an austere budget environment is never an easy task, and our work is not done. But this Subcommittee is well-served by an excellent negotiating partner in Ms. Edwards and a supportive Full Committee Chairman and Ranking Member.

I look forward to working together with my friends on the other side of the aisle to make additional changes on provisions important to Republicans and Democrats as we move this bill to the Full Committee and House Floor.

[The prepared statement of Mr. Palazzo follows:]

PREPARED STATEMENT OF SUBCOMMITTEE CHAIRMAN STEVEN PALAZZO

The bill and amendment before the Subcommittee this morning reflect a true bipartisan agreement.

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I look forward to working together with my friends on the other side of the aisle to make additional changes on provisions important to Republicans and Democrats as we move this bill to the Full Committee and House floor.

Chairman PALAZZO. I now yield to the Ranking Member of the Subcommittee, Ms. Edwards, for her remarks.

Ms. EDWARDS. Thank you very much, Mr. Chairman. Today really is a good day for us in this Subcommittee. And I join you in recognizing NASA's critical—as critical to this Nation, to our economic strength, and to our place in the world. NASA's accomplishments in human spaceflight, space science, aeronautics research, and space technology are the envy of other nations and a source of inspiration for all our citizens. Helping NASA to maintain its leadership in all these areas is one of the most critical responsibilities of this Subcommittee. The 21st century requires a robust space agency supported by a strong, vibrant, and innovative private sector. So, Mr. Chairman, I know that that is why you and I redoubled our commitment to working together over these last several weeks and months to develop a truly bipartisan NASA authorization bill.

Today, we are marking up a NASA Authorization Act of 2014. And while the markup bill that is introduced did not reflect all of the ongoing work that both sides have been doing in trying to reach common ground, the bipartisan manager's amendment being introduced today is a major step forward and serves as an important example of progress that this Subcommittee and the Full Committee can build upon.

First and foremost, the manager's amendment directs NASA to develop an exploration roadmap, one that will have the agency define the specific capabilities and technologies to extend human presence to the surface of Mars and sets the sequences of missions required to demonstrate such capabilities and technologies. The roadmap will allow NASA's technical experts to analyze the merits of potential interim destinations toward achieving the goal of sending humans to Mars.

I know that different Members have their own personal favorite destinations and interim missions, but this amendment puts the job of deciding the pathway forward where it squarely belongs, by requiring NASA to develop an informed and realistic roadmap to get this Nation to Mars. Within 180 days, just six months, NASA

will share that roadmap with Congress and provide updates in the coming years.

There are other important aspects of the manager's amendment worth mentioning. I am pleased that the manager's amendment unequivocally states that the safety shall be the highest priority in the selection and development of commercial crew transportation services that NASA plans to use to transport U.S. astronauts to and from the International Space Station. We learned from the mistakes leading up to the Columbia disaster and we do not want to repeat them.

The amendment recognizes the importance of robust science and aeronautics research portfolios and highlights the importance of NASA's space technology program in enabling new technologies and capabilities that will make NASA's mission more reliable and affordable.

And this amendment we have also removed the prohibition against canceling covered programs without Congressional action. Those covered programs are no more protected than any other NASA program, nor should they be, but this amendment will ensure that the funds appropriated for these programs will not be sitting idle but instead, in this austere environment, as the Chairman puts it, would be put to productive use in making as much progress as possible on major development programs.

Mr. Chairman, I am also pleased to be achieving this markup milestone and I thank you and Chairman Smith for your willingness to respond to many of the concerns raised by Ranking Member Johnson and me in the process of reaching this bipartisan amendment. And while the amendment covers a sizable chunk of NASA's roles and responsibilities, it is clear that we still have more work to do in a number of important areas. I look forward to honoring our commitment and the commitments of our Chairman and Ranking Member to bring this to finality in a bipartisan fashion through the Full Committee.

For example, I have made no secret of my view that we need to provide authorizations of sufficient length and magnitude to meaningfully reflect the funding required to carry out all the tasks we are asking NASA to undertake. We were unable to do so for this markup but I hope that by the time this bill has been enacted into law for this one-year authorization, we will have begun the longer-term work to provide the funding guidance that Congress has a responsibility to render in the coming years.

We also need to continue discussions on NASA's education activities on earth science and a range of other topics so we can ideally include sensible provisions in these areas when we move to Full Committee markup. Their omission from today's markup in no way minimizes their importance. It simply reflects the need to take our time together to get them right and for all of us to be on the same page in the same spirit in which we have engaged up to this point.

In addition, Mr. Chairman, I know there are other technical improvements the staff will continue to seek to make for us in preparation for the Full Committee markup. I look forward to engaging Members on both sides of the aisle who have ideas for strengthening the bill. I am committed to maintaining a bipartisan product that reflects the high regard we have on both sides of the aisle for

the agency, its workers, and the incredible private sector partners who think about the future every day.

Today, we can be proud to have achieved to reach common ground for this Subcommittee markup. Mr. Chairman, let us maintain our resolve to continue working together as we have so that we can come up with an even better bill before the Full Committee markup. And let us continue our progress on reauthorizing NASA and getting a bill enacted into law. Thank you, Mr. Chairman.

[The prepared statement of Ms. Edwards follows:]

PREPARED STATEMENT OF SUBCOMMITTEE RANKING MEMBER DONNA EDWARDS

Mr. Chairman, NASA is critical to this Nation, to our economic strength, and to our place in the world. NASA's accomplishments in human spaceflight, space science, aeronautics research, and space technology are the envy of other nations and a source of inspiration for all our citizens.

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I know that different Members have their own personal favorite destinations and interim missions, but this Amendment puts the job of deciding the pathway forward where it belongs by requiring NASA to develop an informed and realistic Roadmap to get this nation to Mars. Within 180 days - just 6 months - NASA will share that Roadmap with Congress and provide updates in the coming years.

There are other important aspects of the Manager's Amendment worth mentioning:

I'm pleased that Manager's Amendment unequivocally states that the safety shall be the highest priority in the selection and development of commercial crew transportation services that NASA plans to use to transport U.S. astronauts to and from the International Space Station. We learned from the mistakes leading up to the Columbia disaster and we do not want to repeat them.

The Amendment recognizes the importance of robust science and aeronautics research portfolios and highlights the importance of NASA's space technology program in enabling new technologies and capabilities that will make NASA's missions more affordable and reliable.

In this Amendment we have also removed the prohibition against cancelling "covered programs" without congressional action-those covered programs are no more protected than any other NASA program, nor should they be.

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For example, I have made no secret of my view that we need to provide authorizations of sufficient length and magnitude to meaningfully reflect the funding required to carry out all the tasks we are asking NASA to undertake.

We were unable to do so for this markup, but I hope that by the time this bill has been enacted into law, we will have begun the longer term work to provide the funding guidance that Congress has a responsibility to render in the coming years.

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I look forward to engaging Members on both sides of the aisle who have ideas for strengthening the bill. I am committed to maintaining a bipartisan product that reflects the high regard we have on both sides of the aisle for the agency, its workers, and the incredible private sector partners who think about the future every day.

Today, we can be proud to have reached common ground for this subcommittee markup.

Mr. Chairman, let us maintain our resolve to continue working together so that we can come up with an even better bill before Full Committee markup. Let us continue our progress on reauthorizing NASA and get a bill enacted into law.

Chairman PALAZZO. Thank you, Ms. Edwards.

I now recognize the Ranking Member of the Full Committee, Ms. Johnson, for a statement.

Ms. JOHNSON. Thank you very much, Mr. Chairman, for yielding to me. I will be brief in my remarks.

Today's Subcommittee markup represents a step forward for NASA. I think we will come out of this markup with an approved NASA reauthorization, not a perfect one by any means, but definitely a better piece of legislation. It is also a step forward for our committee. Chairman Palazzo, Chairman Smith, and their staffs have worked constructively with Ranking Member Edwards and me and our staff to try to reach an agreement on a bipartisan NASA bill, something that had always been a hallmark of this committee.

It has not been easy to get to where we are today and the Committee's work on this NASA reauthorization bill is by no means done. However, I greatly appreciate the willingness of Chairman Palazzo and Chairman Smith to work with us and I look forward to our continued collaboration so that at the end of the process we can have a bill that we will all take pride in having enacted into law.

Ranking Member Edwards has always articulated both a number of the manager's amendment's strengths and some of our remaining concerns about the bill before us today. As a result, I will not spend any time restating them now. I will just close by again making the point that NASA is an important part of our Nation's R&D enterprise. We need to keep it strong and vital and I think that the manager's amendment before us today will help us achieve that goal.

Thank you and I yield back the balance of my time.

[The prepared statement of Ms. Johnson follows:]

PREPARED STATEMENT OF FULL COMMITTEE RANKING MEMBER EDDIE BERNICE JOHNSON

Thank you, Mr. Chairman for yielding to me. I will be brief in my remarks. Today's subcommittee markup represents a step forward for NASA. I think we will come out of this markup with an improved NASA reauthorization-not a perfect one, by any means, but definitely a better piece of legislation. It is also a step forward for our Committee.

Chairman Palazzo, Chairman Smith, and their staffs have worked constructively with Ranking Member Edwards and me and our staffs to try to reach agreement on a bipartisan NASA bill—something that had always been a hallmark of this Committee. It has not been easy to get to where we are today, and the Committee's work on this NASA Reauthorization bill is by no means done. However, I greatly appreciate the willingness of Chairman Palazzo and Chairman Smith to work with us, and I look forward to our continued collaboration so that at the end of the process we can have a bill that we will all take pride in having enacted into law.

Ranking Member Edwards has already articulated both a number of the Manager's Amendment's strengths, and some of our remaining concerns about the bill before us today. As a result, I will not spend any time restating them now.

I will just close by again making the point that NASA is an important part of our nation's R&D enterprise. We need to keep it strong and vital, and I think that the Manager's Amendment before us today will help us achieve that goal.

Thank you, and I yield back the balance of my time.

Chairman PALAZZO. Thank you, Ms. Johnson.

Pursuant to Committee Rule 2(f) and House Rule XI(2)(h)(4), the Chair announces that he may postpone roll call votes on matters on which the yeas and nays are ordered.

Pursuant to notice, I now call up H.R. 4412, the NASA Reauthorization Act of 2014, for markup. The clerk will report the bill.

The CLERK. H.R. 4412, to authorize the programs in the National Aeronautics and Space Administration and for other purposes.

[H.R. 4412 appears in Appendix I]

Chairman PALAZZO. Without objection, the bill is considered as read.

Does any Member wish to be recognized on the bill?

Mr. ROHRABACHER. Mr. Chairman.

Chairman PALAZZO. I recognize Mr. Rohrabacher.

Mr. ROHRABACHER. I rise in support of your authorization bill—this authorization bill. I should say ours because I will be supporting it and also would like to stand in solidarity with my colleagues on both sides of the aisle and I think that this has been exemplary and we have seen some great leadership on your part, as well as from our leaders on the other side of the aisle, and I want to congratulate all of you.

However, I feel compelled to state for the record my thoughts of one of the basic tenants of this authorization. I believe it is an expensive folly to tie America's—American Government's program so closely to the goal of putting human beings on Mars. The odds are too great that this will result in huge waste of very limited resources that could be spent on goals that are much more certain and much more beneficial to our people today. When one tries to cross a bridge too far, somebody is going to get soaked. And in this case, it will be the American taxpayer who will be paying dearly for unnecessary expenditures in achieving a goal, meaning landing human beings on Mars, which is more of a publicity stunt than a scientific achievement.

If we are to maximize the benefits to mankind and to our citizens of space and humans—human involvement in space, we need to

prioritize and we need to be realistic. I do not find the goal of landing a human being on Mars something that will benefit our citizens or humankind at this time as much as perhaps some other goals, and then going on to Mars when other technologies have been developed that will make it less expensive and more certain.

Chairman PALAZZO. The gentleman yields back.

Is there any further discussion on the bill?

Is there any further discussion on the bill?

Mr. Smith.

Chairman SMITH. Thank you, Mr. Chairman.

I don't know if this is an appropriate time or not but I would like to make a quick statement about the bill. And I appreciate everybody's attendance here and I appreciate the fact that we are underway.

Mr. Chairman, first, I want to thank you for your leadership on this Subcommittee and your dedication to NASA and its employees. The work you and Ranking Member Donna Edwards did to put this agreement together sets an example for how this Committee can work productively towards a common goal. Also, I want to thank the Republican and Democratic staff who worked long hours to help advance this legislation.

This bill continues the bipartisan direction that this Committee has provided to NASA for nearly a decade, despite the Administration's attempts to reorder Congressional priorities. The 91-page bill before the Subcommittee today provides support and guidance to the Space Launch System and Orion crew capsule, the Commercial Crew Program, the International Space Station, astrophysics including the James Webb Space Telescope, planetary science, heliophysics, Earth science, space technology and aeronautics.

At a fundamental level, space exploration—the mission of NASA—is about inspiration. The agreement reached by Chairman Palazzo and Ranking Member Edwards demonstrates what we can accomplish together. It is my hope that the bipartisanship embodied in this agreement will establish a precedent for the future.

I look forward to continuing this discussion with Ranking Member Johnson. It is my desire to move this bill through the Full Committee and to the House Floor as soon as possible. I know we still have work to do, but this is certainly a positive step.

Thank you, Mr. Chairman, and I will yield back.

[The prepared statement of Mr. Smith follows:]

PREPARED STATEMENT OF FULL COMMITTEE CHAIRMAN LAMAR S. SMITH

Thank you Mr. Chairman. I appreciate your leadership on this Subcommittee and your dedication to NASA and its employees. The work you and Ranking Member Donna Edwards did to put this agreement together sets an example for how this Committee can work productively towards a common goal. Also, I want to thank the Republican and Democratic staff who worked long hours to help advance this legislation.

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At a fundamental level, space exploration—the mission of NASA—is about inspiration. The agreement reached by Chairman Palazzo and Ranking Member Edwards demonstrates what we can accomplish together. It is my hope that the bipartisanship embodied in this agreement will establish a precedent of the future.

I look forward to continuing this discussion with Ranking Member Johnson. It is my desire to move this bill through the Full Committee and to the House floor as soon as possible. I know we still have work to do, but this is certainly a positive step.

Thank you Mr. Chairman, I yield back.

Chairman PALAZZO. Thank you, Mr. Smith, for your statement.

Is there any further discussion on the bill?

Hearing none, without objection, I ask unanimous consent that the bill is considered open to amendment at any point and that Members proceed with amendments in the order listed on the roster. So ordered.

The first amendment on the roster is an amendment in the nature of a substitute offered by myself and the gentlewoman from Maryland, Ms. Edwards. The clerk shall report the amendment.

The CLERK. Amendment in the nature of a substitute to H.R. 4412 offered by Mr. Palazzo of Mississippi and Ms. Edwards of Maryland. Strike all after the——

[The amendment of Mr. Palazzo and Ms. Edwards appears in Appendix I]

Chairman PALAZZO. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

I recognize myself for five minutes to explain the amendment.

The amendment in the nature of a substitute before us today is the result of weeks of negotiations between the minority and majority. While this amendment is not perfect, it represents a sincere effort and desire by both Republicans and Democrats to come to an agreement on the future of NASA.

The amendment sets NASA on a path of landing humans on Mars with the creation of a human exploration roadmap. This roadmap is critical to the future of human exploration for the United States and ensures there is a plan and structure in place that will span several administrations and elections.

The prioritization of the Space Launch System and Orion crew capsule are reaffirmed by this agreement, not just in authorized funding levels but also in a direction for their use. The NASA Authorization Act of 2010 laid out very clear guidelines and a direction for the development of these systems. This agreement is intended to ensure that the Administration's rhetoric is supported by reality in NASA's budgets.

One of the most important near-term challenges facing our program is access to low-Earth orbit and the International Space Station. The agreement authorizes ample funding for the Commercial Crew Program in order to develop domestic access to the International Space Station. There are also oversight provisions to provide transparency in the contracts and processes used to develop these systems. This agreement represents an understanding that both our commercial crew partners and those developed in SLS and Orion have a crucial role to play in ending our reliance on Russian rockets.

The science title of the agreement emphasizes the importance of completing and launching the James Webb Space Telescope in

2018, which will build on the work of its Hubble predecessor while expanding our view into the universe.

The agreement reaffirms Congress' commitment to the first "A" in NASA, Aeronautics Research Mission Directorate. The agency has a proud history of infusing critical industry-changing technologies into the aerospace sector. This agreement directs NASA to create research and develop roadmaps for the agency's work on unmanned aerial systems, hypersonics, supersonics, and rotorcraft. The agreement also supports critical development efforts in composite materials in the NextGen program.

In an ongoing effort to keep NASA's shrinking budgets focused to support the agency's primary mission, our amendment asks that any transfer of additional responsibilities to NASA be accompanied by additional resources. NASA is the only agency tasked with space exploration and its budget must reflect space exploration as a priority. Yet the President's budget request again transfers responsibility for developing instruments for climate research from NOAA to NASA without providing additional resources to NASA to pay for such responsibilities.

Finally, this Committee has made multiple requests for more information on a proposed Asteroid Redirect Mission, or ARM. These are reasonable requests, especially in light of the considerable concerns that have been expressed in the scientific community by NASA's own advisory groups. To date, NASA has failed to provide a budget profile, program office, or schedule. This agreement continues asking NASA to provide these key details about this mission.

There is still work to be done to perfect this bill. Specifically, I know the Ranking Member and I will continue work on refining several sections. Some provisions have been left out to allow for more time to discuss but that does not mean we will not address them in the future. Specifically, the advanced booster competition section may need to be updated to reflect current realities of NASA. Other provisions such as the Space Act Agreement section may need further changes. I look forward to continuing our efforts as we move to Full Committee, the Floor, and eventually the conference with the Senate.

I want to thank Ms. Edwards, her staff, and of course the majority staff for their tireless efforts to pull together this agreement. I am proud that at the end of the day we were able to put our names on a bipartisan bill.

Is there any further discussion on the amendment?

I now recognize Ms. Edwards.

Ms. EDWARDS. Thank you, Mr. Chairman.

I just want to echo your words with respect to the amendment that we have developed together in this Subcommittee, both Republicans and Democrats, as a demonstration of our strong support for NASA.

I do want to take just a moment to recognize all of the staff who put in many, many hours of work over these last several weeks and months. From the majority, Chris Shank, Tom Hammond, Jared Stout, Allison Rose-Sonnesyn, and Gabriella Ra'anan, and your personal staff, Megan Mitchell; from the minority, Dick Obermann, Pam Whitney, Allen Li, and my personal staff Anne Nelson.

Thank you, Mr. Chairman.

Chairman PALAZZO. Thank you, Ms. Edwards, for recognizing the staff that pretty much helped make this all possible.

Is there any further discussion on the amendment?

Hearing none, the vote occurs on the Palazzo-Edwards amendment in the nature of a substitute.

All in favor, say aye.

Those opposed, say no.

The ayes have it and the amendment is agreed to.

Are there any further amendments?

Hearing none and a reporting quorum being present, the question is on the bill, H.R. 4412, the NASA Authorization Act of 2014, as amended.

Those in favor, say aye.

Opposed, no.

The ayes have it and the bill, as amended, is agreed to.

Without objection, the Motion to Reconsider is laid upon the table.

I now recognize Ms. Edwards for a motion.

Ms. EDWARDS. Mr. Chairman, I move that the bill H.R. 4412, the NASA Authorization Act of 2014, as amended, be favorably reported to the Full Committee on Science, Space, and Technology and the staff be authorized to make any necessary technical and conforming changes.

Chairman PALAZZO. Without objection, so ordered.

If there is no further discussion, this completes our business. This concludes the Subcommittee markup. The Subcommittee on Space stands adjourned.

[Whereupon, at 9:33 a.m., the Subcommittee was adjourned.]

Appendix I

H.R. 4412, THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 2014

SECTION–BY–SECTION ANALYSIS, AMENDMENTS

AMENDMENT ROSTER

.....

(Original Signature of Member)

113TH CONGRESS
2D SESSION

H. R. 4412

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

IN THE HOUSE OF REPRESENTATIVES

Mr. PALAZZO (for himself and Mr. SMITH of Texas) introduced the following bill; which was referred to the Committee on

---

A BILL

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 Authorization Act of 2014".

(b) TABLE OF CONTENTS.—The table of contents for 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 Administration.

(3) ORION CREW CAPSULE.—The term "Orion crew capsule" refers to the multipurpose crew vehicle described in section 303 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18323).

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

(5) SPACE LAUNCH SYSTEM.—The term "Space Launch System" refers to the follow-on Government-owned civil launch system developed, managed, and operated by the Administration to serve as a key component to expand human presence beyond low-Earth orbit, as described in section 302 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322).

TITLE I—AUTHORIZATION OF APPROPRIATIONS

SEC. 101. FISCAL YEAR 2014.

There are authorized to be appropriated to the Administration for fiscal year 2014 $17,646,500,000 as follows:

(1) For Space Exploration, $4,113,200,000, of which—

(A) $1,918,200,000 shall be for the Space Launch System, of which $318,200,000 shall be for Exploration Ground Systems;

(B) $1,197,000,000 shall be for the Orion crew capsule;

(C) $302,000,000 shall be for Exploration Research and Development; and

(D) $696,000,000 shall be for Commercial Crew Development activities.

(2) For Space Operations, $3,778,000,000, of which $2,984,100,000 shall be for the International Space Station Program.

(3) For Science, $5,151,200,000, of which—

(A) $1,826,000,000 shall be for Earth Science;

(B) $1,345,000,000 shall be for Planetary Science, of which $30,000,000 shall be for the Astrobiology Institute;

(C) $668,000,000 shall be for Astrophysics;

(D) $658,200,000 shall be for the James Webb Space Telescope; and

(E) $654,000,000 shall be for Heliophysics.

(4) For Aeronautics, $566,000,000.

(5) For Space Technology, $576,000,000.

(6) For Education, $116,600,000.

(7) For Cross-Agency Support, $2,793,000,000.

(8) For Construction and Environmental Compliance and Restoration, $515,000,000.

(9) For Inspector General, $37,500,000.

TITLE II—HUMAN SPACE FLIGHT

Subtitle A—Exploration

SEC. 201. SPACE EXPLORATION POLICY.

(a) FINDINGS.—Congress finds the following:

(1) Congress supports a human exploration program that is not critically dependent on the achievement of milestones by fixed dates and an exploration technology development program to enable lunar human and robotic operations, as described in para-

graphs (1) and (2) of section 70502 of title 51, United States Code.

(2) Congress supports the expansion of permanent human presence beyond low-Earth orbit, in a manner involving international partners, commercial partners, and other not-for-profit partners where practical.

(3) Congress remains committed to ensuring that authorized budgets for the human space flight program should allow the Administration to maintain high safety standards.

(4) Exploration deeper into the solar system should be the core mission of the Administration.

(5) Congress strongly supports the development of the Space Launch System and the Orion crew capsule as the enabling elements for human exploration, advanced scientific missions, and national security priorities beyond low-Earth orbit.

(b) POLICY.—It is the policy of the United States that the development of capabilities and technologies necessary for human missions to lunar orbit, the surface of the Moon, the surface of Mars, and beyond shall be the goal of the Administration's human space flight program.

(c) VISION FOR SPACE EXPLORATION.—Section 20302 of title 51, United States Code, is amended—

(1) by striking subsection (a) and inserting the following:

"(a) IN GENERAL.—The Administrator shall establish a program to develop a sustained human presence on the Moon and the surface of Mars, including a robust precursor program that follows the stepping stone plan required in section 70504 to promote exploration, science, commerce, and United States preeminence in space. The Administrator is further authorized to develop and conduct appropriate international collaborations, commercial collaborations, and other not-for-profit collaborations in pursuit of such program, but the absence of such partnerships may not be justification for failure to pursue such program in a timely manner.";

(2) in subsection (b)—

(A) by striking paragraph (1) and inserting the following:

"(1) Returning Americans to the Moon.";

(B) by striking paragraph (2) and inserting the following:

"(2) Launching the first crewed mission of the fully integrated Orion crew capsule with the Space Launch System as close to 2020 as possible."; and

(C) in paragraph (4), by striking "from Mars and" and inserting "from the Moon, Mars, and"; and

(3) by adding at the end the following:

"(e) DEFINITIONS.—In this section:

"(1) ORION CREW CAPSULE.—The term 'Orion crew capsule' refers to the multipurpose crew vehicle described in 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' refers to the follow-on Government-owned civil launch system developed, managed, and operated by the Administration to serve as a key component to expand human presence beyond low-Earth orbit, as described in section 302 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322).".

(d) 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" after the 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 accelerate the development of capabilities to enable a human exploration mission to the surface of Mars and beyond through the prioritization of those technologies and capabilities best suited for such a mission in accordance with the Mars Human Exploration Roadmap under section 70504 of title 51, United States Code.".

(e) 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 CAPABILITIES.—

"(1) IN GENERAL.—NASA may not obtain non-United States human space flight capabilities unless no domestic commercial or public-private partnership provider that the Administrator has determined to meet safety requirements established by NASA for the transport of its astronauts is available to provide such capabilities.

"(2) DEFINITION.—For purposes of this subsection, the term 'domestic commercial provider' means a person providing space transportation serv-

ices or other space-related activities, the majority control of which is held by persons other than a Federal, State, local, or foreign government, foreign company, or foreign national.".

(f) REPEAL OF 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.

(g) FULLEST COMMERCIAL USE OF SPACE.—

(1) REPORT.—Not later than 90 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on current and continuing efforts by the Administration to "seek and encourage, to the maximum extent possible, the fullest commercial use of space," as described in section 20102(c) of title 51, United States Code.

(2) ELEMENTS.—The report required under subsection (a) shall include—

(A) an assessment of the Administration's efforts to comply with the policy;

(B) an explanation of criteria used to define compliance;

(C) a description of programs, policies, and activities the Administration is using, and will continue to use, to ensure compliance;

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

(E) a summary of all current and planned activities pursuant to this policy.

(h) BARRIERS TO FULLEST COMMERCIAL USE OF SPACE.—Not later than 90 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on current and continuing efforts by the Administration to reduce impediments, bureaucracy, redundancy, and burdens to ensure the fullest commercial use of space as required in section 20102(c) of title 51, United States Code.

SEC. 202. STEPPING STONE APPROACH TO EXPLORATION.

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

"§ 70504. Stepping stone approach to exploration

"(a) IN GENERAL.—In order to maximize the cost effectiveness of the long-term space exploration and utilization activities of the United States, the Administrator shall direct the Human Exploration and Operations Mission Directorate to develop a Mars Human Exploration Roadmap to define the specific capabilities and technologies necessary to extend human presence to the surface of Mars and the mission sets required to demonstrate such capabilities and technologies.

"(b) INTERNATIONAL PARTICIPATION.—The President should invite the United States partners in the International Space Station program and other nations, as appropriate, to participate in an international initiative under the leadership of the United States to achieve the goal of successfully conducting a crewed mission to the surface of Mars.

"(c) ROADMAP REQUIREMENTS.—In developing the Mars Human Exploration Roadmap, the Administrator shall—

"(1) include the specific set of capabilities and technologies required to extend human presence to the surface of Mars and the mission sets necessary

to demonstrate the proficiency of these capabilities and technologies with an emphasis on using the International Space Station, lunar landings, cis-lunar space, trans-lunar space, Lagrangian points, and the natural satellites of Mars, Phobos and Deimos, as testbeds, as necessary, and shall include the most appropriate process for developing such capabilities and technologies;

"(2) describe those technologies already under development across the Federal Government or by nongovernment entities which meet or exceed the needs described in paragraph (1);

"(3) provide a specific process for the evolution of the capabilities of the fully integrated Orion crew capsule with the Space Launch System and how these systems demonstrate the capabilities and technologies described in paragraph (1);

"(4) provide a description of the capabilities and technologies that could be demonstrated or research data that could be gained through the utilization of the International Space Station and the status of the development of such capabilities and technologies;

"(5) describe a framework for international cooperation in the development of all technologies and

capabilities required in this section, as well as an assessment of the risks posed by relying on international partners for capabilities and technologies on the critical path of development;

"(6) describe a process for utilizing nongovernmental entities for future human exploration beyond trans-lunar space and specify what, if any, synergy could be gained from—

"(A) partnerships using Space Act Agreements (as defined in section 2 of the National Aeronautics and Space Administration Authorization Act of 2014); or

"(B) other acquisition instruments;

"(7) include in the Roadmap an addendum from the NASA Advisory Council, and an addendum from the Aerospace Safety Advisory Panel, each with a statement of review of the Roadmap that shall include—

"(A) subjects of agreement;

"(B) areas of concern; and

"(C) recommendations; and

"(8) include in the Roadmap an examination of the benefits of utilizing current Administration launch facilities for trans-lunar missions.

"(d) UPDATES.—The Administrator shall update such Roadmap at least every 4 years and include it in the budget for that fiscal year transmitted to Congress under section 1105(a) of title 31, and describe—

"(1) the achievements and goals reached in the process of developing such capabilities and technologies during the 4-year period prior to the submission of the Roadmap to Congress; and

"(2) the expected goals and achievements in the following 4-year period.

"(e) DEFINITIONS.—The terms 'Orion crew capsule' and 'Space Launch System' have the meanings given such terms in section 20302.".

(b) REPORT.—

(1) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Administrator shall transmit a copy of the Mars Human Exploration Roadmap developed under section 70504 of title 51, United States Code, to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(2) UPDATES.—The Administrator shall transmit a copy of each updated Mars Human Exploration Roadmap to the Committee on Science,

Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 7 days after such Roadmap is updated under section 70504(b)(6) of such title.

SEC. 203. SPACE LAUNCH SYSTEM.

(a) FINDINGS.—Congress finds that—

(1) the Space Launch System is the most practical approach to reaching the Moon, Mars, and beyond, and Congress reaffirms the policy and minimum capability requirements for the Space Launch System contained in section 302 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322);

(2) the primary goal for the design of the fully integrated Space Launch System is to safely carry a total payload of 130 tons or more to low-Earth orbit to 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));

(3) the uncrewed flight test of the 70-ton core element of the Space Launch System fully integrated with the Orion crew capsule as described in

section 302(c)(1) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322(c)(1)) is a necessary flight demonstration in an overall program plan, subject to appropriations; and

(4) the schedule of the 70-ton core element crewed flight demonstration in 2021 with the Space Launch System fully integrated with the Orion crew capsule as described in section 302(c)(1) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322(c)(1)) is subject to appropriations.

(b) IN GENERAL.—As required in section 302(c)(2) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322(c)(2)), the Administration shall design the Space Launch System as a fully integrated vehicle capable of carrying a total payload of 130 tons or more into low-Earth orbit in preparation for transit for missions beyond low-Earth orbit.

(c) PROGRESS REPORT.—

(1) IN GENERAL.—Using the President's budget request for fiscal year 2014 and notional numbers requested therein as a baseline, not later than 90 days after the date of enactment of this Act the Administrator shall transmit to the Committee on

Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate an estimate of—

(A) when the 70-ton core element of the Space Launch System fully integrated with the Orion crew capsule may be demonstrated as an operational capability;

(B) when the 130-ton Space Launch System fully integrated with the Orion crew capsule may be demonstrated as an operational capability;

(C) the projected annual operational costs through 2030 for the 130-ton Space Launch System fully integrated with the Orion crew capsule after its operational capability has been demonstrated; and

(D) the projected flight rate for the 130-ton Space Launch System fully integrated with the Orion crew capsule through 2030.

(2) CONTINGENCY FUNDING ESTIMATES.—If the Administrator determines that the uncrewed test flight of the 70-ton core element of the Space Launch System fully integrated with the Orion crew capsule will not occur on or before December 31,

2017, or that the crewed test flight of the 70-ton core element of the Space Launch System fully integrated with the Orion crew capsule will not occur on or before December 31, 2021, the report transmitted under paragraph (1) shall include an estimate of additional funds required through annual appropriations for fiscal years 2015 through 2021 which may be necessary to meet such goals in those years.

(d) UTILIZATION REPORT.—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)). This report shall also include consideration of the technical requirements of the scientific and national security communities related to such Space Launch System and shall directly assess the utility and estimated cost savings obtained by using such Space Launch System for national security and space science missions. The Administrator shall transmit such report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate

not later than 180 days after the date of enactment of this Act.

(e) NAMING COMPETITION.—Beginning not later than 180 days after the date of enactment of this Act and concluding not later than 1 year after such date of enactment, the Administrator shall conduct a well-publicized competition among students in elementary and secondary schools to name the elements of the Administration's exploration program, including—

(1) a name for the deep space human exploration program as a whole, which includes the Space Launch System, the Orion crew capsule, lunar landers, and future missions; and

(2) a name for the Space Launch System.

SEC. 204. ORION CREW CAPSULE.

(a) IN GENERAL.—The Orion crew capsule shall meet the practical needs and the minimum capability requirements described in section 303 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18323).

(b) REPORT.—Not later than 60 days after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee

on Commerce, Science, and Transportation of the Senate—

(1) detailing those components and systems of the Orion crew capsule that ensure it is in compliance with section 303(b) of such Act (42 U.S.C. 18323(b));

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

(3) certifying that the requirements of section 303(b)(3) of such Act (42 U.S.C. 18323(b)(3)) will be met by the Administration in time for the first crewed test flight in 2021.

SEC. 205. ADVANCED BOOSTER COMPETITION.

(a) REPORT.—Not later than 90 days after the date of enactment of this Act, the Associate Administrator of the National Aeronautics and Space Administration shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report that—

(1) describes the estimated total development cost of an advanced booster for the Space Launch System;

(2) details any reductions or increases to the development cost of the Space Launch System which may result from conducting a competition for an advanced booster; and

(3) outlines any potential schedule delay to the Space Launch System 2017 EM–1 launch as a result of increased costs associated with conducting a competition for an advanced booster.

(b) COMPETITION.—If the Associate Administrator reports reductions pursuant to paragraph (2) of subsection (a), and no adverse schedule impact pursuant to paragraph (3), then the Administration shall conduct a full and open competition for an advanced booster for the Space Launch System to meet the requirements described in section 302(c) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322(c)), to begin not later than 1 year after the Associate Administrator transmits the report required under subsection (a).

Subtitle B—Space Operations

SEC. 211. FINDINGS.

Congress finds the following:

(1) The International Space Station is the ideal short-term testbed for future exploration systems development, including long-duration space travel.

(2) The use of the private market to provide cargo and crew transportation services is currently the most expeditious process to restore domestic access to the International Space Station and low-Earth orbit.

(3) Government-assured access to low-Earth orbit is paramount to the continued success of the International Space Station and National Laboratory.

(4) Acquiring and maintaining an operational domestic commercial crew transportation service by the year 2017 is of the utmost importance for the future viability of the International Space Station and National Laboratory.

SEC. 212. INTERNATIONAL SPACE STATION.

(a) IN GENERAL.—The following is the policy of the United States:

(1) The International Space Station shall be utilized to the maximum extent practicable for the development of capabilities and technologies needed for the future of human exploration beyond low-Earth orbit.

(2) The Administrator shall, in consultation with the International Space Station partners—

(A) take all necessary measures to support the operation and full utilization of the International Space Station; and

(B) seek to minimize, to the extent practicable, the operating costs of the International Space Station.

(3) Reliance on foreign carriers for crew transfer is unacceptable, and the Nation's human space flight program must acquire the capability to launch United States astronauts on United States rockets from United States soil as soon as is safe and practically possible, whether on Government-owned and operated space transportation systems or privately owned systems that have been certified for flight by the appropriate Federal agencies.

(b) REAFFIRMATION OF POLICY.—Congress reaffirms—

(1) its commitment to the development of a commercially developed launch and delivery system to the International Space Station for crew missions as expressed in the National Aeronautics and Space Administration Authorization Act of 2005 (Public Law 109–155), the National Aeronautics and Space Administration Authorization Act of 2008 (Public Law 110–422), and the National Aeronautics and

Space Administration Authorization Act of 2010 (Public Law 111–267);

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

(3) the policy stated in section 501(b) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18351(b)) that the Administration shall pursue international, commercial, and intragovernmental means to maximize International Space Station logistics supply, maintenance, and operational capabilities, reduce risks to International Space Station systems sustainability, and offset and minimize United States operations costs relating to the International Space Station.

(c) ASSURED ACCESS TO LOW-EARTH ORBIT.—Section 70501(a) of title 51, United States Code, is amended to read as follows:

"(a) POLICY STATEMENT.—It is the policy of the United States to maintain an uninterrupted capability for human space flight and operations in low-Earth orbit, and beyond, as an essential instrument of national security and the capability to ensure continued United States par-

ticipation and leadership in the exploration and utilization of space.".

(d) REPEALS.—

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

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

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

(e) EXTENSION CRITERIA REPORT.—Not later than 1 year after the date of enactment of this Act, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the feasibility of extending the operation of the International Space Station that includes—

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

(2) cost estimates for operating the International Space Station to achieve the criteria in paragraph (1);

(3) cost estimates for extending operations to 2020, 2025, and 2030; and

(4) an assessment of how the defined criteria under paragraph (1) respond to the National Academies Decadal Survey on Biological and Physical Sciences in Space.

(f) STRATEGIC PLAN FOR INTERNATIONAL SPACE STATION RESEARCH.—

(1) IN GENERAL.—The Director of the Office of Science and Technology Policy, in consultation with the Administrator, academia, other Federal agencies, the International Space Station National Laboratory Advisory Committee, and other potential stakeholders, shall develop and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a strategic plan for conducting competitive, peer-reviewed research in physical and life sciences and related technologies on the International Space Station through at least 2020.

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

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

(B) provide a research timeline and identify resource requirements for its implementation, including the facilities and instrumentation necessary for the conduct of such research; and

(C) identify—

(i) criteria for the proposed research, including—

(I) a justification for the research to be carried out in the space microgravity environment;

(II) the use of model systems;

(III) the testing of flight hardware to understand and ensure its functioning in the microgravity environment;

(IV) the use of controls to help distinguish among the direct and indirect effects of microgravity, among

other effects of the flight or space environment;

(V) approaches for facilitating data collection, analysis, and interpretation;

(VI) procedures to ensure repetition of experiments, as needed;

(VII) support for timely presentation of the peer-reviewed results of the research; and

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

(ii) instrumentation required to support the measurements and analysis of the research to be carried out under the strategic plan;

(iii) the capabilities needed to support direct, real-time communications between astronauts working on research experiments onboard the International Space Station and the principal investigator on the ground;

(iv) a process for involving the external user community in research planning, including planning for relevant flight hard-

ware and instrumentation, and for utilization of the International Space Station, free flyers, or other research platforms;

(v) the acquisition strategies the Administration plans to use to acquire any new capabilities which are not operational on the International Space Station as of the date of enactment of this Act and which have an estimated total life cycle cost of $10,000,000 or more, along with a justification of any anticipated use of less than full and open competition and written approval therefor from the Administration's Assistant Administrator for Procurement; and

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

(3) REPORT.—

(A) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Comptroller General of the United States shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on

the progress of the organization chosen for the management of the International Space Station National Laboratory as directed in section 504 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18354).

(B) SPECIFIC REQUIREMENTS.—The report shall assess the management, organization, and performance of such organization and shall include a review of the status of each of the 7 required activities listed in section 504(c) of such Act (42 U.S.C. 18354(c)).

SEC. 213. COMMERCIAL CREW REPORT.

(a) IN GENERAL.—The Administration shall consider the ramifications of and create contingencies as the sequestration adopted in the Budget Control Act of 2011 (Public Law 112–25) continues to reduce the Administration's overall budget.

(b) REPORT.—

(1) IN GENERAL.—Not later than 60 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report containing 5 dis-

tinct options for the final stages of the commercial crew program.

(2) REQUIREMENTS.—These options shall include—

(A) a strategy that assumes an appropriation of $500,000,000 over the next 3 fiscal years;

(B) a strategy that assumes an appropriation of $600,000,000 over the next 3 fiscal years;

(C) a strategy that assumes an appropriation of $700,000,000 over the next 3 fiscal years;

(D) a strategy that assumes an appropriation of $800,000,000 over the next 3 fiscal years; and

(E) a strategy that has yet to be considered previously in any budget submission but that the Administration believes could ensure the flight readiness date of 2017 for at least one provider or significantly decreases the overall program lifecycle cost.

(3) INCLUSIONS.—Each strategy shall include the contracting instruments the Administration will employ to acquire the services in each phase of de-

velopment or acquisition, the number of commercial providers the Administration will include in the program, and the estimated flight readiness date in each scenario.

SEC. 214. FLIGHT READINESS DEMONSTRATION.

(a) IN GENERAL.—The Administration shall carry out its flight readiness demonstration, in which one or more commercial crew partner companies safely transports United States astronauts to the International Space Station, by December 31, 2017.

(b) REPORT.—Not later than 180 days after the date of enactment of this Act and every 90 days thereafter until the Administration carries out its flight readiness demonstration, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report—

(1) describing the current status of the Commercial Crew program, including all funding paid to any partner company throughout the life of the program detailed by specific dollar amounts provided for each milestone completed for each partner company;

(2) specifying the accomplishments and milestones completed in the 90 days prior to the date of

transmission of the report under any phase of the program and all dollar amounts provided for each of those milestones;

(3) identifying those accomplishments and milestones that were expected to be completed in the 90 days prior to the date of transmission of such report under any phase of the program but that were not completed in that timeframe;

(4) setting forth the accomplishments and milestones that are expected to be completed in the 90-day period following the transmission of such report under any phase of the program; and

(5) containing a statement of flight readiness under subsection (c).

(c) STATEMENT OF FLIGHT READINESS.—The statement of flight readiness required by subsection (b)(5) shall include—

(1) either—

(A) a certification by the Administrator that the Administration is on schedule to comply with subsection (a); or

(B) an explanation as to why the Administration is not on schedule to comply with subsection (a) and why the Administration did not

develop an acquisition strategy based on existing budget authority; and

(2) a certification by the Administrator that all deviations from the Aerospace Safety Advisory Panel recommendations have been reported in accordance with section 215.

(d) AUTHORIZATION OF FUNDS.—Not later than 60 days after the issuance of the explanation described in subsection (c)(2), the Administrator shall provide, and begin implementation of, a new acquisition strategy that ensures that at least 1 company will be prepared to provide crew transport services by December 31, 2017.

SEC. 215. AEROSPACE SAFETY ADVISORY PANEL ADVICE.

(a) IMPORTANCE.—Congress reaffirms the importance of the Aerospace Safety Advisory Panel in providing advice to the Administrator and Congress in accordance with the duties prescribed in section 31101 of title 51, United States Code.

(b) INITIAL REPORT.—Not later than 30 days after the date of enactment of this Act, the Administrator shall report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on the extent to which the Administration has followed, intends to follow, or does not intend to follow the advice

in the 2012 Annual Report of the Aerospace Safety Advisory Panel.

(c) ANNUAL REPORTS.—Section 31101 of title 51, United States Code, is amended by striking subsection (e) and inserting the following:

"(e) PANEL ANNUAL REPORT.—The Panel shall submit an annual report to the Administrator and to Congress. The Panel shall include in such report an evaluation of the Administration's management and culture related to safety. Each annual report shall include an evaluation of the extent to which the Administration follows the Panel's advice.

"(f) ADMINISTRATOR ANNUAL REPORT.—Not later than 30 days after each annual report by the Panel under subsection (e), the Administrator shall report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on the extent to which the Administration has followed, intends to follow, or does not intend to follow the Panel's advice.".

SEC. 216. SPACE COMMUNICATIONS.

(a) PLAN.—The Administrator shall develop a plan, in consultation with relevant Federal agencies, for updating the Administration's space communications architecture for both low-Earth orbital operations and deep space

exploration so that it is capable of meeting the Administration's needs over the next 20 years. The plan shall include lifecycle cost estimates, milestones, estimated performance capabilities, and 5-year funding profiles. The plan shall also include an estimate of the amounts of any reimbursements the Administration is likely to receive from other Federal agencies during the expected life of the upgrades described in the plan. At a minimum, the plan shall include a description of the following:

(1) Projected Deep Space Network requirements for the next 20 years, including those in support of human space exploration missions.

(2) Upgrades needed to support Deep Space Network requirements, including cost estimates and schedules.

(3) Cost estimates for the maintenance of existing Deep Space Network capabilities.

(4) Projected Tracking and Data Relay Satellite System requirements for the next 20 years, including those in support of other relevant Federal agencies.

(5) Cost and schedule estimates to maintain and upgrade the Tracking and Data Relay Satellite System to meet projected requirements.

(6) Steps the Administration is taking to mitigate threats to electromagnetic spectrum use.

(b) SCHEDULE.—The Administrator shall transmit the plan developed under this section to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 1 year after the date of enactment of this Act.

TITLE III—SCIENCE

Subtitle A—General

SEC. 301. SCIENCE PORTFOLIO.

(a) BALANCED AND ADEQUATELY FUNDED ACTIVITIES.—Section 803 of the National Aeronautics and Space Administration Authorization Act of 2010 (124 Stat. 2832) is amended to read as follows:

"SEC. 803. OVERALL SCIENCE PORTFOLIO; SENSE OF CONGRESS.

"Congress reaffirms its sense, expressed in the National Aeronautics and Space Administration Authorization Act of 2010, that a balanced and adequately funded set of activities, consisting of research and analysis grants programs, technology development, small, medium, and large space missions, and suborbital research activities, contributes to a robust and productive science program and serves as a catalyst for innovation and discovery.".

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

SEC. 302. 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) ASSESSMENT.—The Administrator shall carry out biennial 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 mission lifetime. The assessment shall take into consideration how extending existing 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 consult with any affected Federal agency and shall take into account the potential benefits of instruments on missions that are beyond their planned mission lifetime.

"(c) COSTS.—If a mission is extended based on consultation required under subsection (b), the full costs of the extension shall be paid for by the operational agency or agencies.

"(d) REPORT.—The Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, at the same time as the submission to Congress of the President's annual budget request, a report detailing any assessment required by subsection (a) that was carried out during the previous year.".

SEC. 303. RADIOISOTOPE THERMOELECTRIC GENERATORS.

(a) ANALYSIS OF REQUIREMENTS AND RISKS.—The Administrator, in consultation with 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.

(b) CONTENTS OF ANALYSIS.—The analysis conducted under subsection (a) 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 Stirling Radioisotope Generator technology;

(B) the status of and timeline for completing development and demonstration of the Advanced Stirling Radioisotope Generator technology, including the development of flight readiness requirements; and

(C) 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 Stirling Radioisotope Generator 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

(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".

(c) TRANSMITTAL.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit the results of the analysis to the Committee on

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

SEC. 304. CONGRESSIONAL DECLARATION OF POLICY AND PURPOSE.

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

"(10) The direction of the unique competence of the Administration to the search for life's origin, evolution, distribution, and future in the Universe. In carrying out this objective, the Administration may use any practicable ground-based, airborne, or space-based technical means and spectra of electromagnetic radiation.".

SEC. 305. UTILIZATION OF INTERNATIONAL SPACE STATION FOR SCIENCE MISSIONS.

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

Subtitle B—Astrophysics

SEC. 311. DECADAL CADENCE.

In carrying out section 301(b), the Administrator shall ensure a steady cadence of large, medium, and small astrophysics missions.

SEC. 312. EXTRASOLAR PLANET EXPLORATION STRATEGY.

(a) STRATEGY.—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 TESS, the James Webb Space Telescope, WFIRST, or any other telescope, spacecraft, or instrument as appropriate. Such strategy shall—

(1) outline key scientific questions;

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

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

(4) make recommendations with respect to optimal coordination with international partners, commercial partners, and other not-for-profit partners.

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

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

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

(c) REPORT TO CONGRESS.—Not later than 18 months after the date of enactment of this Act, the National Academies shall transmit a report to the Administrator, and to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, containing the strategy developed under subsection (a).

SEC. 313. JAMES WEBB SPACE TELESCOPE.

It is the sense of Congress that the James Webb Space Telescope program is significant to our understanding of the history of the universe, including galaxies, stars, and planetary systems, and should continue to receive priority of funding in accord with the recommendation of the most recent decadal survey for Astronomy and Astrophysics of the National Academies' Space Studies Board.

SEC. 314. WIDE-FIELD INFRARED SURVEY TELESCOPE.

The Administrator shall ensure that the development of the Wide-Field Infrared Survey Telescope continues while the James Webb Space Telescope is completed.

SEC. 315. NATIONAL RECONNAISSANCE OFFICE TELESCOPE DONATION.

Not later than 90 days after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate outlining the cost of the Administration's potential plan for developing the Wide-Field Infrared Survey Telescope as described in the most recent astronomy and astrophysics decadal survey, including an alternative plan for the Wide-Field Infrared Survey Telescope 2.4, which includes the donated 2.4-meter aperture National Reconnaissance Office telescope. Due to the budget constraints on the Administration's science programs, this report shall include—

(1) an assessment of affordable approaches to develop the Wide-Field Infrared Survey Telescope;

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

(3) an assessment of how the Administration's existing science missions will be affected by the utilization of the donated asset described in this section; and

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

Subtitle C—Planetary Science

SEC. 321. DECADAL CADENCE.

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

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

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

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

SEC. 322. NEAR-EARTH OBJECTS.

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

(1) Near-Earth objects pose a serious and credible threat to humankind, as many scientists believe that a major asteroid or comet was responsible for the mass extinction of the majority of the Earth's

species, including the dinosaurs, nearly 65,000,000 years ago.

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

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

(4) The efforts taken to date by the Administration for detecting and characterizing the hazards of near-Earth objects must continue to fully determine the threat posed by such objects to cause widespread destruction and loss of life.

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

(c) NEAR-EARTH OBJECT SURVEY.—The Administrator shall continue to discover, track, catalogue, and characterize the physical characteristics of near-Earth objects equal to or greater than 140 meters in diameter in order to assess the threat of such near-Earth objects to

the Earth, pursuant to the George E. Brown, Jr. Near-Earth Object Survey Act (42 U.S.C. 16691). It shall be the goal of the Survey program to achieve 90 percent completion of its near-Earth object catalogue (based on statistically predicted populations of near-Earth objects) by 2020.

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

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

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

(2) 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 dis-

cover 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.—The Administrator shall annually transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report that provides—

(1) a summary of all activities carried out pursuant to subsection (c) since the date of enactment of this Act; and

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

SEC. 323. ASTROBIOLOGY STRATEGY.

(a) STRATEGY.—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.

(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. The strategy shall include recommendations for coordination with international partners.

(c) REPORT TO CONGRESS.—Not later than 18 months after the date of enactment of this Act, the National Academies shall transmit a report to the Administrator, and to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, containing the strategy developed under subsection (a).

SEC. 324. PUBLIC-PRIVATE PARTNERSHIPS.

Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report describing how the Administration can expand collaborative public-private partnerships to study life's origin, evolution, distribution, and future in the Universe.

Subtitle D—Heliophysics

SEC. 331. DECADAL CADENCE.

In carrying out section 301(b), the Administrator shall ensure a steady cadence of large, medium, and small heliophysics missions.

SEC. 332. REVIEW OF SPACE WEATHER.

(a) REVIEW.—The Director of the Office of Science and Technology Policy, in consultation with the Administrator, the Administrator of the National Oceanic and Atmospheric Administration, the Director of the National Science Foundation, the Secretary of Defense, the Secretary of Energy, and the Secretary of Homeland Security, shall enter into an arrangement with the National Academies to provide a comprehensive study that reviews current and planned space weather monitoring requirements and capabilities. The study shall inform the process of identifying national needs for future space weather monitoring and mitigation. The National Academies shall give consideration to international and private sector efforts and collaboration. The study shall also review the current state of research capabilities in observing, modeling, and prediction and provide recommendations to ensure future advancement of predictive capability.

(b) REPORT TO CONGRESS.—Not later than 1 year after the date of enactment of this Act, the National Acad-

emies shall transmit a report to the Administrator, and to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, containing the results of the study provided under subsection (a).

SEC. 333. DEEP SPACE CLIMATE OBSERVATORY.

(a) INTEGRATING SENSORS.—The Administrator may not integrate or fund the development of any sensor on the Deep Space Climate Observatory (DSCOVR) that is not aligned with the spacecraft's original space weather mission requirements.

(b) ALGORITHMS.—The Administration may not develop or implement algorithms, or any other applications or products, that—

(1) are not aligned with the Deep Space Climate Observatory mission's intended space weather requirements; or

(2) enable "Earth at noon" images from the spacecraft.

Subtitle E—Earth Science

SEC. 341. GOAL.

(a) IN GENERAL.—Recognizing the contributions that Earth science and remote sensing have made to society over the last 50 years, the Administration shall con-

tinue to develop first-of-a-kind instruments that, once proved, can be transitioned to other agencies for operations.

(b) AMENDMENT.—Section 60501 of title 51, United States Code, is amended by inserting "In order to accomplish this goal, the Administrator shall conduct research and development on new sensors and instruments that will mitigate the risks associated with the development of operational systems and long-term data continuity requirements by other agencies. The Administration shall not be responsible for the development of operational Earth science systems, including satellite, sensor, or instrument development, acquisition, and operations, as well as product development and data analysis, unless such work is conducted on a reimbursable basis that accounts for the full cost of the work. The Administrator shall use the Joint Agency Satellite Division structure, or a direct successor thereto, to manage this process on a fully reimbursable basis." after "Earth observations-based research program.".

SEC. 342. DECADAL CADENCE.

In carrying out section 301(b), the Administrator shall ensure a steady cadence of large, medium, and small Earth science missions.

SEC. 343. RESEARCH TO OPERATIONS.

Section 60502(a) of title 51, United States Code, is amended by inserting "Operational responsibility for Earth science or space weather missions or sensors may not be transferred from any other Federal agency to the Administration, except as specifically authorized by law." after "execute the transitions.".

SEC. 344. INTERAGENCY COORDINATION.

(a) AMENDMENTS.—Section 60505 of title 51, United States Code, is amended—

(1) in the section heading, by inserting "**and other Federal agencies**" after "**Atmospheric Administration**";

(2) in subsection (a)—

(A) by striking "and the Administrator of the National Oceanic and Atmospheric Administration" and inserting ", the Administrator of the National Oceanic and Atmospheric Administration, and the heads of other relevant Federal agencies"; and

(B) by striking "the two agencies" and inserting "each of those agencies";

(3) in subsection (b)—

(A) by striking "and the Administrator of the National Oceanic and Atmospheric Administration" and inserting ", the Administrator of

the National Oceanic and Atmospheric Administration, and the heads of other relevant Federal agencies";

(B) by striking "Committee on Science and Technology" and inserting "Committee on Science, Space, and Technology"; and

(C) by striking "and the National Oceanic and Atmospheric Administration" and inserting ", the National Oceanic and Atmospheric Administration, and other relevant Federal agencies"; and

(4) in subsection (d), by striking "Administration Earth science mission" and all that follows through the period and inserting "Earth science mission or Earth observing system to or from the National Oceanic and Atmospheric Administration, any other Federal agency, or the Administration, or to or from other stakeholders, until the plans required under subsection (c) have been approved by the Administrator, the Administrator of the National Oceanic and Atmospheric Administration, and the heads of other relevant Federal agencies, and until financial resources have been identified to support the transition or transfer in the President's annual budget request for the National Oceanic and Atmos-

pheric Administration, the Administration, or other relevant agencies. Operational responsibility for Earth science programs may not be transferred from any other Federal agency to the Administration, except as specifically authorized by law.".

(b) CONFORMING AMENDMENT.—The item relating to section 60505 in the table of sections for chapter 605 of title 51, United States Code, is amended to read as follows:

"60505. Coordination with the National Oceanic and Atmospheric Administration and other Federal agencies.".

SEC. 345. JOINT POLAR SATELLITE SYSTEM CLIMATE SENSORS.

The Administration shall not be responsible for the development of Joint Polar Satellite System climate sensors, including the Total Solar Irradiance Sensor (TSIS–2), the Ozone Mapping and Profiler Suite–Limb (OMPS–L), or the Clouds and Earth Radiant Energy System (CERES–C). Any effort by the Administration related to this work shall be conducted on a fully reimbursable basis and executed by the Administration's Joint Agency Satellite Division or a direct successor thereto.

SEC. 346. LAND IMAGING.

(a) REAFFIRMATION OF POLICY.—Congress reaffirms the finding in section 2(1) of the Land Remote Sensing Policy Act of 1992 (15 U.S.C. 5601(1)), which states

that "The continuous collection and utilization of land remote sensing data from space are of major benefit in studying and understanding human impacts on the global environment, in managing the Earth's natural resources, in carrying out national security functions, and in planning and conducting many other activities of scientific, economic, and social importance.".

(b) CONTINUOUS LAND REMOTE SENSING DATA COLLECTION.—The Director of the Office of Science and Technology Policy shall take steps in consultation with other relevant Federal agencies to ensure, to the maximum extent practicable, the continuous collection of space-based, medium-resolution observations of the Earth's land cover, and to ensure that the data are made available in such ways as to facilitate the widest possible use.

(c) DEFINITION OF LAND IMAGING CAPABILITIES.—The Administrator may not initiate the definition of requirements for land imaging capabilities unless such work is conducted on a fully reimbursable basis and executed by the Administration's Joint Agency Satellite Division or a direct successor thereto.

SEC. 347. SOURCES OF EARTH SCIENCE DATA.

(a) ACQUISITION.—The Administrator shall, to the extent possible and while satisfying the scientific or educational requirements of the Administration and, where

appropriate, of other Federal agencies and scientific researchers, acquire, where cost effective, space-based and airborne Earth remote sensing data, services, distribution, and applications from non-Federal providers.

(b) TREATMENT AS COMMERCIAL ITEM UNDER ACQUISITION LAWS.—Acquisitions by the Administrator of the data, services, distribution, and applications referred to in subsection (a) shall be carried out in accordance with applicable acquisition laws and regulations (including chapters 137 and 140 of title 10, United States Code). For purposes of such laws and regulations, such data, services, distribution, and applications shall be considered to be commercial items. Nothing in this subsection shall be construed to preclude the United States from acquiring, through contracts with commercial providers, sufficient rights in data to meet the needs of the scientific and educational community or the needs of other government activities.

(c) SAFETY STANDARDS.—Nothing in this section shall be construed to prohibit the Federal Government from requiring compliance with applicable safety standards.

(d) REPORT.—Not later than 180 days after the date of enactment of the Act, the Administrator shall submit a report to the Committee on Science, Space, and Tech-

nology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on the Administration's efforts to carry out this section.

TITLE IV—AERONAUTICS

SEC. 401. SENSE OF CONGRESS.

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;

(2) aeronautics research is essential to the Administration's mission; and

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

SEC. 402. UNMANNED AERIAL SYSTEMS RESEARCH AND DEVELOPMENT.

(a) IN GENERAL.—The Administrator, in consultation with the Administrator of the Federal Aviation Administration and other Federal agencies, shall direct research and technological development to facilitate the safe integration of unmanned aerial systems into the National Airspace System, including—

(1) positioning and navigation systems;

(2) sense and avoid capabilities;

(3) secure data and communication links;

(4) flight recovery systems; and

(5) human systems integration.

(b) ROADMAP.—The Administrator shall update a roadmap for unmanned aerial systems research and development and transmit this roadmap to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 90 days after the date of enactment of this Act.

(c) COOPERATIVE UNMANNED AERIAL VEHICLE ACTIVITIES.—Section 31504 of title 51, United States Code, is amended by inserting "Operational flight data derived from these cooperative agreements shall be made available, in appropriate and usable formats, to the Administration and the Federal Aviation Administration for the development of regulatory standards." after "in remote areas.".

SEC. 403. RESEARCH PROGRAM ON COMPOSITE MATERIALS USED IN AERONAUTICS.

(a) CONSULTATION.—The Administrator, in overseeing the Administration's Integrated Systems Research Program's work on composite materials, shall consult with relevant Federal agencies and partners in industry to accelerate safe development and certification processes for

new composite materials and design methods while maintaining rigorous inspection of new composite materials.

(b) REPORT.—Not later than 1 year after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate detailing the Administration's work on new composite materials and the coordination efforts among Federal agencies.

SEC. 404. HYPERSONIC RESEARCH.

Not later than 1 year after the date of enactment of this Act, the Administrator, in consultation with other Federal agencies, shall develop and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a research and development roadmap for hypersonic aircraft research with the objective of exploring 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. The roadmap shall prescribe appropriate agency contributions, coordination efforts, and technology milestones.

SEC. 405. SUPERSONIC RESEARCH.

Not later than 1 year after the date of enactment of this Act, the Administrator shall develop and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a roadmap that allows for flexible funding profiles, for supersonic aeronautics research and development with the objective of developing and demonstrating, 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. The roadmap shall include—

(1) a status report on the Administration's existing research on supersonic flight;

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

(3) a research plan to address such challenges, as well as a project timeline for accomplishing relevant research goals; and

(4) a plan for coordination with stakeholders, including relevant government agencies and industry.

SEC. 406. RESEARCH ON NEXTGEN AIRSPACE MANAGEMENT CONCEPTS AND TOOLS.

(a) IN GENERAL.—The Administrator shall, in consultation with other Federal agencies, review at least annually the alignment and timing of the Administration's research and development activities in support of the NextGen airspace management modernization initiative, and shall make any necessary adjustments by reprioritizing or retargeting the Administration's research and development activities in support of the NextGen initiative.

(b) ANNUAL REPORTS.—The Administrator shall report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate annually regarding the progress of the Administration's research and development activities in support of the NextGen airspace management modernization initiative, including details of consultation with the Federal Aviation Administration and any adjustments made to research activities.

SEC. 407. ROTORCRAFT RESEARCH.

Not later than 1 year after the date of enactment of this Act, the Administrator, in consultation with other Federal agencies, shall prepare and transmit to the Committee on Science, Space, and Technology of the House

of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a plan for research relating to rotorcraft and other runway-independent air vehicles, with the objective of developing and demonstrating improved safety, noise, and environmental impact in a relevant environment. The plan 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 V—SPACE TECHNOLOGY

SEC. 501. SPACE TECHNOLOGY.

(a) FINDINGS.—Congress finds the following:

(1) The Space Technology Mission Directorate created by the Administration is lacking an organic statutory authorization and in need of congressional direction.

(2) In order to appropriately prioritize the Administration's resources to accomplish its goals and purposes, the Space Technology Mission Directorate needs to be reorganized as provided in the amendments made by this section.

(3) Projects, programs, and activities currently within the Exploration Research and Development program should continue as planned as part of the

Human Exploration and Operations Mission Directorate.

(b) SPACE TECHNOLOGY PROGRAM.—

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

"§ 70507. Space Technology Program authorized

"(a) PROGRAM AUTHORIZED.—The Administrator shall establish, within the office of the Administrator, a Space Technology Program to pursue the development of technologies that enable exploration of the solar system or advanced space science throughout the various elements of the Administration.

"(b) 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 Space Technology Program.

"(c) NONDUPLICATION CERTIFICATION.—The Administrator shall include in the budget for each fiscal year, as transmitted to Congress under section 1105(a) of title 31, a certification that no project, program, or mission undertaken by the Space Technology Program is independently under development by any other office or directorate of the Administration.".

(2) TABLE OF SECTIONS AMENDMENT.—The item relating to section 70507 in the table of sections for chapter 705 of title 51, United States Code, is amended to read as follows:

"70507. Space Technology Program authorized.".

SEC. 502. UTILIZATION OF THE INTERNATIONAL SPACE STATION FOR TECHNOLOGY DEMONSTRATIONS.

The Administrator shall utilize the International Space Station and commercial services for Space Technology Demonstration missions in low-Earth orbit wherever it is practical and cost effective to do so.

TITLE VI—EDUCATION

SEC. 601. EDUCATION.

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

(1) increase student interest and participation in Science, Technology, Engineering, and Mathematics ("STEM") education;

(2) improve public literacy in STEM;

(3) employ proven strategies for improving student learning and teaching;

(4) provide curriculum support materials; and

(5) create and support opportunities for professional development for STEM teachers.

(b) ORGANIZATION.—In order to ensure the inspiration and engagement of children and the general public, the Administration shall continue its STEM education and outreach activities within the Science, Aeronautics Research, Space Operations, and Exploration Mission Directorates. Funds devoted to education and public outreach shall be maintained in the Directorates, and the consolidation of these activities into the Education Directorate is prohibited.

(c) PROHIBITION.—The Administration may not implement any proposed STEM education and outreach-related changes proposed in the budget for fiscal year 2014 transmitted to Congress under section 1105(a) of title 31, United States Code.

(d) CONTINUATION OF SPACE GRANT PROGRAM.—The Administrator shall continue to operate the National Space Grant College and Fellowship program through a nati~~onal~~ ~~net~~work consisting of a State-based consortium in each State that provides flexibility to the States, with the objective of providing hands-on research, training, and education programs, with measurable outcomes, to enhance America's STEM education and workforce.

(e) REAFFIRMATION OF POLICY.—Congress reaffirms its commitment to informal science education at science centers and planetariums as set forth in section

616 of the National Aeronautics and Space Administration Authorization Act of 2005 (51 U.S.C. 40907).

SEC. 602. INDEPENDENT REVIEW OF THE NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM.

(a) SENSE OF CONGRESS.—It is the sense of Congress that the National Space Grant College and Fellowship Program, which was established in the National Aeronautics and Space Administration Authorization Act of 1988 (42 U.S.C. 2486 et seq.), has been an important program by which the Federal Government has partnered with State and local governments, universities, private industry, and other organizations to enhance the understanding and use of space and aeronautics activities and their benefits through education, fostering of interdisciplinary and multidisciplinary space research and training, and supporting Federal funding for graduate fellowships in space-related fields, among other purposes.

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

(1) a review of the National Space Grant College and Fellowship Program, including its structure and capabilities for supporting science, technology, engineering, and mathematics education and training consistent with the National Science and Tech-

nology Council's Federal Science, Technology, Engineering, and Mathematics (STEM) Education 5–Year Strategic Plan; and

(2) recommendations on measures, if needed, to enhance the Program's effectiveness and mechanisms by which any increases in funding appropriated by Congress can be applied.

(c) NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM AMENDMENTS.—

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

(A) by striking "and" at the end of paragraph (5);

(B) by striking the period at the end of paragraph (6) and inserting "; and"; and

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

"(7) support outreach to primary and secondary schools to help support STEM engagement and learning at the K–12 level and to encourage K–12 students to pursue postsecondary degrees in fields related to space.".

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

(A) by redesignating paragraphs (2) and (3) as paragraphs (3) and (4), respectively; and

(B) by inserting after paragraph (1) the following new paragraph:

"(2) INCLUSION OF 2-YEAR INSTITUTIONS.—A space grant regional consortium designated in paragraph (1)(B) may include one or more 2-year institutions of higher education.".

TITLE VII—POLICY PROVISIONS

SEC. 701. ASTEROID RETRIEVAL MISSION.

(a) IN GENERAL.—Consistent with the policy stated in section 201(b), the Administrator may not fund the development of an asteroid retrieval mission to send a robotic spacecraft to a near-Earth asteroid for rendezvous, retrieval, and redirection of that asteroid to lunar orbit for exploration by astronauts.

(b) ASTEROID SURVEY.—The Administration may not pursue a program to search for asteroids of 20 meters or less in diameter unless the survey program described in section 322(c) is at least 90 percent complete.

(c) REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall provide to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report

on the proposed Asteroid Retrieval Mission. Such report shall include—

(1) a detailed budget profile, including cost estimates for the development of all necessary technologies and spacecraft required for the mission;

(2) a detailed technical plan that includes milestones and a specific schedule;

(3) a description of the technologies and capabilities anticipated to be gained from the proposed mission that will enable future human missions to Mars which could not be gained by lunar missions;

(4) a description of the technologies and capabilities anticipated to be gained from the proposed mission that will enable future planetary defense missions, against impact threats from near-Earth objects equal to or greater than 140 meters in diameter, which could not be gained by current or planned missions; and

(5) a complete review by the Small Bodies Assessment Group and the NASA Advisory Council that includes a recommendation to Congress on the feasibility of the mission as proposed by the Administration.

SEC. 702. TERMINATION LIABILITY.

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

(1) The International Space Station, the Space Launch System, and the Orion crew capsule will enable the Nation to continue operations in low-Earth orbit and to send its astronauts to deep space. The James Webb Space Telescope will revolutionize our understanding of star and planet formation and how galaxies evolved and advance the search for the origins of our universe. 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.

(2) While the Space Launch System and the Orion programs, currently under development, have made significant progress, they have not been funded at levels authorized, and as a result congressionally authorized milestones will be delayed by several years.

(3) Although the James Webb Space Telescope is making steady progress towards its scheduled 2018 launch, it confronts a number of challenging integration tests that will stress a congressionally imposed development cost cap.

(4) In addition, 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. As a result, hundreds of millions of taxpayer dollars are unavailable for meaningful work on these programs.

(5) According to the Government Accountability Office, the Administration procures most of its goods and services through contracts, and it terminates very few of them. In fiscal year 2010, the Administration terminated 28 of 16,343 active contracts and orders—a termination rate of about 0.17 percent.

(6) Providing processes requiring congressional action on termination of these high-priority programs would enable contractors to apply taxpayer dollars to making maximum progress in meeting the established technical goals and schedule milestones of these programs.

(b) NASA TERMINATION LIABILITY.—

(1) GENERAL RULE.—Termination liability costs for a covered program shall be provided only pursuant to this subsection.

(2) PROHIBITION ON RESERVING FUNDS.—The Administrator may not reserve funds from amounts appropriated for a covered program, or require the reservation of funds by the prime contractor, for potential termination liability costs with respect to a covered program.

(3) INTENT OF CONGRESS.—It is the intent of Congress that funds authorized to be appropriated for covered programs be applied in meeting established technical goals and schedule milestones.

(4) APPLICATION OF PRIOR RESERVED FUNDS.—Funds that have been reserved before the date of enactment of this Act for potential termination liability shall be promptly used to make maximum progress in meeting the established goals and milestones of the covered program.

(5) NOTIFICATION.—The Administrator shall notify the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 120 days in advance of initiating termination for convenience or termination for cause of a prime contract on a covered program.

(6) SUPPLEMENTAL APPROPRIATION REQUEST.—

(A) REQUEST.—If the Administrator initiates termination of a prime contract on a covered program pursuant to paragraph (5), and sufficient unobligated appropriations are not available to cover termination liability costs in the appropriations account that is funding the prime contract being terminated, the Administrator shall provide to Congress a notification that an authorization of appropriations is necessary not later than 120 days in advance of the proposed contract termination settlement for the covered program.

(B) INTENT OF CONGRESS.—It is the intent of Congress to provide additional authorization for appropriations as may be necessary to pay termination liability costs on prime contracts for covered programs if Congress deems it appropriate that the Administration terminate such prime contracts. The Administration shall be responsible for applying these additional funds for payment of all allowable and reasonable negotiated termination liability costs if the Administration terminates a prime con-

tract for a covered program. If the Administration terminates a prime contract for a covered program for the convenience of the Federal Government, then the Federal Government is responsible for payment of all allowable and reasonable negotiated termination liability costs on the prime contract.

(c) REPORTING.—Not later than 6 months after the date of enactment of this Act, and every 6 months thereafter for the duration of the prime contracts on covered programs, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report that provides—

(1) the estimated termination liability costs for each of the prime contracts; and

(2) the basis for how such estimate was determined.

(d) DEFINITIONS.—For purposes of this section:

(1) COVERED PROGRAM.—The term "covered program" means the International Space Station, the Space Launch System, the Orion crew capsule, and the James Webb Space Telescope.

(2) PRIME CONTRACT.—The term "prime contract" means a contract entered directly between a person or entity and the Federal Government for the performance of all or the majority of the responsibilities for developing, integrating, fielding, operating, or sustaining a covered program.

(3) PRIME CONTRACTOR.—The term "prime contractor" means a person or entity contracting directly with the Federal Government on a covered program.

(4) TERMINATION LIABILITY COSTS.—The term "termination liability costs" means any costs incurred by a prime contractor, or by any subcontractor of a prime contractor, for which the Federal Government is liable as a result of termination of a prime contract by the Administrator.

SEC. 703. BASELINE AND COST CONTROLS.

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

(1) in subsection (a)(1), by striking "Procedural Requirements 7120.5c, dated March 22, 2005" and inserting "Procedural Requirements 7120.5E, dated August 14, 2012"; and

(2) in subsection (f), by striking "beginning 18 months after the date the Administrator transmits a

report under subsection (e)(1)(A)" and inserting "beginning 18 months after the Administrator makes such determination".

SEC. 704. PROJECT AND PROGRAM RESERVES.

To ensure that the establishment, maintenance, and allotment of project and program reserves contribute to prudent management, not later than 180 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report describing the Administration's criteria for establishing the amount of reserves at the project and program levels and how such criteria complement the Administration's policy of budgeting at a 70-percent confidence level.

SEC. 705. INDEPENDENT REVIEWS.

Not later than 270 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report describing the Administration's procedures for conducting independent reviews of projects and programs at lifecycle milestones and how the Administration ensures the inde-

pendence of the individuals who conduct those reviews prior to their assignment.

SEC. 706. SPACE ACT AGREEMENTS.

(a) COST SHARING.—To the extent that the Administrator determines practicable, the funds provided by the Government under a funded Space Act Agreement shall not exceed the total amount provided by other parties to the Space Act Agreement.

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

(c) PUBLIC NOTICE AND COMMENT.—The Administrator shall make available for public notice and comment each proposed Space Act Agreement at least 30 days before entering into such agreement, with appropriate redactions for proprietary, sensitive, or classified information.

(d) TRANSPARENCY.—The Administrator shall publicly disclose on the Administration's website and make available in a searchable format all Space Act Agreements, with appropriate redactions for proprietary, sensitive, or classified information, not later than 60 days after such agreement is signed.

(e) AUTHORIZATION.—The Administrator may not enter into a funded Space Act Agreement for an amount in excess of $50,000,000 unless such agreement has been specifically authorized by law.

(f) ANNUAL REPORT.—

(1) REQUIREMENT.—Not later than 90 days after the end of each fiscal year, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate 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, nonreimbursable, 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 also include a list of all anticipated reimbursable, nonreimbursable, and funded Space Act Agreements for the upcoming fiscal year.

(4) CUMULATIVE PROGRAM BENEFITS.—The report shall also include, with respect to the Space Act Agreements covered by the report, a summary of—

(A) the technology areas in which research projects were conducted under such agreements;

(B) the extent to which the use of the Space Act Agreements—

(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 pursuant to such Space Act Agreements.

SEC. 707. HUMAN SPACEFLIGHT ACCIDENT INVESTIGATIONS.

Section 70702(a) of title 51, United States Code, is amended by striking paragraph (3) and inserting the following:

"(3) any other space vehicle carrying humans that is owned by the Federal Government or that is being used pursuant to a contract or Space Act Agreement, as defined in section 2 of the National Aeronautics and Space Administration Authorization Act of 2014 with the Federal Government; or".

SEC. 708. 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. 709. ORBITAL DEBRIS.

(a) FINDING.—Congress finds that orbital debris poses serious risks to the operational space capabilities of the United States and that an international consensus and strategic plan is needed to mitigate the growth of orbital debris wherever possible, as well as the status of any orbital debris mitigation concepts and technological options that have been developed or funded by any Federal agency in the past 5 years, or that otherwise show significant promise, in the near-term, to mitigate orbital debris.

(b) REPORTS.—

(1) COORDINATION.—Not later than 90 days after the date of enactment of this Act, the Administrator shall provide the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate with a report on the status of efforts to coordinate with countries within the Inter-Agency Space Debris Coordination Committee to mitigate the effects and growth of orbital debris as required by 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 provide the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate with 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. 710. NASA ADVISORY COUNCIL.

(a) ESTABLISHMENT.—Subchapter II of chapter 201 of title 51, United States Code, is amended by adding at the end the following new section:

"§ 20118. NASA Advisory Council

"(a) ESTABLISHMENT.—There shall be established a NASA Advisory Council (in this section referred to as 'the Council') for the Administration in accordance with this section, not later than 9 months after the date of enactment of this section.

"(b) MEMBERSHIP AND APPOINTMENT.—The Council shall consist of 11 members to be appointed as follows:

"(1) 5 members shall be appointed by the President.

"(2) 2 members shall be appointed by the President pro tempore of the Senate.

"(3) 1 member shall be appointed by the minority leader of the Senate.

"(4) 2 members shall be appointed by the Speaker of the House of Representatives.

"(5) 1 member shall be appointed by the minority leader of the House of Representatives.

In addition to the members appointed under paragraphs (1) through (5), the Administrator shall be an ex officio, nonvoting member of the Council. Members of the Council shall comply with the Federal Advisory Committee Act (5 U.S.C. App.) and the Ethics in Government Act of 1978 (5 U.S.C. App.).

"(c) QUALIFICATIONS.—The persons appointed as members of the Council shall be—

"(1) former astronauts or scientists or engineers eminent in the fields of human spaceflight, planetary science, space science, Earth science, aeronautics, or disciplines related to space exploration and aeronautics, including other scientific, engineering, or business disciplines;

"(2) selected on the basis of established records of distinguished service; and

"(3) so selected as to provide representation of the views of engineering, science, and aerospace leaders in all areas of the Nation.

"(d) TERMS.—The term of office of each member of the Council shall be 6 years.

"(e) MEETINGS.—The Council shall meet two times annually at minimum and at such other times as the Chairman may determine, but the Chairman shall also call a meeting whenever one-third of the members so request in writing. The Council shall adopt procedures governing the conduct of its meetings, including delivery of notice and a definition of a quorum, which in no case shall be less than one-half plus one of the members of the Council.

"(f) CHAIRMAN AND VICE CHAIRMAN.—The Chairman and Vice Chairman of the Council shall be elected by a majority vote of the Council for a two-year term. A member may serve as Chairman and Vice Chairman for up to three terms. The Vice Chairman shall perform the duties of the Chairman in his absence. If a vacancy occurs in the chairmanship or vice chairmanship, the Council shall elect a member to fill such vacancy.

"(g) STAFF.—The Administrator shall support the Council with professional staff to provide for the performance of such duties as may be prescribed by the Council.

"(h) COMMITTEES.—The Council is authorized to appoint from among its members such committees as it deems necessary and to assign to committees so appointed such survey and advisory functions as the Council deems

appropriate to assist it in exercising its powers and functions.

"(i) FUNCTIONS.—

"(1) BUDGET PROPOSAL.—

"(A) REVIEW OF PROPOSAL.—Not later than October 15 of each year, the Council shall have reviewed the Administration's proposed budget for the next fiscal year and shall provide to the President their advice based on the best professional judgment of a majority of members. Portions of Council meetings in which the Council considers the budget proposal for the next fiscal year may be closed to the public until the Council submits the proposal to the President and Congress.

"(B) ADVICE TO CONGRESSIONAL COMMITTEES.—Not later than 14 days following the President's budget submittal to Congress for the next fiscal year, the Council shall provide to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate their advice based on the best professional judgment of a majority of members.

"(2) ADVICE TO THE PRESIDENT AND CONGRESS.—The Council shall report their findings, advice, and recommendations to the President and Congress on matters of particular policy interest on space exploration and aeronautics based on the best professional judgment of a majority of members.".

(b) TABLE OF SECTIONS.—The table of sections for chapter 201 of title 51, United States Code, is amended by adding at the end of the items for subchapter II the following new item:

"20118. NASA Advisory Council.".

(c) CONSULTATION AND ADVICE.—Section 20113(g) of title 51, United States Code, is amended by inserting "and Congress" after "advice to the Administration".

SEC. 711. COST ESTIMATION.

(a) REPORT.—Not later than 90 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on current and continuing efforts to implement more effective cost-estimation practices.

(b) ELEMENTS.—The report required under subsection (a) shall include—

(1) a list of steps the Administration is undertaking to advance consistent implementation of the joint cost and schedule level (JCL) process; and

(2) a description of mechanisms the Administration is using and will continue to use to ensure that adequate resources are dedicated to cost estimation.

SEC. 712. DETECTION AND AVOIDANCE OF COUNTERFEIT ELECTRONIC PARTS.

(a) REGULATIONS.—

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

(2) CONTRACTOR RESPONSIBILITIES.—The revised regulations issued pursuant to paragraph (1) shall provide that—

(A) Administration contractors who supply electronic parts or products that include electronic parts are responsible for detecting and avoiding the use or inclusion of counterfeit electronic parts or suspect counterfeit electronic parts in such products and for any rework or

corrective action that may be required to remedy the use or inclusion of such parts; and

(B) the cost of counterfeit electronic parts and suspect counterfeit electronic parts and the cost of rework or corrective action that may be required to remedy the use or inclusion of such parts are not allowable costs under Agency contracts, unless

(i) the covered contractor has an operational system to detect and avoid counterfeit parts and suspect counterfeit electronic parts that has been reviewed and approved by the Administration or the Department of Defense;

(ii) the covered contractor provides timely notice to the Administration pursuant to paragraph (4); or

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

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

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

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

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

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

(i) notification of the Administration; and

(ii) inspection, testing, and authentication of electronic parts that the Administration or an Administration contractor or 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 the Administration 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 Administration contractors and subcontractors to identify and use additional suppliers beyond those identified pursuant to subparagraph (C), provided that—

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

(ii) the contractor or subcontractor assumes responsibility for the authenticity of parts provided by such suppliers as provided in paragraph (2); and

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

(4) TIMELY NOTIFICATION.—The revised regulations issued pursuant to paragraph (1) shall require that any Administration contractor or subcontractor who becomes aware, or has reason to suspect, that any end item, component, part, or material contained in supplies purchased by the Administration, or purchased by a contractor or subcontractor for delivery to, or on behalf of, the Administration, contains counterfeit electronic parts or suspect counterfeit electronic parts, shall provide notification to the applicable Administration contracting officer within 30 calendar days.

(b) DEFINITIONS.—In this section, 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. 713. PROHIBITION ON USE OF FUNDS FOR CONTRACTORS THAT HAVE COMMITTED FRAUD OR OTHER CRIMES.

None of the funds authorized to be appropriated or otherwise made available for fiscal year 2014 or any fiscal year thereafter for the Administration may be used to enter into a contract with any offeror or any of its principals if the offeror certifies, pursuant to the Federal Ac-

quisition Regulation, that the offeror or any of its principals—

(1) within a three-year period preceding this offer has been convicted of or had a civil judgment rendered against it for—

(A) commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) contract or subcontract;

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

(C) commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating Federal criminal tax laws, or receiving stolen property;

(2) are presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in paragraph (1); or

(3) within a three-year period preceding this offer, has been notified of any delinquent Federal taxes in an amount that exceeds $3,000 for which the liability remains unsatisfied.

SECTION–BY–SECTION ANALYSIS OF

H.R. 4412, THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 2014

Section 1. Short Title; Table of Contents.

This Act may be cited as the "National Aeronautics and Space Administration Authorization Act of 2014."

Section 2. Definitions.

This section provides relevant definitions within the Act.

TITLE I–AUTHORIZATION OF APPROPRIATIONS

Sec. 101. Fiscal Year 2014.

This section authorizes NASA at levels in line with the Consolidated Appropriations Act, 2014 (P.L. 113–76).

TITLE II–HUMAN SPACE FLIGHT

SUBTITLE A–EXPLORATION

Sec. 201. Space Exploration Policy.

This section supports a human exploration program that is not dependent on achieving milestones by fixed dates, and an exploration technology development program to enable lunar human and robotic operations. It supports expanding human presence beyond low-Earth orbit. This section states that Congress remains committed to ensuring that authorized budgets for the human space flight program maintain NASA's high safety standards. This section states that exploration deeper into the solar system should be the core mission of NASA. Congress strongly supports the development of the SLS and Orion as enabling elements for human exploration, advanced scientific missions, and national security priorities beyond low-Earth orbit. This section further states that it is the policy of the United States that the development of capabilities and technologies necessary for a human mission to Mars and beyond is the top priority of NASA's human space flight and technology development programs. This section states that it is the policy of the United States that the development of capabilities necessary for human mission to lunar orbit, the surface of the Moon, the surface of Mars and beyond shall be the goal of the Administration's human space flight program. The section requires the Administrator to establish a program to develop a sustained human presence on the Moon and the surface of Mars. Section 201 directs the Administrator to focus on the milestone of launching the first crewed mission of Orion fully integrated with SLS as close to 2020 as possible. It adds language to the law creating the milestone of enabling humans to land on the Moon. This section also adds language to title 51 regarding the acceleration of development of capabilities to enable a human exploration mission to the surface of Mars and beyond through the prioritization of those technologies and capabilities best suited for such a mission in accordance with the Mars Human Exploration Roadmap. Finally, this section states that non-United States human space flight capabilities should only be used as a contingency when no domestic commercial or public-private partnerships provider that meets NASA's safety requirements is available. This section requires a report to Congress on current and continuing efforts to seek and encourage, to the maximum extent possible, the fullest commercial use of space. This section also requires a report to Congress on efforts by NASA to reduce impediments, bureaucracy, redundancy, and burdens to ensure the fullest commercial use of space.

Sec. 202. Stepping Stone Approach to Exploration.

This section encourages the President to invite our partners in the ISS program and other nations to participate in an international initiative, under US leadership, to conduct a crewed mission to the surface of Mars. This section requires the development of a Mars Human Exploration Roadmap defining the capabilities and technologies necessary to extend human presence to the surface of Mars, providing a process for the evolution of the capabilities of the fully integrated Orion with SLS, and describing the capabilities and technologies that could be demonstrated, or re-

search data that could be gained through the utilization of the ISS. The roadmap describes a framework for international cooperation and a process for utilizing private companies. The roadmap must be transmitted the Congress, updated at least every four years, and include addenda from the NASA Advisory Council and Aerospace Safety Advisory Panel, each with a statement of review. The roadmap must also include an examination of the benefits of utilizing current Administration launch facilities for trans-lunar missions.

Sec. 203. Space Launch System.

This section contains findings regarding the importance of the SLS and describing its intended uses. This section also contains findings describing the test flight required by the 2010 Authorization Act and stating that the schedule for this demonstration is subject to appropriations. This section requires a progress report on the status of SLS and its integration with Orion. If the Administrator determines that either required test flight will not occur before the dates specified, the progress report must include an estimate of additional funds necessary to meet these goals. This section requires the Administrator to report on the effort and budget required to enable and utilize a cargo variant of the 130 ton SLS configuration. This section would require NASA to conduct a competition among students in elementary and secondary schools to name the elements of NASA's exploration program.

Sec. 204. Orion Crew Capsule.

This section states that the Orion must meet the practical needs and the minimum capability requirements described in law. It requires a report to Congress detailing those components and systems of Orion which ensure it is in compliance with the law and the expected date that Orion will be available to transport crew and cargo to the ISS, as well as certifying that the requirements of the law will be met in time for the first crewed test flight in the year 2021.

Sec. 205. Advanced Booster Competition.

This section requires the Associate Administrator of NASA to transmit a report to Congress describing the estimated total cost of an advanced booster for SLS, detailing any reductions or increases to development costs of SLS that may result from conducting a competition for an advanced booster, and outlining any potential schedule delay to the 2017 launch as a result of increased costs associated with conducting a booster competition. It further directs NASA to conduct a full and open competition for an advanced booster for SLS if the Associate Administrator reports reductions and no adverse schedule impact in the required report.

SUBTITLE B–SPACE OPERATIONS

Sec. 211. Findings.

This section contains findings regarding the importance of ISS and the need to acquire an operational domestic commercial crew transportation service by the year 2017.

Sec. 212. International Space Station (ISS).

This section states that it is the policy of the United States that the ISS be utilized to the maximum extent practicable for the development of capabilities and technologies needed for the future of human exploration beyond low-Earth orbit. This section requires the Administrator to take all necessary steps to support the operation and full utilization of the ISS and seek to minimize the operating costs of the ISS. It states that reliance on foreign carriers for crew and cargo is unacceptable and the Nation's human space flight program must acquire the capability to launch American astronauts on American rockets from American soil as soon as possible. This section reaffirms Congress' commitment to development of a commercially developed launch and delivery system to the ISS for crew missions. This section reaffirms that NASA shall make use of the United States' commercially provided ISS crew transfer and crew rescue services to the maximum extent practicable. Section 212 also reaffirms that NASA shall pursue means to maximize ISS logistics capabilities, reduce risks to ISS systems sustainability, and minimize United States operations costs relating to the ISS. This section amends the law to state that it is the policy of the United States to maintain an uninterrupted capa-

bility for human space flight and operations in low-Earth orbit and beyond as an essential instrument of national security and the capability to ensure continued United States participation and leadership in the exploration and utilization of space. This section requires the Administrator to submit a report to Congress on the feasibility of extending the operation of the ISS. This section also requires the Director of OSTP to develop and transmit to Congress a strategic plan for conducting research in the physical and life sciences and related technologies on the ISS through at least 2020. Finally, this section requires the Comptroller General to submit a report to Congress on the progress of the chosen not-for profit entity for management of the National Laboratory.

Sec. 213. Commercial Crew Report.

This section requires the Administrator to provide a clear plan forward for funding the Commercial Crew program. This section requires the Administrator to transmit a report with five distinct options for the final stage of the Commercial Crew program: a strategy that assumes an appropriation of $500 million over three years; a strategy that assumes an appropriation of $600 million over three years; a strategy that assumes an appropriation of $700 million over three years; a strategy that assumes an appropriation of $800 million over three years; and a strategy that has yet to be considered previously, but that NASA believes could ensure the flight readiness date of 2017 for at least one provider or decrease the program cost. Each strategy shall include the contracting instruments NASA will employ to acquire the services in each phase of development or acquisition, the number of commercial providers NASA will include in the program, and the estimated flight readiness date in each scenario.

Sec. 214. Flight Readiness Demonstration.

This section requires NASA to carry out its flight readiness demonstration by December 31, 2017. This section requires a quarterly report to Congress providing the status of the Commercial Crew development program and a Statement of Flight Readiness. NASA must notify Congress if a partner misses a milestone. The Administrator must provide, and begin implementation of, a new acquisition strategy with the goal of ensuring that one company will be prepared to provide crew transport services by December 31, 2017.

Sec. 215. Aerospace Safety Advisory Panel Advice.

This section would reaffirm the importance of the Aerospace Safety Advisory Panel. This section would require an initial report on the extent to which the Administration has followed, intends to follow, or does not follow the advice of the 2012 Annual Report of the Aerospace Safety Advisory Panel. This section would amend the requirements of the annual report required by the Panel such that the Panel's annual report must: include an evaluation of NASA's management and culture related to safety and an evaluation of the extent to which NASA follows the Panel's advice. This section would require an annual report to Congress on the extent to which NASA has followed, intends to follow, or does not follow the Panel's advice.

Sec. 216. Space Communications.

This section directs the Administrator to develop a plan for updating NASA's space communications architecture for both low-Earth orbit operations and deep space exploration so that it is capable of meeting NASA's needs over the next twenty years. The plan shall include life-cycle cost estimates, milestones, estimated performance capabilities, and five year funding profits. The plan shall also include (but is not limited to) a description of: projected Deep Space Network requirements for the next twenty years; upgrades needed to support Deep Space Network requirements; cost estimates for the maintenance of existing Deep Space Network capabilities; projected Tracking and Data Relay Satellite System requirements for the next twenty years; cost and schedule estimates to maintain and+ upgrade the Tracking and Data Relay Satellite System to meet projected requirements; and steps the Administration is taking to mitigate threats to electromagnetic spectrum use.

TITLE III–SCIENCE

SUBTITLE A–GENERAL

Sec. 301. Science Portfolio.

This section amends the law to state that a balanced and adequately funded set of activities contributes to a robust and productive science program that serves as a catalyst for innovation and discovery (language previously did not contain "discovery"). This section states that unless otherwise directed by Congress, NASA shall take into account the current decadal surveys from the National Academies when submitting the President's budget request to Congress.

Sec. 302. Assessment of Science Mission Extensions.

This section amends the law to require that biennial reviews within each of the Science divisions take into account how extending the date of termination for missions that exceed their planned mission lifetime impacts the start of future missions. This section requires consultation by relevant agencies for missions with an operational component. It states that if a mission is extended by a consultation, the full costs of the extension shall be paid for by the operational agency. This section requires a report to Congress detailing the assessment required.

Sec. 303. Radioisotope Thermoelectric Generators.

This section requires the Administrator to conduct and transmit to Congress an analysis of NASA requirements for radioisotope power system material needed to carry out high priority robotic missions in the solar system and other surface exploration activities beyond low-Earth orbit, as well as the risks to NASA missions in meeting those requirements due to a lack of adequate domestic production of radioisotope power system material.

Sec. 304. Congressional Declaration of Policy and Purpose.

This section amends current law to add the search for life's origin, evolution, distribution, and future in the Universe to the list of objectives of NASA's activities.

Sec. 305. Utilization of the International Space Station for Science Missions.

This section requires the Administrator to utilize the ISS and commercial services for Science Mission Directorate missions in low-Earth orbit wherever it is practical and cost effective to do so.

SUBTITLE B–ASTROPHYSICS

Sec. 311. Decadal Cadence.

This section states that the Administrator shall ensure a steady cadence of large, medium, and small missions when following the guidance provided by the decadal surveys.

Sec. 312. Extrasolar Planet Exploration Strategy.

This section requires the Administrator to contract with the National Academies to develop a strategy for the study and exploration of extrasolar planets that would provide a foundation for NASA roadmaps, strategic plans, and activities related to exoplanet research and exploration.

Sec. 313. James Webb Space Telescope.

This section states that it is the sense of Congress that the James Webb Space Telescope program is significant to our understanding of the history of the universe and should continue to receive priority of funding in accordance with the recommendations of the most recent decadal survey.

Sec. 314. Wide-Field Infrared Survey Telescope.

This section requires the Administrator to ensure that the development of the Wide-Field Infrared Survey Telescope continue while the James Webb Space Telescope is completed.

Sec. 315. National Reconnaissance Office Telescope Donation

Section 315 requires the Administrator to report to Congress on NASA's plan for developing the Wide-Field Infrared Survey Telescope including a plan for the Wide-Field Infrared Survey Telescope 2.4, which includes the donated 2.4-meter aperture National Reconnaissance Office telescope.

SUBTITLE C–PLANETARY SCIENCE

Sec. 321. Decadal Cadence.

This section states that when following the guidance provided by the decadal surveys, the Administrator shall ensure that NASA carries out a balanced set of programs in accordance with the priorities established in the most recent decadal survey, including: a Discovery-class mission at least once every 24 months; a New Frontiers-class mission at least once every 60 months; and a Flagship-class mission at least once per decadal survey period, starting with a Europa mission with a goal of launching by 2021.

Sec. 322. Near Earth Objects.

This section requires the Administrator to continue to discover, track, catalogue, and characterize the physical characteristic of near-Earth objects equal to or greater than 140 meters in diameter in order to assess the threat of such near-Earth objects to Earth. It shall be the goal of the survey to achieve 90 percent completion of its near-earth object catalogue by 2020. This section reaffirms the policy in title 51 relating to detecting, tracking, cataloguing, and characterizing asteroids and comets. It requires the Office of Science and Technology Policy to transmit to Congress an initial report that provides the following: recommendations and a proposed budget to carry out the Survey program; an analysis of possible options NASA could employ to divert an object on a likely collision course with Earth; and 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. This section further requires the Administrator to transmit an annual report that provides a summary of all activities and expenditures taken with regards to the Survey since the enactment of this act.

Sec. 323. Astrobiology Strategy.

This section would require the Administrator to contract with the National Academies to develop a science strategy for astrobiology to guide NASA roadmaps, strategic plans and other activities.

Sec. 324. Public-Private Partnerships.

This section requires a report to Congress describing how NASA can expand collaborative public-private partnerships to study life's origin, evolution, distribution, and future in the Universe.

SUBTITLE D–HELIOPHYSICS

Sec. 331. Decadal Cadence.

This section states that the Administrator shall ensure a steady cadence of large, medium, and small heliophysics missions when following the guidance provided by the decadal surveys.

Sec. 332. Review of Space Weather.

This section requires the Director of OSTP to contract with the National Academies to provide a comprehensive study that reviews planned space weather monitoring requirements and capabilities to inform future space weather monitoring.

Sec. 333. Deep Space Climate Observatory

This section prohibit the Administrator from integrating or funding the development of any sensor on the Deep Space Climate Observatory not aligned with the spacecraft's original space weather mission requirements. This section prohibits NASA from developing or implementing algorithms or any other application or product that are not aligned with the Deep Space Climate Observatory mission's intended space weather requirements, or that enables the "Earth at noon" images from the spacecraft.

SUBTITLE E–EARTH SCIENCE

Sec. 341. Goal.

This section states that the Administrator shall continue to develop first of a kind instruments that can be transitioned to other agencies for operations. This section requires the Administrator to conduct research and development on new sensors and instruments that will mitigate the risks associated with the development of operational systems and long term data continuity requirements by other agencies. This section also adds language stating that NASA is not responsible for long term data continuity or the development of operational systems, including satellite, sensor, or instrument development, acquisition, and operations, as well as product development and data analysis, unless such work is conducted on a reimbursable basis that accounts for the full cost of the work. It further requires that NASA shall use the existing Joint Agency Satellite Division structure to manage this process on a fully reimbursable basis.

Sec. 342. Decadal Cadence.

This section states that the Administrator shall ensure a steady cadence of large, medium, and small Earth Science missions when following the guidance provided by the decadal surveys.

Sec. 343. Research to Operations.

This section prevents the transfer of operational responsibility of science and space weather mission or sensors to NASA without authorization by Congress.

Sec. 344. Interagency Coordination.

This section amends the law to require coordination with other Federal agencies in addition to NOAA.

Sec. 345. Joint Polar Satellite System Climate Sensors.

This section states that NASA shall not be responsible for the development of Joint Polar Satellite System climate sensors, and that any effort by NASA related to this work will be conducted on a fully-reimbursable basis, and executed by NASA's Joint Agency Satellite Division.

Sec. 346. Land Imaging.

This section requires the Director of OSTP to take steps to ensure the continuous collection of space-based medium-resolution observations of the Earth's land cover with the data available to facilitate the widest possible use. This section prevents the Administrator from initiating the definition of land imaging capabilities unless this work is conducted on a fully-reimbursable basis, and executed by NASA's Joint Agency Satellite Division.

Sec. 347. Sources of Earth Science Data.

This section directs the Administrator to acquire space-based and airborne Earth remote sensing data, services, distribution, and applications from a commercial provider. It requires that acquisition be carried out in accordance with applicable laws and regulations. This section also requires a report to Congress on NASA's efforts to utilize this authority.

TITLE IV–AERONAUTICS

Sec. 401. Sense of Congress.

This section states that it is the sense of Congress that a robust aeronautics research portfolio will help maintain the United States' status as a leader in aviation. This section would state that aeronautics research is essential to NASA's mission and that the Administrator should coordinate with other stakeholders to minimize duplication and leverage resources.

Sec. 402. Unmanned Aerial Systems Research and Development.

This section requires the Administrator to direct research and technological development to facilitate the safe integration of unmanned aerial systems into the National Airspace System. This section requires the Administrator to update and transmit to Congress a roadmap for unmanned aerial systems research and development. This section requires that operational flight data from specified cooperative agreements be made available to NASA and the FAA for the development of regulatory standards.

Sec. 403. Research Program On Composite Materials Used In Aeronautics.

This section states that the Administrator, in overseeing NASA's Integrated Systems Research Program's work on composite materials, shall consult with relevant Federal agencies and partners in industry to accelerate safe development and certification processes for new composite materials and design methods while maintaining rigorous inspection of new composite materials. This section requires the Administrator to transmit to Congress a report detailing the work of NASA on new composite materials and the coordination efforts between agencies.

Sec. 404. Hypersonic Research.

This section requires the Administrator to develop and transmit to Congress a roadmap for hypersonic aircraft research.

Sec. 405. Supersonic Research.

This section requires the Administrator to develop and transmit to Congress a roadmap for supersonic aeronautics research and development with the goal of developing and demonstrating, in a relevant environment, airframe and propulsion technologies to minimize the environmental impact of supersonic overland flight in an efficient and economical manner.

Sec. 406 - Research On NextGen Airspace Management Concepts And Tools.

This section requires the Administrator, in consultation with other Federal agencies, to review NASA's research and development activities in support of NextGen and make any necessary adjustments to NASA's research and development activities in support of NextGen. This section also requires the Administrator to report to Congress regarding the progress of NASA's research and development activities in support of the NextGen airspace management modernization initiative, including details of consultation with the FAA and any adjustments made to research activities.

Sec. 407. Rotorcraft Research.

This section requires the Administrator to prepare and transmit to Congress a plan for research relating to rotorcraft and other runway-independent air vehicles. The plan must 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 V–SPACE TECHNOLOGY

Sec. 501. Space Technology Program.

This section creates a Space Technology Program within the office of the Administrator to pursue the development of technologies that enable exploration of the solar system or advanced space science through various elements of NASA. This section

also states that the Administrator shall organize and manage NASA's Small Business Innovation Research program and Small Business Technology Transfer program within the Space Technology Program. Finally, this section requires the Administrator to certify that no project within the Space Technology Program is also under development in any established mission directorate.

Sec. 502. Utilization of the International Space Station for Technology Demonstrations.

This section requires the Administrator to utilize the ISS and commercial services for Space Technology Demonstration missions in low-Earth orbit wherever it is practical and cost effective to do so.

TITLE VI V–EDUCATION AND OUTREACH

Sec. 601. Education.

This section states that NASA must continue its education and outreach efforts to: increase student interest and participation in STEM education; improve public literacy in STEM; employ proven strategies for improving student learning and teaching; provide curriculum support materials; and create and support opportunities for professional development for STEM teachers. It requires NASA to continue its STEM education and outreach activities within the Missions Directorates. This section requires that funds for education and public outreach be maintained in the Directorates, and prohibit their consolidations into the Education Directorate. This section prohibits NASA from implementing any proposed STEM education and outreach related changes proposed in the budget for FY 2014. This section requires the Administrator to continue to operate the National Space Grant College and Fellowship program through a national network consisting of a State-based consortium in each state. This section reaffirms Congress' commitment to informal science education and science centers and planetariums as set forth in the NASA Authorization Act of 2005.

Sec. 602. Independent Review of the National Space Grant College and Fellowship Program.

This section contains a sense of Congress stating the importance of the Space Grant Program. This section would require a review of the Space Grant Program by the National Academies. This section would expand the Space Grant Program to support outreach to primary and secondary schools to help support STEM engagement and learning at the K-12 level and to encourage K–12 students to pursue post-secondary degrees in fields related to space. This section would also permit a space grant regional consortium to include one or more two-year institutions of higher education.

TITLE VI–Other Provisions

Sec. 701. Asteroid Retrieval Mission.

This section prohibits the Administrator from funding the development of any asteroid retrieval mission to send a robotic spacecraft to a near-Earth asteroid for rendezvous, retrieval, and redirection of that asteroid to lunar orbit for exploration by astronauts. This section prohibits the Administrator from pursuing a program to search for asteroids of 20 meters or less in diameter until the survey program described in section 322 is at least 90 percent complete. This section also requires the Administrator to report to Congress on the proposed Asteroid Retrieval Mission including a detailed budget profile, a detailed technical plan, a description of the technologies and capabilities anticipated to be gained that will enable future missions to Mars that could not be gained by lunar missions, a description of the technologies and capabilities anticipated to be gained from the proposed mission that will enable future planetary defense missions, and a review by the Small Bodies Assessment Group and the NASA Advisory Council.

Sec. 702 . Termination Liability.

This section directs that funds set aside for contract termination liability be utilized for development work.

Sec. 703. Baseline and Cost Controls.

This section amends requirements associated with Baseline and Cost Controls to make the reporting more timely.

Sec. 704. Project and Program Reserves.

This section requires the Administrator to report to Congress on NASA's criteria for establishing the amount of reserves at the project and program levels and how such criteria complement NASA's policy of budgeting at a 70 percent confidence level.

Sec. 705. Independent Reviews.

This section requires the Administrator to report to Congress on NASA's procedure for independent reviews of projects and programs at lifecycle milestones and how NASA ensures the independence of the individuals conducting those reviews.11

Sec. 706. Space Act Agreements.

This section would set the following conditions for Space Act Agreements:

- Funds provided by the government under a funded Space Act Agreement should not exceed the total amount provided by other parties to the agreement or other transaction;
- A Space Act Agreement may be used only when the use of a standard contract, grant, or cooperative agreement is not feasible or appropriate;
- Space Act Agreements must be available for public notice and comment prior to agreement;
- The Administrator shall publically disclose on NASA's website and make available in a searchable format all Space Act Agreements with appropriate redactions for proprietary information in a timely manner;
- The Administrator shall not enter into any funded Space Act Agreements in excess of $50 million unless such an agreement has been specifically authorized by law;
- The Administrator must submit to Congress an annual report on the use of Space Act Agreement authority by NASA during the previous fiscal year. The report must also include a list of anticipated agreements for the upcoming fiscal year.

Sec. 707. Human Spaceflight Accident Investigations.

This section adds vehicles being used by the Federal Government pursuant to a contract or Space Act Agreement to the list of vehicles covered by the investigative provision.

Sec. 708. Commercial Technology Transfer Program.

This section adds "protecting national security" to the considerations used in evaluating technology transfer.

Sec. 709. Orbital Debris

This section requires the Administrator to report to Congress on efforts to coordinate with countries within the Inter-Agency Space Debris Coordination Committee to mitigate the effects of orbital debris as required by law. This section requires the Director of OSTP to report to Congress on the status of the orbital debris mitigation strategy required by law, as well as the status of any orbital debris mitigation concepts and technological operations that have been developed or funded by any Federal agency in the past five years or that otherwise show promise to mitigate orbital debris.

Sec. 710. NASA Advisory Council

This section establishes the NASA Advisory Council and set guidelines for appointing its members. This section also establishes criteria for membership on the Council, set the terms of such membership, set requirements for meetings of the Council, and describes its internal leadership. This section requires the Administrator to provide the Council with staff. This section states that the functions of the Council are as follows: to review the Administration's budget proposal and provide advice to the President, to advise the Congress on the budget, and to report their

findings, advice, and recommendations to the President and Congress on matters of policy related to space exploration and aeronautics.

Sec. 711. Cost Estimation.

This section requires a report to Congress on the implementation of more effective cost estimation practices.

Sec. 712. Detection and Avoidance of Counterfeit Electronic Parts.

This section would require NASA to revise the NASA Supplement for the Federal Acquisition Regulation to address the detection and avoidance of counterfeit electronic parts. The revised regulations must provide that contractors who supply electronic parts or products including electronic parts are responsible for detecting and avoiding the use or inclusion of counterfeit electronic parts or suspect counterfeit parts in such products, and for any corrective actions that may be required to remedy the use of such parts. The costs of counterfeit electronic parts and the cost of corrective action are not allowable costs under Agency contracts except under specified exemptions. This section sets requirements for acquisition of electronic parts by NASA contractors and subcontractors to ensure authenticity. This section requires that any contractor or subcontractor who becomes aware of a possible counterfeit part notify NASA within 30 calendar days.

Sec. 713. Prohibition on Use of Funds for Contractors that Have Committed Fraud or Other Crimes.

This section prohibits any funds authorized or appropriated for NASA from being used to enter into a contract with an offeror or any of its principals if the offeror or any of its principals has been convicted of: fraud related to Federal contracts; violation Federal or State antitrust statutes; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating Federal tax laws, or receiving stolen property. It also forbids contracts with offerors if the offeror or principal is presently indicted for any of those crimes, or has been notified of delinquent Federal taxes in an amount that exceeds $3,000 for which the liability remains unsatisfied.

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AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 4412 OFFERED BY MR. PALAZZO OF MISSISSIPPI AND MS. EDWARDS OF MARYLAND

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the "National Aeronautics and Space Administration Authorization Act of 2014".

(b) TABLE OF CONTENTS.—The table of contents for 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 Administration.

(3) ORION CREW CAPSULE.—The term "Orion crew capsule" refers to the multipurpose crew vehicle described in section 303 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18323).

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

(5) SPACE LAUNCH SYSTEM.—The term "Space Launch System" refers to the follow-on Government owned civil launch system developed, managed, and operated by the Administration to serve as a key

component to expand human presence beyond low-Earth orbit, as described in section 302 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322).

TITLE I—AUTHORIZATION OF APPROPRIATIONS

SEC. 101. FISCAL YEAR 2014.

There are authorized to be appropriated to the Administration for fiscal year 2014 $17,646,500,000 as follows:

(1) For Space Exploration, $4,113,200,000, of which—

(A) $1,918,200,000 shall be for the Space Launch System, of which $318,200,000 shall be for Exploration Ground Systems;

(B) $1,197,000,000 shall be for the Orion crew capsule;

(C) $302,000,000 shall be for Exploration Research and Development; and

(D) $696,000,000 shall be for Commercial Crew Development activities.

(2) For Space Operations, $3,778,000,000, of which $2,984,100,000 shall be for the International Space Station Program.

(3) For Science, $5,151,200,000, of which—

(A) $1,826,000,000 shall be for Earth Science;

(B) $1,345,000,000 shall be for Planetary Science, of which $30,000,000 shall be for the Astrobiology Institute;

(C) $668,000,000 shall be for Astrophysics;

(D) $658,200,000 shall be for the James Webb Space Telescope; and

(E) $654,000,000 shall be for Heliophysics.

(4) For Aeronautics, $566,000,000.

(5) For Space Technology, $576,000,000.

(6) For Education, $116,600,000.

(7) For Cross-Agency Support, $2,793,000,000.

(8) For Construction and Environmental Compliance and Restoration, $515,000,000.

(9) For Inspector General, $37,500,000.

TITLE II—HUMAN SPACE FLIGHT

Subtitle A—Exploration

SEC. 201. SPACE EXPLORATION POLICY.

(a) POLICY.—Human exploration deeper into the solar system shall be a core mission of the Administration. It is the policy of the United States that the goal of NASA's exploration program shall be to successfully con-

duct a crewed mission to the surface of Mars to begin human exploration of that planet. The use of the surface of the Moon, cis-lunar space, near-Earth asteroids, Lagrangian points, and Martian moons may be pursued provided they are properly incorporated into the Roadmap described in section 202 of this Act.

(b) VISION FOR SPACE EXPLORATION.—Section 20302 of title 51, United States Code, is amended—

(1) by adding at the end the following:

"(c) DEFINITIONS.—In this section:

"(1) ORION CREW CAPSULE.—The term 'Orion crew capsule' refers to the multipurpose crew vehicle described in 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' refers to the follow-on Government-owned civil launch system developed, managed, and operated by the Administration to serve as a key component to expand human presence beyond low-Earth orbit, as described in section 302 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322).".

(c) 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" after the 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 accelerate the development of capabilities to enable a human exploration mission to the surface of Mars and beyond through the prioritization of those technologies and capabilities best suited for such a mission in accordance with the Exploration Roadmap under section 70504 of title 51, United States Code.".

(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 CAPABILITIES.—

"(1) IN GENERAL.—NASA may not obtain non-United States human space flight capabilities unless no domestic commercial or public-private partnership

provider that the Administrator has determined to meet safety and affordability requirements established by NASA for the transport of its astronauts is available to provide such capabilities.

"(2) DEFINITION.—For purposes of this subsection, the term 'domestic commercial provider' means a person providing space transportation services or other space-related activities, the majority control of which is held by persons other than a Federal, State, local, or foreign government, foreign company, or foreign national.".

(e) REPEAL OF 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.

SEC. 202. STEPPING STONE APPROACH TO EXPLORATION.

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

"§ 70504. Stepping stone approach to exploration

"(a) IN GENERAL.—In order to maximize the cost effectiveness of the long-term space exploration and utilization activities of the United States, the Administrator shall direct the Human Exploration and Operations Mission Directorate, or successor division, to develop a Exploration Roadmap to define the specific capabilities and technologies necessary to extend human presence to the surface of Mars and the sets and sequences of missions required to demonstrate such capabilities and technologies.

"(b) INTERNATIONAL PARTICIPATION.—The President should invite the United States partners in the International Space Station program and other nations, as appropriate, to participate in an international initiative under the leadership of the United States to achieve the goal of successfully conducting a crewed mission to the surface of Mars.

"(c) ROADMAP REQUIREMENTS.—In developing the Mars Human Exploration Roadmap, the Administrator shall—

"(1) include the specific set of capabilities and technologies that contribute to extending human presence to the surface of Mars and the sets and sequences of missions necessary to demonstrate the proficiency of these capabilities and technologies

with an emphasis on using or not using the International Space Station, lunar landings, cislunar space, trans-lunar space, Lagrangian points, and the natural satellites of Mars, Phobos and Deimos, as testbeds, as necessary, and shall include the most appropriate process for developing such capabilities and technologies;

"(2) 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, and planned international collaborative activities, potential commercial contributions, and other activities relevant to the achievement of the goal established in section 201 of the National Aeronautics and Space Administration Authorization Act of 2014;

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

"(4) provide a specific process for the evolution of the capabilities of the fully integrated Orion crew capsule with the Space Launch System and how

these systems demonstrate the capabilities and technologies described in paragraph (1);

"(5) provide a description of the capabilities and technologies that need to be demonstrated or research data that could be gained through the utilization of the International Space Station and the status of the development of such capabilities and technologies;

"(6) describe a framework for international cooperation in the development of all technologies and capabilities required in this section, as well as an assessment of the risks posed by relying on international partners for capabilities and technologies on the critical path of development;

"(7) describe a process for utilizing nongovernmental entities for future human exploration beyond trans-lunar space and specify what, if any, synergy could be gained from—

"(A) partnerships using Space Act Agreements (as defined in section 2 of the National Aeronautics and Space Administration Authorization Act of 2014); or

"(B) other acquisition instruments;

"(8) include in the Exploration Roadmap an addendum from the NASA Advisory Council, and an

addendum from the Aerospace Safety Advisory Panel, each with a statement of review of the Roadmap that shall include—

"(A) subjects of agreement;

"(B) areas of concern; and

"(C) recommendations; and

"(9) include in the Roadmap an examination of the benefits of utilizing current Administration launch facilities for trans-lunar missions.

"(d) UPDATES.—The Administrator shall update such Roadmap as needed but no more than every 2 years and include it in the budget for that fiscal year transmitted to Congress under section 1105(a) of title 31, and describe—

"(1) the achievements and goals reached in the process of developing such capabilities and technologies during the 2-year period prior to the submission of the Roadmap to Congress; and

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

"(e) DEFINITIONS.—In this section, the terms 'Orion crew capsule' and 'Space Launch System' have the meanings given such terms in section 20302.".

(b) REPORT.—

(1) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit a copy of the Human Exploration Roadmap developed under section 70504 of title 51, United States Code, to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(2) UPDATES.—The Administrator shall transmit a copy of each updated Human Exploration Roadmap to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 7 days after such Roadmap is updated.

SEC. 203. SPACE LAUNCH SYSTEM.

(a) FINDINGS.—Congress finds that—

(1) the Space Launch System is the most practical approach to reaching the Moon, Mars, and beyond, and Congress reaffirms the policy and minimum capability requirements for the Space Launch System contained in section 302 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322);

(2) the primary goal for the design of the fully integrated Space Launch System is to 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)); and

(3) In order to promote safety and reduce programmatic risk, the Administrator shall budget for and undertake a robust ground test and uncrewed and crewed flight test and demonstration program for the Space Launch System and the Orion multipurpose crew vehicle and shall budget for an operational flight rate sufficient to maintain safety and operational readiness.

(b) SENSE OF CONGRESS.—It is the sense of Congress that the President's annual budget requests for the Space Launch System and Orion multipurpose crew vehicle development, test, and operational phases should strive to accurately reflect the resource requirements of each of those phases, consistent with the policy established in section 201 of this Act.

(c) IN GENERAL.—Given the critical importance of a heavy-lift launch vehicle and crewed spacecraft to enable the achievement of the goal established in section 201 of

this Act, as well as to the accomplishment of intermediate exploration milestones and the provision of a backup capability to transfer crew and cargo to the ISS, the Administrator shall make the expeditious development, test, and achievement of operational readiness of the Space Launch System and the Orion crew capsule the highest priority of the exploration program.

(d) GOVERNMENT ACCOUNTABILITY OFFICE REVIEW.—Not later than 270 days after the date of enactment of this Act, the Comptroller General shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on NASA's acquisition of ground systems in support of the Space Launch System. The report shall assess the extent to which NASA's exploration systems development of ground systems is focused on the direct support of the Space Launch System and shall identify any ground support projects or activities that NASA is undertaking that do not solely or primarily support the Space Launch System.

(e) UTILIZATION REPORT.—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)). This report shall also include consideration of the technical requirements of the scientific and national security communities related to such Space Launch System and shall directly assess the utility and estimated cost savings obtained by using such Space Launch System for national security and space science missions. The Administrator shall transmit such report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 180 days after the date of enactment of this Act.

(f) NAMING COMPETITION.—Beginning not later than 180 days after the date of enactment of this Act and concluding not later than 1 year after such date of enactment, the Administrator shall conduct a well-publicized competition among students in elementary and secondary schools to name the elements of the Administration's exploration program, including—

(1) a name for the deep space human exploration program as a whole, which includes the Space

Launch System, the Orion crew capsule, and future missions; and

(2) a name for the Space Launch System.

(g) ADVANCED BOOSTER COMPETITION.—

(1) REPORT.—Not later than 90 days after the date of enactment of this Act, the Associate Administrator of the National Aeronautics and Space Administration shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report that—

(A) describes the estimated total development cost of an advanced booster for the Space Launch System;

(B) details any reductions or increases to the development cost of the Space Launch System which may result from conducting a competition for an advanced booster; and

(C) outlines any potential schedule delay to the Space Launch System 2017 EM–1 launch as a result of increased costs associated with conducting a competition for an advanced booster.

(2) COMPETITION.—If the Associate Administrator reports reductions pursuant to paragraph (1)(B), and no adverse schedule impact pursuant to paragraph (1)(C), then the Administration shall conduct a full and open competition for an advanced booster for the Space Launch System to meet the requirements described in section 302(c) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322(c)), to begin not later than 1 year after the Associate Administrator transmits the report required under paragraph (1).

SEC. 204. ORION CREW CAPSULE.

(a) IN GENERAL.—The Orion crew capsule shall meet the practical needs and the minimum capability requirements described in section 303 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18323).

(b) REPORT.—Not later than 60 days after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate—

(1) detailing those components and systems of the Orion crew capsule that ensure it is in compliance with section 303(b) of such Act (42 U.S.C. 18323(b));

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

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

SEC. 205. SPACE RADIATION.

(a) STRATEGY AND PLAN.—

(1) IN GENERAL.—The Administrator shall develop a space radiation mitigation and management strategy and implementation plan to enable the achievement of the goal established in section 201 that includes key research and monitoring requirements, milestones, a timetable, and an estimate of facility and budgetary requirements.

(2) COORDINATION.—The strategy shall include a mechanism for coordinating NASA research, technology, facilities, engineering, operations, and other functions required to support the strategy and plan.

(3) TRANSMITTAL.—Not later than 1 year after the date of enactment of this Act, the Administrator

shall transmit the strategy and plan to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(b) SPACE RADIATION RESEARCH FACILITIES.—The Administrator, in consultation with the heads of other appropriate Federal agencies, shall assess the national capabilities for carrying out critical ground-based research on space radiation biology and shall identify any issues that could affect the ability to carry out that research.

SEC. 206. PLANETARY PROTECTION FOR HUMAN EXPLORATION MISSIONS.

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

(b) SCOPE.—The study shall—

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

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

(3) develop a methodology, if possible, for defining and classifying the degree of concern associated with each likely destination;

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

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

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

Subtitle B—Space Operations

SEC. 211. INTERNATIONAL SPACE STATION.

(a) IN GENERAL.—The following is the policy of the United States:

(1) The United States ISS program shall have two primary objectives: Supporting Achievement of the goal established in section 201 of this Act and pursuing a research program that advances knowl-

edge and provides benefits to the Nation. It shall continue to be the policy of the United States to, in consultation with its international partners in the ISS program, support full and complete utilization of the ISS.

(2) The International Space Station shall be utilized to the maximum extent practicable for the development of capabilities and technologies needed for the future of human exploration beyond low-Earth orbit and shall be considered in the development of the Exploration Roadmap specified in section 202 of this Act.

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

(A) take all necessary measures to support the operation and full utilization of the International Space Station; and

(B) seek to minimize, to the extent practicable, the operating costs of the International Space Station.

(4) Reliance on foreign carriers for crew transfer is unacceptable, and the Nation's human space flight program must acquire the capability to launch United States astronauts on United States rockets from United States soil as soon as is safe and prac-

tically possible, whether on Government-owned and operated space transportation systems or privately owned systems that have been certified for flight by the appropriate Federal agencies.

(b) REAFFIRMATION OF POLICY.—Congress reaffirms—

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

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

(3) that the Orion crew capsule shall provide an alternative means of deliver of crew and cargo to the International Space Station, in the event other vehicles, whether commercial vehicles or partner-supplied vehicles, are unable to perform that function; and

(3) the policy stated in section 501(b) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18351(b)) that the Administration shall pursue international, commercial, and intragovernmental means to maximize International Space Station logistics supply, maintenance, and operational capabilities, reduce risks to International Space Station systems sustainability, and offset and minimize United States operations costs relating to the International Space Station.

(c) ASSURED ACCESS TO LOW-EARTH ORBIT.—Section 70501(a) of title 51, United States Code, is amended to read as follows:

"(a) POLICY STATEMENT.—It is the policy of the United States to maintain an uninterrupted capability for human space flight and operations in low-Earth orbit, and beyond, as an essential instrument of national security and the capability to ensure continued United States participation and leadership in the exploration and utilization of space.".

(d) REPEALS.—

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

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

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

(e) EXTENSION CRITERIA REPORT.—Not later than 1 year after the date of enactment of this Act, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the feasibility of extending the operation of the International Space Station that includes—

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

(2) any necessary contributions to enabling execution of the Exploration Roadmap specified in section 202 of this Act;

(3) cost estimates for operating the International Space Station to achieve the criteria required under paragraph (1);

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

(5) an assessment of how the defined criteria under paragraph (1) respond to the National Academies Decadal Survey on Biological and Physical Sciences in Space; and

(6) an identification of the actions and cost estimate needed to deorbit the ISS once a decision is made to deorbit the laboratory.

(f) STRATEGIC PLAN FOR INTERNATIONAL SPACE STATION RESEARCH.—

(1) IN GENERAL.—The Director of the Office of Science and Technology Policy, in consultation with the Administrator, academia, other Federal agencies, the International Space Station National Laboratory Advisory Committee, and other potential stakeholders, shall develop and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a strategic plan for conducting competitive, peer-reviewed research in physical and life sciences and related technologies on the International Space Station through at least 2020.

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

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

(B) provide a research timeline and identify resource requirements for its implementation, including but not exclusive to, the facilities and instrumentation necessary for the conduct of such research; and

(C) identify—

(i) criteria for the proposed research, including—

(I) a justification for the research to be carried out in the space microgravity environment;

(II) the use of model systems;

(III) the testing of flight hardware to understand and ensure its functioning in the microgravity environment;

(IV) the use of controls to help distinguish among the direct and indirect effects of microgravity, among

other effects of the flight or space environment;

(V) approaches for facilitating data collection, analysis, and interpretation;

(VI) procedures to ensure repetition of experiments, as needed;

(VII) support for timely presentation of the peer-reviewed results of the research;

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

(IX) how these activities enable the Exploration Roadmap described in section 202 of this Act.

(ii) instrumentation required to support the measurements and analysis of the research to be carried out under the strategic plan;

(iii) the capabilities needed to support direct, real-time communications between astronauts working on research experiments onboard the International Space Station and the principal investigator on the ground;

(iv) a process for involving the external user community in research planning, including planning for relevant flight hardware and instrumentation, and for utilization of the International Space Station, free flyers, or other research platforms;

(v) the acquisition strategies the Administration plans to use to acquire any new capabilities which are not operational on the International Space Station as of the date of enactment of this Act and which have an estimated total life cycle cost of $10,000,000 or more, along with a justification of any anticipated use of less than full and open competition and written approval therefor from the Administration's Assistant Administrator for Procurement; and

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

(3) REPORT.—

(A) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Comptroller General of the United States shall transmit to the Committee on Science, Space,

and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the progress of the organization chosen for the management of the International Space Station National Laboratory as directed in section 504 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18354).

(B) SPECIFIC REQUIREMENTS.—The report shall assess the management, organization, and performance of such organization and shall include a review of the status of each of the 7 required activities listed in section 504(c) of such Act (42 U.S.C. 18354(c)).

SEC. 212. COMMERCIAL CREW PROGRAM.

(a) SENSE OF CONGRESS.—It is the sense of Congress that once developed and certified to meet NASA's safety and reliability requirements, United States commercially provided crew transportation systems offer the potential of serving as the primary means of transporting American astronauts and international partner astronauts to and from the ISS and serving as ISS emergency crew rescue vehicles. At the same time, the budgetary assumptions used by NASA in its planning for the Commercial

Crew Program have consistently assumed significantly higher funding levels than have historically been authorized and appropriated by Congress. It is the sense of Congress that credibility in the Administration's budgetary estimates for the Commercial Crew Program can be enhanced by an independently developed cost estimate. Such credibility in budgetary estimates is an important factor in understanding program risk.

(b) OBJECTIVE.—The objective of NASA's Commercial Crew Program shall be to assist the development of at least one crew transportation system to carry NASA astronauts safely, reliably, and affordably to and from the ISS and to serve as an emergency crew rescue vehicle as soon as practicable within the funding levels authorized in this Act. The Administration shall not use any considerations beyond this objective in the overall acquisition strategy.

(c) SAFETY.—Consistent with the findings and recommendations of the Columbia Accident Investigation Board, the Administration shall—

(1) ensure that in its evaluation and selection of contracts for the development of commercial crew transportation capabilities, that safety is the highest priority; and

(2) seek to ensure that minimization of the probability of loss of crew shall be an important selection criterion of the Commercial Crew Transportation Capability Contract.

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

(e) TRANSPARENCY.—Transparency is the cornerstone of ensuring a safe and reliable commercial crew transportation service to the International Space Station. The Administrator shall, to the greatest extent practicable, ensure that every commercial crew transportation services provider has provided evidence based support for their costs and schedule.

(f) INDEPENDENT COST AND SCHEDULE ESTIMATE.—

(1) REQUIREMENT.—Not later than 30 days after the Federal Acquisition Regulation-based contract for the Commercial Crew Transportation Capability Contract is awarded, the Administrator shall arrange for the initiation of an Independent Cost and Schedule Estimate for—

(A) all activities associated with the development, test, demonstration, and certification of commercial crew transportation systems;

(B) transportation and rescue services required by NASA for ISS operations through calendar year 2020 or later if NASA requirements so dictate; and

(C) the estimated date of operational readiness for the program each assumption listed in paragraph (2) of this subsection.

(2) ASSUMPTIONS.—The Independent Cost and Schedule Estimate shall provide an estimate for each of the following scenarios:

(A) An appropriation of $600,000,000 over the next 3 fiscal years.

(B) An appropriation of $700,000,000 over the next 3 fiscal years.

(C) An appropriation of $800,000,000 over the next 3 fiscal years.

(D) The funding level assumptions over the next 3 fiscal years that are included as part of commercial crew transportation capability contract awards.

(3) TRANSMITTAL.—Not later than 180 days after initiation of the Independent Cost and Sched-

ule Estimate under paragraph (1), the Administrator shall transmit the results of the Independent Cost and Schedule Estimate to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(g) IMPLEMENTATION STRATEGIES.—

(1) REPORT.—Not later than 60 days after the completion of the Independent Cost and Schedule Estimate under subsection (f), the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report containing 4 distinct implementation strategies based on such Independent Cost and Schedule Estimate for the final stages of the commercial crew program.

(2) REQUIREMENTS.—These options shall include—

(A) a strategy that assumes an appropriation of $600,000,000 over the next 3 fiscal years;

(B) a strategy that assumes an appropriation of $700,000,000 over the next 3 fiscal years;

(C) a strategy that assumes an appropriation of $800,000,000 over the next 3 fiscal years; and

(D) a strategy that has yet to be considered previously in any budget submission but that the Administration believes could ensure the flight readiness date of 2017 for at least one provider.

(3) INCLUSIONS.—Each strategy shall include the contracting instruments the Administration will employ to acquire the services in each phase of development or acquisition and the number of commercial providers the Administration will include in the program.

TITLE III—SCIENCE

Subtitle A—General

SEC. 301. SCIENCE PORTFOLIO.

(a) BALANCED AND ADEQUATELY FUNDED ACTIVITIES.—Section 803 of the National Aeronautics and Space Administration Authorization Act of 2010 (124 Stat. 2832) is amended to read as follows:

"SEC. 803. OVERALL SCIENCE PORTFOLIO; SENSE OF CONGRESS.

"Congress reaffirms its sense, expressed in the National Aeronautics and Space Administration Authoriza-

tion Act of 2010, that a balanced and adequately funded set of activities, consisting of research and analysis grants programs, technology development, small, medium, and large space missions, and suborbital research activities, contributes to a robust and productive science program and serves as a catalyst for innovation and discovery.".

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

SEC. 302. RADIOISOTOPE POWER SYSTEMS.

(a) SENSE OF CONGRESS.—It is the sense of Congress that conducting deep space exploration requires radioisotope power systems, and establishing continuity in the production of the material needed to power these systems is paramount to the success of these future deep space missions. It is further the sense of Congress that Federal agencies supporting NASA through the production of such material should do so in a cost effective manner so as not to impose excessive reimbursement requirements on NASA.

(b) ANALYSIS OF REQUIREMENTS AND RISKS.—The Director of the Office of Science and Technology Policy

and the Administrator, in consultation with 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;

(B) the risks and implications of, and contingencies for, any delays or unanticipated tech-

nical 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 De-

partment 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) TRANSMITTAL.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit the results of the analysis to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 303. CONGRESSIONAL DECLARATION OF POLICY AND PURPOSE.

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

"(10) The direction of the unique competence of the Administration to the search for life's origin, evolution, distribution, and future in the Universe. In carrying out this objective, the Administration may use any practicable ground-based, airborne, or space-based technical means and spectra of electromagnetic radiation.".

Subtitle B—Astrophysics

SEC. 311. DECADAL CADENCE.

In carrying out section 301(b), the Administrator shall seek to ensure to the extent practicable a steady cadence of large, medium, and small astrophysics missions.

SEC. 312. EXTRASOLAR PLANET EXPLORATION STRATEGY.

(a) STRATEGY.—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 TESS, the James Webb Space Telescope, a potential WFIRST mission, or any other telescope, spacecraft, or instrument as appropriate. Such strategy shall—

(1) outline key scientific questions;

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

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

(4) make recommendations with respect to optimal coordination with international partners, commercial partners, and other not-for-profit partners; and

(5) make recommendations on the above as appropriate.

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

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

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

(c) REPORT TO CONGRESS.—Not later than 18 months after the date of enactment of this Act, the National Academies shall transmit a report to the Administrator, and to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, containing the strategy developed under subsection (a).

SEC. 313. JAMES WEBB TELESCOPE.

It is the sense of Congress that—

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

(2) the JWST will enable American scientists to maintain their leadership in astrophysics and other disciplines;

(3) the JWST program is making steady progress towards a launch in 2018;

(4) the on-time and on-budget delivery of JWST is a high congressional priority; and

(5) maintaining this progress will require the Administrator to 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 JWST's development schedule prior to launch.

SEC. 314. NATIONAL RECONNAISSANCE OFFICE TELESCOPE DONATION.

Not later than 90 days after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate outlining the cost of the Administration's potential plan for developing the Wide-Field Infrared Survey Telescope as described in the 2010 National Academies' astronomy and astrophysics decadal survey, including an alternative plan for the Wide-Field Infrared Survey Telescope 2.4, which includes the donated 2.4-meter aperture National Reconnaissance Office telescope. Due to the budget constraints on the Administration's science programs, this report shall include—

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

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

(3) an assessment of how the Administration's existing science missions will be affected by the utilization of the donated asset described in this section; and

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

Subtitle C—Planetary Science

SEC. 321. DECADAL CADENCE.

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

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

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

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

SEC. 322. NEAR-EARTH OBJECTS.

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

(1) Near-Earth objects pose a serious and credible threat to humankind, as many scientists believe that a major asteroid or comet was responsible for the mass extinction of the majority of the Earth's species, including the dinosaurs, approximately 65,000,000 years ago.

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

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

(4) The efforts undertaken by the Administration for detecting and characterizing the hazards of near-Earth objects should continue to seek to fully

determine the threat posed by such objects to cause widespread destruction and loss of life.

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

(c) NEAR-EARTH OBJECT SURVEY.—The Administrator shall continue to discover, track, catalogue, and characterize the physical characteristics of near-Earth objects equal to or greater than 140 meters in diameter in order to assess the threat of such near-Earth objects to the Earth, pursuant to the George E. Brown, Jr. Near-Earth Object Survey Act (42 U.S.C. 16691). It shall be the goal of the Survey program to achieve 90 percent completion of its near-Earth object catalogue (based on statistically predicted populations of near-Earth objects) by 2020.

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

(e) PROGRAM REPORT.—The Director of the Office of Science and Technology Policy and the Administrator shall transmit to the Committee on Science, Space, and

Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, not later than 1 year after the date of enactment of this Act, an initial report that provides—

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

(2) 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.—Subsequent to the initial report the Administrator shall annually transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report that provides—

(1) a summary of all activities carried out pursuant to subsection (c) since the date of enactment of this Act, including the progress towards achieving

90 percent completion of the survey in subsection (c); and

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

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

(1) accelerate the survey in subsection (c) and;

(2) expand NASA'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 this Act, the Administrator shall transmit the results of the assessment to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 323. 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 organi-

zations to the maximum extent practicable in carrying out the Near-Earth Object Survey program in order to meet the goal of the Survey program.

(b) REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, Transportation of the Senate a report describing how the Administration can expand collaborative partnerships to detect, catalogue, and categorize near-Earth asteroids.

SEC. 324. ASTROBIOLOGY STRATEGY.

(a) STRATEGY.—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. 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 transmit a report to the Administrator, and to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, containing the strategy developed under subsection (a).

SEC. 325. ASTROBIOLOGY PUBLIC-PRIVATE PARTNERSHIPS.

Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, Transportation of the Senate a report describing how the Administration can expand collaborative partnerships to study life's origin, evolution, distribution, and future in the Universe.

SEC. 326. ASSESSMENT OF MARS ARCHITECTURE.

(a) ASSESSMENT.—The Administrator shall enter into an arrangement with the National Academies to assess—

(1) NASA's revised post-2016 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 NASA'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 architecture's relationship to Mars-related activities to be undertaken by agencies and organizations outside of the United States; and

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

(b) TRANSMITTAL.—Not later than 18 months after the date of enactment of this Act, the Administrator shall transmit the results of the assessment to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

Subtitle D—Heliophysics

SEC. 331. DECADAL CADENCE.

In carrying out section 301(b), the Administrator shall seek to ensure to the extent practicable a steady cadence of large, medium, and small heliophysics missions.

Subtitle E—Earth Science

SEC. 341. REIMBURSEMENT FOR ADDITIONAL RESPONSIBILITIES.

It is the sense of Congress that NASA is being asked to undertake important Earth science activities in an environment of increasingly constrained fiscal resources, and that any transfer of additional responsibilities to NASA, such as climate instrument development and measurements that are currently part of the portfolio of the National Oceanic and Atmospheric Administration, should be accompanied by the provision of additional resources to allow NASA to carry out the increased responsibilities without adversely impacting its implementation of its existing Earth science programs and priorities.

TITLE IV—AERONAUTICS

SEC. 401. SENSE OF CONGRESS.

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 NASA's mission and should be supported;

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

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

SEC. 402. AERONAUTICS RESEARCH GOALS.

The Administrator shall ensure that the Administration maintains a strong aeronautics research portfolio ranging from fundamental research through integrated systems research with specific research goals, including the following:

(1) ENHANCE AIRSPACE OPERATIONS AND SAFETY.—NASA's Aeronautics Research Mission Directorate shall address research needs of the Next Generation Air Transportation System and identify critical gaps in technology which must be bridged to enable the implementation of the Next Generation Air Transportation System so that safety and productivity improvements can be achieved as soon as possible.

(2) IMPROVE AIR VEHICLE PERFORMANCE.—Such Directorate shall conduct research to improve aircraft performance and minimize environmental impacts. The Director shall consider and pursue concepts to reduce noise, emissions and fuel consumption while maintaining high safety standards, and conduct research related to the impact of alternative fuels on the safety, reliability and maintainability of current and new air vehicles.

(3) STRENGTHEN AVIATION SAFETY.—Such Directorate shall proactively address safety challenges associated with current and new air vehicles and with operations in the Nation's current and future air transportation system.

(4) DEMONSTRATE CONCEPTS AT THE SYSTEM LEVEL.—Such Directorate shall mature the most promising technologies to the point at which they can be demonstrated in a relevant environment and shall integrate individual components and technologies as appropriate to ensure that they perform in an integrated manner as well as they do when operated individually.

SEC. 403. UNMANNED AERIAL SYSTEMS RESEARCH AND DEVELOPMENT.

(a) IN GENERAL.—The Administrator, in consultation with the Administrator of the Federal Aviation Administration and other Federal agencies, shall carry out research and technological development to facilitate the safe integration of unmanned aerial systems into the National Airspace System, including—

(1) positioning and navigation systems;

(2) sense and avoid capabilities;

(3) secure data and communication links;

(4) flight recovery systems; and

(5) human systems integration.

(b) ROADMAP.—The Administrator shall update a roadmap for unmanned aerial systems research and development and transmit this roadmap to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 180 days after the date of enactment of this Act.

(c) COOPERATIVE UNMANNED AERIAL VEHICLE ACTIVITIES.—Section 31504 of title 51, United States Code, is amended by inserting "Operational flight data derived from these cooperative agreements shall be made available, in appropriate and usable formats, to the Administration

and the Federal Aviation Administration for the development of regulatory standards." after "in remote areas.".

SEC. 404. RESEARCH PROGRAM ON COMPOSITE MATERIALS USED IN AERONAUTICS.

(a) PURPOSE OF RESEARCH.—The Administrator shall continue NASA's cooperative research program with industry to identify and demonstrate more effective and safe ways of developing, manufacturing, and maintaining composite materials for use in airframes, subsystems, and propulsion components.

(b) CONSULTATION.—The Administrator, in overseeing the Administration's work on composite materials, shall consult with relevant Federal agencies and partners in industry to accelerate safe development and certification processes for new composite materials and design methods while maintaining rigorous inspection of new composite materials.

(c) REPORT.—Not later than 1 year after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate detailing the Administration's work on new composite materials and the coordination efforts among Federal agencies.

SEC. 405. HYPERSONIC RESEARCH.

Not later than 1 year after the date of enactment of this Act, the Administrator, in consultation with other Federal agencies, shall develop and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a research and development roadmap for hypersonic aircraft research with the objective of exploring 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. The roadmap shall prescribe appropriate agency contributions, coordination efforts, and technology milestones.

SEC. 406. 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 NASA'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.—Not later than 1 year after the date of enactment of this Act, the Administrator shall develop and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a roadmap that allows for flexible funding profiles, for supersonic aeronautics research and development with the objective of developing and demonstrating, 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. The roadmap shall include—

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

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

(3) a research plan to address such challenges, as well as a project timeline for accomplishing relevant research goals;

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

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

SEC. 407. RESEARCH ON NEXTGEN AIRSPACE MANAGEMENT CONCEPTS AND TOOLS.

(a) IN GENERAL.—The Administrator shall, in consultation with other Federal agencies, review at least annually the alignment and timing of the Administration's research and development activities in support of the NextGen airspace management modernization initiative, and shall make any necessary adjustments by reprioritizing or retargeting the Administration's research and development activities in support of the NextGen initiative.

(b) ANNUAL REPORTS.—The Administrator shall report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate annually regarding the progress of the Administration's research and development activities in support of the NextGen airspace management modernization initiative, including details of technologies transferred to relevant

Federal agencies for eventual operation implementation, consultation with other Federal agencies, and any adjustments made to research activities.

SEC. 408. ROTORCRAFT RESEARCH.

Not later than 1 year after the date of enactment of this Act, the Administrator, in consultation with other Federal agencies, shall prepare and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a roadmap for research relating to rotorcraft and other runway-independent air vehicles, with the objective of developing and demonstrating improved safety, noise, and environmental impact in a relevant environment. 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.

SEC. 409. TRANSFORMATIVE AERONAUTICS RESEARCH.

It is the sense of Congress that the Administrator, in looking strategically into the future and ensuring that NASA's Center personnel are at the leading edge of aeronautics research, should encourage investigations into the early-stage advancement of new processes, novel concepts, and innovative technologies that have the potential to meet

national aeronautics needs. The Administrator shall continue to ensure that awards for the investigation of these concepts and technologies are open for competition among NASA civil servants at its Centers, separate from other awards open only to non-NASA sources.

SEC. 410. STUDY OF UNITED STATES LEADERSHIP IN AERONAUTICS RESEARCH.

(a) STUDY.—The Administrator shall enter into an arrangement with the National Academies for a study to benchmark the position of the United States in civil aeronautics research compared to the rest of the world. The study shall—

(1) seek to define metrics by which relative leadership in civil aeronautics research can be determined;

(2) ascertain how the United States compares to other countries in the field of civil aeronautics research and any relevant trends; and

(3) provide recommendations on what can be done to regain or retain global leadership, including—

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

(B) defining appropriate roles for NASA;

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

(D) estimating the impact on NASA's budget should such recommendations be implemented.

(b) REPORT.—Not later than 18 months after the date of enactment of this Act, the Administrator shall provide the results of the study to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

TITLE V—SPACE TECHNOLOGY

SEC. 501. SENSE OF CONGRESS.

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

(1) enabling a new class of NASA missions beyond low-Earth orbit;

(2) developing technologies and capabilities that will make NASA's missions more affordable and more reliable; and

(3) improving technological capabilities and promoting innovation for NASA and the Nation.

SEC. 502. SPACE TECHNOLOGY PROGRAM.

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

"§ 70507. Space technology program authorized

"(a) PROGRAM AUTHORIZED.—The Administrator shall establish a Space Technology Program to pursue the research and development of advanced space technologies that have the potential of delivering innovative solutions and to support human exploration of the solar system or advanced space science. The program established by the Administrator shall take into consideration the recommendations of the National Academies' review of NASA Space Technology Roadmaps and Priorities, as well as applicable enabling aspects of the roadmap specified in section 70504. In conducting the space technology program established under this section, the Administrator shall—

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

"(2) make use of small satellites and NASA suborbital and ground-based platforms, to the extent practicable and appropriate, to demonstrate space technology concepts and developments; and

"(3) undertake partnerships with other Federal agencies, universities, private industry, and other spacefaring nations, as appropriate.

"(b) 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 Space Technology Program.

"(c) NONDUPLICATION CERTIFICATION.—The Administrator shall include in the budget for each fiscal year, as transmitted to Congress under section 1105(a) of title 31 a certification that no project, program, or mission undertaken by the Space Technology Program is duplicative of any other project, program, or mission conducted by another office or directorate of the Administration.".

(b) COLLABORATION, COORDINATION, AND ALIGNMENT.—The Administrator shall 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 and that results from such work are shared and leveraged within the Administration. Projects, programs, and activities currently 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. The Administrator shall ensure that organizational responsibility for research and development activities in support of human space exploration not initiated as of the date of enactment is established on the basis of a sound ration-

ale. The Administrator shall provide the rationale in the report specified in subsection (d).

(c) REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall provide to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report comparing NASA's space technology investments with the high-priority technology areas identified by the National Academies in the National Research Council's report on NASA's Space Technology Roadmaps. The Administrator shall identify how NASA will address any gaps between the agency's investments and the recommended technology areas, including a projection of funding requirements.

(d) ANNUAL REPORT.—The Administrator shall include in the budget 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.

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

"70507. Space Technology Program authorized.".

SEC. 503. UTILIZATION OF THE INTERNATIONAL SPACE STATION FOR TECHNOLOGY DEMONSTRATIONS.

The Administrator shall utilize the International Space Station and commercial services for Space Technology Demonstration missions in low-Earth orbit whenever it is practical and cost effective to do so.

TITLE VI—POLICY PROVISIONS

SEC. 601. ASTEROID RETRIEVAL MISSION.

(a) ASTEROID RETRIEVAL REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall provide to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the proposed Asteroid Retrieval Mission. Such report shall include—

(1) a detailed budget profile, including cost estimates for the development of all necessary technologies and spacecraft required for the mission;

(2) a detailed technical plan that includes milestones and a specific schedule;

(3) a description of the technologies and capabilities anticipated to be gained from the proposed mission that will enable future human missions to Mars which could not be gained by lunar missions;

(4) a description of the technologies and capabilities anticipated to be gained from the proposed mission that will enable future planetary defense missions, against impact threats from near-Earth objects equal to or greater than 140 meters in diameter, which could not be gained by robotic missions; and

(5) a complete assessment by the Small Bodies Assessment Group and the NASA Advisory Council of how the proposed mission is in the strategic interests of the United States in space exploration.

(b) MARS FLYBY REPORT.—Not later than 60 days after the date of enactment of this Act, an independent, private systems engineering and technical assistance organization contracted by the Human Exploration Operations Mission Directorate shall transmit to the Administrator, the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report analyzing the proposal for a Mars Flyby human spaceflight mission to be launched in 2021. Such report shall include—

(1) a technical development, test, fielding, and operations plan using the Space Launch System and

other systems to successfully mount a Mars Flyby mission by 2021;

(2) a description of the benefits in scientific knowledge and technologies demonstrated by a Mars Flyby mission to be launched in 2021 suitable for future Mars missions; and

(3) an annual budget profile, including cost estimates, for the development test, fielding, and operations plan to carry out a Mars Flyby mission through 2021 and comparison of that budget profile to the current 5-year budget profile contained in the President's Budget request for fiscal year 2015.

(c) ASSESSMENT.—Not later than 60 days after transmittal of the report specified in subsection (b), the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate an assessment by the NASA Advisory Council of whether the proposal for a Mars Flyby Mission to be launched in 2021 is in the strategic interests of the United States in space exploration.

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

SEC. 602. TERMINATION LIABILITY.

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

(1) The International Space Station, the Space Launch System, and the Orion crew capsule will enable the Nation to continue operations in low-Earth orbit and to send its astronauts to deep space. The James Webb Space Telescope will revolutionize our understanding of star and planet formation and how galaxies evolved and advance the search for the origins of our universe. 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.

(2) In addition, 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. As a result, hundreds of millions of taxpayer dollars are unavailable for meaningful work on these programs.

(3) According to the Government Accountability Office, the Administration procures most of its goods and services through contracts, and it terminates very few of them. In fiscal year 2010, the Ad-

ministration terminated 28 of 16,343 active contracts and orders—a termination rate of about 0.17 percent.

(4) Providing processes requiring congressional notification on termination of these high-priority programs would enable contractors to apply taxpayer dollars to making maximum progress in meeting the established technical goals and schedule milestones of these programs.

(b) NASA TERMINATION LIABILITY.—

(1) GENERAL RULE.—Termination liability costs for a covered program shall be provided only pursuant to this subsection.

(2) PROHIBITION ON RESERVING FUNDS.—The Administrator may not reserve funds from amounts appropriated for a covered program, or require the reservation of funds by the prime contractor, for potential termination liability costs with respect to a covered program.

(3) INTENT OF CONGRESS.—It is the intent of Congress that funds authorized to be appropriated for covered programs be applied in meeting established technical goals and schedule milestones.

(4) APPLICATION OF PRIOR RESERVED FUNDS.—Funds that have been reserved before the

date of enactment of this Act for potential termination liability shall be promptly used to make maximum progress in meeting the established goals and milestones of the covered program.

(5) NOTIFICATION.—The Administrator shall notify the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate at least 12 months in advance of initiating termination for convenience or termination for cause of a prime contract on a covered program.

(6) SUPPLEMENTAL APPROPRIATION REQUEST.—

(A) REQUEST.—If the Administrator initiates termination of a prime contract on a covered program pursuant to paragraph (5), and sufficient unobligated appropriations are not available to cover termination liability costs in the appropriations account that is funding the prime contract being terminated, the Administrator shall provide to Congress a notification that an authorization of appropriations is necessary not later than 120 days in advance of

the proposed contract termination settlement for the covered program.

(B) INTENT OF CONGRESS.—It is the intent of Congress to provide additional authorization for appropriations as may be necessary to pay termination liability costs on prime contracts for covered programs if Congress deems it appropriate that the Administration terminate such prime contracts. The Administration shall be responsible for applying these additional funds for payment of all allowable and reasonable negotiated termination liability costs if the Administration terminates a prime contract for a covered program. If the Administration terminates a prime contract for a covered program for the convenience of the Federal Government, then the Federal Government is responsible for payment of all allowable and reasonable negotiated termination liability costs on the prime contract.

(c) REPORTING.—Not later than 6 months after the date of enactment of this Act, and every 6 months thereafter for the duration of the prime contracts on covered programs, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House

of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report that provides—

(1) the estimated termination liability costs for each of the prime contracts; and

(2) the basis for how such estimate was determined.

(d) DEFINITIONS.—For purposes of this section:

(1) COVERED PROGRAM.—The term "covered program" means the International Space Station, the Space Launch System, the Orion crew capsule, and the James Webb Space Telescope.

(2) PRIME CONTRACT.—The term "prime contract" means a contract entered directly between a person or entity and the Federal Government for the performance of all or the majority of the responsibilities for developing, integrating, fielding, operating, or sustaining a covered program.

(3) PRIME CONTRACTOR.—The term "prime contractor" means a person or entity contracting directly with the Federal Government on a covered program.

(4) TERMINATION LIABILITY COSTS.—The term "termination liability costs" means any costs incurred by a prime contractor, or by any subcon-

tractor of a prime contractor, for which the Federal Government is liable as a result of termination of a prime contract by the Administrator.

SEC. 603. BASELINE AND COST CONTROLS.

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

(1) in subsection (a), by striking "Procedural Requirements 7120.5c, dated March 22, 2005" and inserting "Procedural Requirements 7120.5E, dated August 14, 2012"; and

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

SEC. 604. PROJECT AND PROGRAM RESERVES.

(a) SENSE OF CONGRESS.—It is the sense of Congress that the judicious use of program and project reserves provides NASA project and program managers with the flexibility needed to manage projects and programs to ensure that the impacts of contingencies can be mitigated.

(b) REPORT.—Not later than 180 days after the date of enactment of this Act the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Com-

merce, Science, and Transportation of the Senate a report describing—

(1) NASA's criteria for establishing the amount of reserves held at the project and program levels;

(2) how such criteria relate to the agency's policy of budgeting at a 70-percent confidence level; and

(3) NASA's criteria for waiving the policy of budgeting at a 70-percent confidence level and alternative strategies and mechanisms aimed at controlling program and project costs when a waiver is granted.

SEC. 605. INDEPENDENT REVIEWS.

Not later than 270 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report describing—

(1) the Administration's procedures for conducting independent reviews of projects and programs at lifecycle milestones and how the Administration ensures the independence of the individuals who conduct those reviews prior to their assignment;

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

(3) how NASA ensures the independence of such entities and their members.

SEC. 606. 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. 607. NASA ADVISORY COUNCIL.

(a) STUDY.—The Administrator shall enter into an arrangement with the National Academy of Public Administration for an assessment of the effectiveness of the NASA Advisory Council, any organizational or other issues that the Academy determines need to be addressed, and any recommendations for improving the Council's effectiveness.

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

(c) SUNSET.—Subsection (b) shall expire on September 30, 2014.

SEC. 608. COST ESTIMATION.

(a) SENSE OF CONGRESS.—It is the sense of Congress that realistic cost estimating is critically important to the ultimate success of major space development projects. NASA has devoted significant efforts over the past five years to improving its cost estimating capabilities, but it is important that NASA continue its efforts to develop and implement guidance in establishing realistic cost estimates.

(b) GUIDANCE AND CRITERIA.—The Administrator shall provide to programs and projects and in a manner consistent with NASA Space Flight Program and Project Management Requirements—

(1) guidance on when an Independent Cost Estimate and Independent Cost Assessment should be used; and

(2) the criteria to be used to make such a determination.

(c) REPORT.—Not later than 270 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report—

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

(2) describing the mechanisms the Administration is using and will continue to use to ensure that adequate resources are dedicated to cost estimation;

(3) listing the steps the Administration is undertaking to advance consistent implementation of the joint cost and schedule (JCL) process;

(4) identifying criteria used by programs and projects in determining when to conduct an Independent Cost Estimate and Independent Cost Assessment; and

(5) listing—

(A) the costs of each individual Independent Cost Estimate or Independent Cost Assessment activity conducted in fiscal year 2011, fiscal year 2012, and fiscal year 2013;

(B) the purpose of the activity;

(C) identification of the primary NASA unit or outside body that conducted the activity; and

(D) key findings and recommendations.

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

SEC. 609. AVOIDING ORGANIZATIONAL CONFLICTS OF INTEREST IN MAJOR NASA ACQUISITION PROGRAMS.

(a) REVISED REGULATIONS REQUIRED.—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 provide uniform guidance and recommend revised requirements for organizational conflicts of interest by contractors in major acquisition programs in order to address elements identified in subsection (b).

(b) ELEMENTS.—The revised regulations required by 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 assistance 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) ensure that NASA receives 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 may be nec-

essary to ensure that NASA 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. 610. FACILITIES AND INFRASTRUCTURE.

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

(1) NASA must reverse the deteriorating condition of its facilities and infrastructure, as this condition is hampering the effectiveness and efficiency of research performed by both NASA and industry participants making use of NASA facilities, thus reducing the competitiveness of the United States aerospace industry;

(2) NASA has a role in providing laboratory capabilities to industry participants that are 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, NASA should seek to establish strategic partnerships with other Federal agencies, academic institutions, 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 future NASA and other Federal agencies' laboratory needs, including those required to meet the activities supporting the Exploration Roadmap required by section 202(c).

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

(c) PLAN.—The Administrator shall develop a plan that has the goal of positioning NASA to have the facilities, laboratories, tools, and approaches necessary to address future NASA requirements. Such plan shall identify—

(1) future NASA research and development and testing needs;

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

(A) the current National Space Policy;

(B) the National Aeronautics Research, Development, Test and Evaluation (RDT&E) Infrastructure Plan;

(C) NASA Authorization Acts; and

(D) the Roadmap specified in section 202(e);

(3) a strategy for the maintenance, repair, upgrading, and modernization of NASA's laboratories, facilities, and equipment;

(4) criteria for prioritizing deferred maintenance tasks and also for upgrading or modernizing laboratories, facilities, and equipment and implementing processes, plans, and policies for guiding Centers on whether to maintain, repair, upgrade, or modernize a facility and for determining the type of instrument to be used;

(5) 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

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

(d) POLICY.—Not later than 180 days after enactment of this Act, the Administrator shall establish and make publically available a policy that guides the agency'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. This policy shall establish criteria for the use of authorities, best practices, standardized procedures, and guidelines for how to appropriately manage property, infrastructure, and facilities.

(e) TRANSMITTAL.—Not later than one year after the date of enactment of this Act, the Administrator shall transmit the plan to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(f) ESTABLISHMENT OF CAPITAL FUND.—The Administrator shall establish a capital fund for the modernization of facilities and laboratories. The Administrator shall ensure to the maximum extent practicable that all financial savings achieved by closing outdated or surplus facilities at a NASA field center shall be made available to that center for the purpose of modernizing the field center's facilities and laboratories and for upgrading the infrastructure at the field center.

(g) REPORT ON CAPITAL FUND.—This fund shall require review and approval by the Administrator and the status, including the amounts held in the Working Capital Fund, shall be reported to the Committee on Science, Space, and Technology of the House of Representatives

and the Committee on Commerce, Science, and Transportation of the Senate in conjunction with annual budget justifications.

SEC. 612. DETECTION AND AVOIDANCE OF COUNTERFEIT ELECTRONIC PARTS.

(a) REGULATIONS.—

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

(2) CONTRACTOR RESPONSIBILITIES.—The revised regulations issued pursuant to paragraph (1) shall provide that—

(A) Administration contractors who supply electronic parts or products that include electronic parts are responsible for detecting and avoiding the use or inclusion of counterfeit electronic parts or suspect counterfeit electronic parts in such products and for any rework or corrective action that may be required to remedy the use or inclusion of such parts; and

(B) the cost of counterfeit electronic parts and suspect counterfeit electronic parts and the

cost of rework or corrective action that may be required to remedy the use or inclusion of such parts are not allowable costs under Agency contracts, unless—

(i) the covered contractor has an operational system to detect and avoid counterfeit parts and suspect counterfeit electronic parts that has been reviewed and approved by the Administration or the Department of Defense;

(ii) the covered contractor provides timely notice to the Administration pursuant to paragraph (4); or

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

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

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

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

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

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

(i) notification of the Administration; and

(ii) inspection, testing, and authentication of electronic parts that the Administration or an Administration contractor or 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 the Administration 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 Administration contractors and subcontractors to identify and use additional suppliers beyond those identified pursuant to subparagraph (C), provided that—

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

(ii) the contractor or subcontractor assumes responsibility for the authenticity of parts provided by such suppliers as provided in paragraph (2); and

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

(4) TIMELY NOTIFICATION.—The revised regulations issued pursuant to paragraph (1) shall require that any Administration contractor or subcontractor who becomes aware, or has reason to suspect, that any end item, component, part, or mate-

rial contained in supplies purchased by the Administration, or purchased by a contractor or subcontractor for delivery to, or on behalf of, the Administration, contains counterfeit electronic parts or suspect counterfeit electronic parts, shall provide notification to the applicable Administration contracting officer within 30 calendar days.

(b) DEFINITIONS.—In this section, 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. 613. SPACE ACT AGREEMENTS.

(a) COST SHARING.—To the extent that the Administrator determines practicable, the funds provided by the Government under a funded Space Act Agreement shall not exceed the total amount provided by other parties to the Space Act Agreement.

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

(c) PUBLIC NOTICE AND COMMENT.—The Administrator shall make available for public notice and comment

each proposed Space Act Agreement at least 30 days before entering into such agreement, with appropriate redactions for proprietary, sensitive, or classified information.

(d) TRANSPARENCY.—The Administrator shall publicly disclose on the Administration's website and make available in a searchable format all Space Act Agreements, with appropriate redactions for proprietary, sensitive, or classified information, not later than 60 days after such agreement is signed.

(e) ANNUAL REPORT.—

(1) REQUIREMENT.—Not later than 90 days after the end of each fiscal year, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate 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, nonreimbursable, 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 also include a list of all anticipated reimbursable, nonreimbursable, and funded Space Act Agreements for the upcoming fiscal year.

(4) CUMULATIVE PROGRAM BENEFITS.—The report shall also include, with respect to the Space Act Agreements covered by the report, a summary of—

(A) the technology areas in which research projects were conducted under such agreements;

(B) the extent to which the use of the Space Act Agreements—

(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 pursuant to such Space Act Agreements.

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AMENDMENT ROSTER

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
Space Subcommittee Markup
April 9, 2014

AMENDMENT ROSTER

H.R. 4412, *the "National Aeronautics and Space Administration Authorization Act of 2014"*

No.	Amendment	Summary	
1	**Amendment in the Nature of a Substitute Offered by Rep. Palazzo and Rep. Edwards (068)**	Reflects a bipartisan agreement on funding, direction, and policy guidance for NASA. Authorizes programs and projects at NASA for one year. Proposed NASA funding is consistent with the Consolidated Appropriations Act, 2014 (P.L. 113-76)--$17,646,500,000. Reaffirms Congress's commitment to space exploration, both human and robotic. Makes clear that a human mission to Mars is the goal for NASA's human spaceflight program and requires biennial reports on that goal. Emphasizes the importance of maintaining a steady cadence of space science missions, including a planetary science mission to Europa. Includes funds for an aeronautics research program for the safe integration of unmanned aerial systems into the national airspace as well as NextGen technology for air traffic management. Provides greater public accountability and transparency and requires NASA to enforce more cost estimating discipline for its program.	**Agreed to by Voice Vote**

XXII. PROCEEDINGS OF THE FULL COMMITTEE MARKUP ON H.R. 4412, THE NASA AUTHORIZATION ACT OF 2014

TUESDAY, APRIL 29, 2014

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
WASHINGTON, D.C.

The Committee met, pursuant to call, at 1:31 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Lamar Smith [Chairman of the Committee] presiding.

Chairman SMITH. The Committee on Science, Space, and Technology will come to order. Without objection, the Chair is authorized to declare recesses of the Committee at any time. Pursuant to Committee Rule 2(f) and House Rule XI(2)(h)(4), roll call votes may be postponed.

Today we meet to consider H.R. 4412, the National Aeronautics and Space Administration Authorization Act of 2014. I will recognize myself, then the Ranking Member, for opening statements.

Let me thank the Members who are here, and we expect more momentarily, to be here for today's markup of H.R. 4412, the NASA Authorization Act of 2014.

There is a reason why the National Air and Space Museum is the most visited museum in America. Space exploration captures the imagination of people around the world and encourages future generations to dream big, work hard and shoot for the stars.

NASA has accomplished some of the most awe-inspiring and technologically advanced space initiatives in the history of humankind. Throughout its history, our space program has set goals that required vision and offered challenges that have led to innovation and the development of new technologies. New technologies give us new discoveries about the universe and hope that we can find solutions to problems here on Earth.

Space exploration is an investment in our nation's future, often the distant future, and many technologies that Americans use on a daily basis were born out of NASA research. These include heart rate monitors, athletic shoes, air and water purifiers, cordless tools, and laptop computers. They improve Americans' quality of life and save lives.

Today's bill ensures that NASA will continue to innovate and inspire. The scientists, engineers and astronauts who find creative

and new solutions to the challenges of exploring the universe serve as role models for our students. They motivate young people to study science, math, engineering and computer science. Even if not all of these students become astronauts, the skills and knowledge they learn can be applied to make technological breakthroughs in other fields. These accomplishments stimulate our economy and keep the United States globally competitive.

There is strong, bipartisan support for NASA's unique role, and the Manager's Amendment offered today reflects this. Mr. Palazzo and Ms. Edwards deserve much credit for producing a bipartisan bill.

The Manager's amendment increases the use of the International Space Station for science research, encourages commercial use of space, protects us from the effects of solar flares, helps remove orbital debris, and supports the development of a new space telescope that will detect Earth-sized planets. The American people largely support space exploration and NASA. This support is reflected in Congress as well on both sides of the Capitol and on both sides of the aisle.

Lastly, we are at this point thanks to the persistence over many days of our very able staff members. On the Republican side they include Tom Hammond, Allison Rose-Sonnesyn, Jared Stout, and Gabriella Ra'anan, and on the Democratic side, Pam Whitney and Allen Li. This was obviously a team effort and is very much appreciated by Members of the Committee.

I encourage Members to vote for the Manager's amendment when we get to it and to support the final bill, and then it is on to the House Floor.

[The prepared statement of Mr. Smith follows:]

PREPARED STATEMENT OF CHAIRMAN LAMAR S. SMITH

Good morning. Thank you all for being here for today's mark-up of H.R. 4412, the NASA Authorization Act of 2014.

There is a reason why the National Air and Space Museum is the most visited museum in America. Space exploration captures the imagination of people around the world and encourages future generations to dream big, work hard and shoot for the stars.

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This was obviously a team effort and is very much appreciated by Members of this Committee.

I encourage Members to vote for the Manager's amendment and to support the final bill. And then it's on to the House floor.

Chairman SMITH. That concludes my opening statement, and I will recognize the ranking member, Ms. Johnson, the gentlewoman from Texas, for hers.

Ms. JOHNSON. Thank you very much, Mr. Chairman. I will try to be relatively brief in my opening remarks so that we can quickly move to the consideration of the Manager's Amendment, at which time I will have a few additional comments.

I have made no secret of the fact that I consider NASA to be a key element of our Nation's research and development enterprise. NASA drives technological innovation and scientific advancement. It is also a very positive symbol throughout the world of American ingenuity and our can-do spirit. Finally, NASA has long been a source of inspiration to our young people, firing them up to pursue the STEM disciplines that will be critical to our future competitiveness.

That is why I consider reauthorizing NASA to be one of our Committee's most significant legislative responsibilities, and that is why I am pleased that after some initial missteps, this Committee is addressing that responsibility with a good bipartisan bill, something that has long been a hallmark of this Committee.

The bill before us with its accompanying Manager's Amendment has many good features, and I will not attempt to discuss all of them. Instead I would just note several key elements of the bill and the Manager's Amendment.

First, it makes clear that NASA is and should remain a multimission agency with a balanced portfolio of programs in space and Earth science, aeronautics, and human spaceflight and exploration. It provides a challenging goal for the Nation's human exploration program and supports the development of the SLS and Orion vehicles needed to carry out that program.

H.R. 4412 and its Manager's amendment contain provisions that will help promote productive Earth and space science, fundamental space life and physical sciences, International Space Station research, aeronautics research, and space technology development. There are also provisions to help strengthen NASA's education and public outreach activities. Finally, there are a number of "good government" provisions to ensure that the taxpayer dollars invested in NASA are used effectively.

Mr. Chairman, this bill and the Manager's Amendment are by no means perfect. For example, I remain disappointed that it was not possible to provide funding guidance to NASA for Fiscal Year 2015 and beyond, because I think that as authorizers we need to provide

the funding required to carry out the important tasks we have given the agency. However, I do believe that the bill as amended by the Manager's Amendment is a good bill, and it is worth support.

Before I close, I would like to express my appreciation to Ms. Edwards and our staff for working with me to ensure that we would have a good bill coming out of today's markup, and I would like to thank you, Chairman Smith, and Space Subcommittee Chairman Palazzo and their staff for their willingness to work cooperatively with us so that we could attain the positive outcome that I anticipate in today's markup.

And with that, I urge support for H.R. 4412 as amended by the Manager's amendment, and I yield back the balance of my time.

[The prepared statement of Ms. Johnson follows:]

PREPARED STATEMENT OF RANKING MEMBER EDDIE BERNICE JOHNSON

Thank you Mr. Chairman. I will be relatively brief in my opening remarks so that we can move quickly to consideration of the Manager's Amendment, at which time I will have a few additional comments.

I have made no secret of the fact that I consider NASA to be a key element of our nation's research and development enterprise. NASA drives technological innovation and scientific advancement.

It is also a very positive symbol throughout the world of American ingenuity and our "can do" spirit. Finally, NASA has long been a source of inspiration to our young people, firing them up to pursue the STEM disciplines that will be critical to our future competitiveness.

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With that, I urge support for H.R. 4412 as amended by the Manager's amendment, and I yield back the balance of my time.

Chairman SMITH. Thank you, Ms. Johnson, and let me thank you for your comments as well as for your essential role in getting us to the point we are now with a bipartisan NASA bill.H.R. 4412

Chairman SMITH. Pursuant to notice, I now call up H.R. 4412, the National Aeronautics and Space Administration Authorization Act of 2014, which was introduced by Representative Palazzo and amended by the Subcommittee on Space, and the clerk will report the bill.

The CLERK. H.R. 4412, as amended by the Subcommittee on Space on April 9——

Chairman SMITH. Without objection, the bill will be considered as read.

[H.R. 4412 appears in Appendix I]

Chairman SMITH. The gentleman from Mississippi, the Chairman of the Space Subcommittee, is recognized for his statement.

Mr. PALAZZO. Thank you, Mr. Chairman.

The bill before us today is the result of weeks of negotiations between the minority and majority. Certainly, this legislation is not perfect but it is a good-faith effort on both sides to commit to a bipartisan deal.

As was said at the Subcommittee markup three weeks ago, the Ranking Member and I anticipated there would be additional changes to the bill moving forward. Over these last few weeks, we have continued to work with our friends on the other side of the aisle to come to an agreement on several outstanding items. The Manager's Amendment being offered today encompasses nearly all of those items.

As the bill is written, it sets NASA on a path to landing humans on Mars with the creation of a human exploration roadmap. This roadmap is critical to the future of human exploration for the United States and ensures there is a plan and structure in place that will span several Administrations and elections. It is a fiscally responsible and technically feasible blueprint. Both the Space Launch System and Orion crew capsule are reaffirmed in the bill, consistent with the NASA Authorization Act of 2010, which laid out very clear guidelines and direction for the development of these systems.

This bill authorizes ample funding for the Commercial Crew program to ensure safe and on-time development of domestic access to the International Space Station. There are also oversight provisions to ensure transparency in the contracts and processes used to develop these systems.

This agreement represents an understanding that both our Commercial Crew partners and those developing SLS and Orion have a crucial role to play in ending our reliance on Russian rockets.

The science title of the bill emphasizes the importance of completing and launching the James Webb Space Telescope in 2018, which will build on the work of its Hubble predecessor while expanding our view into the universe.

The bill reaffirms Congress's commitment to the first A in NASA, the Aeronautics Research Mission Directorate. The agency has a proud history of infusing critical, fundamental, new knowledge and technologies into the aerospace sector, and H.R. 4412 directs NASA to create research and development roadmaps for the agency's work

on unmanned aerial systems, hypersonics, supersonics and rotocraft.

In an ongoing effort to keep NASA's limited budgets focused to support the agency's primary missions, the bill directs that any transfer of additional responsibilities to NASA should be accompanied by additional resources. NASA is the only agency tasked with space exploration, and its budgets must reflect space exploration as a priority, yet the President's budget request again transfers responsibility for developing instruments for climate research from NOAA to NASA without providing additional resources to NASA to pay for such responsibilities.

Finally, this Committee has made multiple requests for more information on a proposed Asteroid Redirect Mission, or ARM. These are reasonable requests, especially in light of the considerable concerns that have been expressed in the scientific community and by NASA's own advisory groups. To date, NASA has failed to provide a budget profile, program office or schedule. This bill directs NASA to provide these key details about this mission.

I want to again thank Ms. Edwards, her staff, and of course, the majority and minority Committee staff for their tireless efforts to pull this bill together. I am proud that at the end of the day, we are able to put our names on a bipartisan bill.

I yield back.

Chairman SMITH. Thank you, Mr. Palazzo.

The gentlewoman from Maryland, Ms. Edwards, the Ranking Member of the Space Subcommittee, is recognized for her statement.

Ms. EDWARDS. Thank you very much, Mr. Chairman, and I am really pleased to be able to join my colleague, Mr. Palazzo, in introducing our Manager's Amendment today. It was jointly agreed to by Mr. Palazzo, Chairman Smith and Ranking Member Johnson and myself along with our Committee. It is an amendment that enhances substantially the Subcommittee-passed bill.

Mr. Chairman, as I indicated previously, due to time constraints, the Subcommittee-passed bill didn't reflect all of the good work that both sides have been doing to reach common ground. In fact, we knew we had work to do. Subsequent to the Subcommittee markup, our staffs have continued to work diligently on a number of areas, and today's markup is proof of that hard work. In fact, it is proof of teamwork.

Provisions in the Manager's Amendment include direction to NASA that it continue carrying out a balanced Earth Science program that includes Earth science research, Earth systematic missions, competitive venture-class missions, other missions and data analyses, mission operations, technology development and applied sciences consistent with the recommendations and priorities established in the National Academies' Earth Science Decadal Survey, having NASA continue its education and outreach efforts to increase student interest and participation in STEM education, improve public literacy in STEM, provide curriculum support materials and create support opportunities for professional development for STEM teachers. NASA is among the best in STEM education and outreach, and the provisions of the Manager's Amendment underscore that point.

The National Academies are engaged to provide a comprehensive study that reviews current and planned ground-based and space-based space weather monitoring requirements and capabilities, identifies gaps and identifies options for a robust and resilient capability. A NASA plan on its potential use of operational commercial reusable suborbital flight vehicles for carrying out scientific and engineering investigations and educational activities, and the development of a strategic plan for carrying out competitive, peer-reviewed, fundamental space life science and physical sciences and related technology research, among other activities, again, consistent with the priorities in the National Academies' Decadal Survey and a report describing NASA's activities, tools and techniques associated with the goal of servicing satellites using robotic spacecraft.

NASA is soliciting and reviewing in collaboration with other relevant Federal agencies, concepts and technological options for removing orbital debris from low-Earth orbit.

As you can see, the areas addressed in the Manager's Amendment are far-reaching and are reflective of hard work by staff on both sides of the aisle. Today we should be proud to have reached common ground for the full Committee markup. We are light years from where we began in 2013.

Mr. Chairman, I am really appreciative of the spirit of cooperation and can-do attitude that Members and staff on both sides have exhibited throughout the drafting process, often giving up our own individual pet projects or ideas for the whole, and I am grateful to you, to Ranking Member Johnson and Chairman Palazzo for your unwavering commitment to bring this bipartisan legislation to a close. I echo the chairman's thanks to our respective staff on the majority and the minority—Chris Shank, Tom Hammond, Jared Stout, Allison Rose-Sonnesyn and Gabriella Ra'anan—and to the personal staff of Mr. Palazzo—Megan Mitchell—and from our team on the minority—Dick Oherman, Pam Whitney, Allen Li—and my personal staff, Anne Nelson. And let me say also to all of our Members, I think each one of us on both sides of the aisle will have something to hang our hats on in support of this NASA authorization, and I thank you for the opportunity to work on it.

Chairman SMITH. Thank you, Ms. Edwards.

[The prepared statement of Ms. Edwards follows:]

PREPARED STATEMENT OF SUBCOMMITTEE ON SPACE RANKING MEMBER DONNA EDWARDS

Mr. Chairman, it has been said that a Nation's greatness is embodied in its space program.

In these uncertain times, we are fortunate to have the talented and dedicated men and women who make up the National Aeronautics and Space Administration as well as its partners in private industry and researchers in academia.

Despite challenging funding levels over the past few years, they have continued to persevere.

Even in these challenging times, NASA's accomplishments in human spaceflight, space science, aeronautics research, and space technology are the envy of other nations and a source of inspiration for all our citizens.

Congress can help NASA to maintain its position of preeminence.

Indeed, Congress has a critical role in providing not only the resources needed to meet the expectations of a multi-mission agency, but also in establishing a clear vision for NASA.

We took an important first step in our Subcommittee markup three weeks ago. I am proud of the Subcommittee-passed 2014 Authorization Act, particularly the provision requiring NASA to develop a Human Exploration Roadmap, a Roadmap that will enable the agency to define the specific capabilities and technologies needed to extend human presence to the surface of Mars, and the sets and sequences of missions required to demonstrate such capabilities and technologies.

Mr. Chairman, I was pleased that we achieved that markup milestone in a bipartisan manner with legislation covering a sizeable amount of NASA's roles and responsibilities. Moreover, I indicated that I was fully aware that we still had more work to do in a number of important areas.

I look forward to continuing our work on this authorization in a bipartisan fashion at today's Full Committee markup.

If there is no further discussion on the bill, we will now go to amendments on the bill, and the bill is open for that purpose. The first amendment on the roster is an amendment offered by Ms. Edwards and Mr. Palazzo, and the clerk will report the amendment.

The CLERK. Amendment to H.R. 4412 offered by Ms. Edwards of Maryland and Mr. Palazzo of Mississippi, amendment number 002. Page 14, line 2, strike "is to enable"——

[The amendment of Ms. Edwards and Mr. Palazzo appears in Appendix I]

Chairman SMITH. Without objection, the amendment will be considered as read, and the gentlewoman from Maryland, Ms. Edwards, is recognized first to explain the amendment.

Ms. EDWARDS. Thank you, Mr. Chairman.

As you could hear from my statement, there are many things that we can point to in the amendment that really clear up some of the issues that we were working on from the Subcommittee markup. We were able to incorporate, you can see in the Manager's Amendment, some ideas that actually had come and been approved earlier by both Republican Members and Democrats, and we incorporated those into the Manager's Amendment, and so with that, I would conclude my statement because I think it is time to move forward with the markup.

Chairman SMITH. Thank you, Ms. Edwards.

The gentleman from Mississippi, Mr. Palazzo.

Mr. PALAZZO. Thank you, Mr. Chairman.

I want to echo the words of Ms. Edwards, the Ranking Member of the Space Subcommittee. This truly is a bipartisan agreement. We can all be proud of the great work of the Subcommittee and full Committee has done to be inclusive of Members on both sides of the aisle.

The Manager's Amendment before us today includes those outstanding items that were unresolved prior to the Subcommittee markup three weeks ago. Since that time, Chairman Smith and I have been working with the Ranking Members to come to an agreement on what additional provisions could be compiled into the Manager's Amendment.

In compiling this amendment, we were very careful to ensure that the spirit of the bipartisan Subcommittee bill was not compromised. The various provisions contained in the Manager's Amendment were meticulously discussed before they were included in our agreement.

The Manager's Amendment continues to build on the Subcommittee's work to provide for a human exploration roadmap. NASA has

put forth several items proposed as a roadmap. In fact, I believe NASA is holding an open forum today describing NASA's human exploration path to Mars.

Unfortunately, many questions remain unanswered regarding NASA's way forward for deep space exploration. As of today, NASA has not provided the specific set of capabilities and technologies required to support a manned mission to Mars nor have they identified the mission sets necessary to demonstrate the proficiency of these capabilities. Congress is still waiting to hear how NASA would stage intermediate destinations, Mars mission risk areas and potential risk mitigation approaches.

Additionally, NASA has not described the process for involving the fully integrated Orion crew capsule with the Space Launch System. And finally, there is currently no framework for international cooperation or the potential risks posed by relying on international partners for items on the critical path of development. In short, for all of NASA's rhetoric about a roadmap, to date, we have seen very little substance to back it up.

This amendment includes important language on the development of next-generation liquid rocket engines. This provision will ensure that any next-generation liquid rocket engine developed for national security purposes takes into consideration the objectives of the Civil Space program as much as possible.

The United States already has a diverse portfolio of engines that reduce risk and ensure access to space. This language will provide for greater coordination on any new developments so that it will meet both national security and civil space needs.

While the base bill includes a section on relief from new onerous termination liability requirements, this amendment includes a provision to ensure timely notification to Congress should the Administration plan to cancel a program covered by the bill. The relief from termination liability costs will allow hundreds of millions of dollars to be freed up from bureaucracy and applied directly to program development work.

Orbital debris continues to pose serious risks to the operational space capabilities of the United States. In the NASA Authorization Act of 2010, Congress directed the Administration to coordinate with countries within the interagency Space Debris Coordination Committee to mitigate the effects and growth of orbital debris. However, the status of this coordination is unknown. The Manager's Amendment requires NASA to produce a report on these coordination efforts and a strategy to mitigate orbital debris.

The road to this agreement was not easy, and we still have work to do before a final product is done with the Senate. We are well on our way.

There are most certainly things from both sides that did not make it into this amendment. I know that I would have preferred a little bit more direction in the exploration sections and more oversight of the progress of SLS Orion development to make sure the Administration is on track.

And with that, I would like to once again, for the third time, thank Chairman Smith, Ms. Edwards and Ms. Johnson for their efforts in pulling together this agreement as well as all of our staff who labored over this bill, Megan Mitchell, who has faithfully ad-

vised me throughout the process, Rebecca Rounds, legal extern on space, Subcommittee staff Tom Hammond, Jared Stout, Allison Rose-Sonnesyn, Anne Nelson on Ms. Edwards' staff, and minority staffers Pam Whitney and Allen Li.

I look forward to continuing our work to pass this bill on the House Floor, and I am proud that we are able to put our names on a bipartisan bill for the sake of our Nation's space program, national pride and our national security.

Thank you, Mr. Chairman. I yield back.

Chairman SMITH. Thank you, Mr. Palazzo.

Let me make an offer to the Members, and it is this. Both the Ranking Member and I are willing to put into the record our statements on the Manager's Amendment. I know there are two Members, Ms. Esty, Mr. Kennedy, and perhaps others who have amendments that they were going to perhaps offer and withdraw. Let me say that the prospects of those being included on the House Floor are exceedingly great if they don't offer those amendments now, and I happen to agree with the substance of both, by the way, and I think they are good amendments and good improvements to the bill, but I would also like to finish up so we don't have to come back after the next series of votes. Ms. Esty, is that agreeable with you and Mr. Kennedy?

Ms. ESTY. Yes.

Chairman SMITH. I thank you both in that regard.

In that case, there are no further amendments and a reporting quorum being present, the question—oh, excuse me.

With no further discussion on the amendment, the question is on agreeing to the amendment offered by Ms. Edwards and Mr. Palazzo.

All in favor, say aye.

All those opposed, say no.

The ayes have it and the amendment is agreed to.

Since there are no further amendments, and a reporting quorum being present, the question is on the bill H.R. 4412 as amended.

Those in favor, say aye.

Opposed, nay.

The ayes have it and the bill as amended is ordered reported favorably.

Before I conclude with some boilerplate language, let me thank all Members for being here and for all being a part of a very successful markup and helping us advance a very, very important bill.

Without objection, the motion to reconsider is laid on the table, and I move that the bill H.R. 4412 as amended, be favorably reported to the House and staff be authorized to make any necessary technical and conforming changes, and without objection, so ordered.

Without any further business, we stand adjourned, and again, thanks to all the Members who are here today.

[Whereupon, at 1:55 p.m., the Committee was adjourned.]

Appendix I

H.R. 4412, THE NASA AUTHORIZATION ACT OF 2014

Section-by-Section Analysis, Amendments

Amendment Roster

H.R. 4412, AS AMENDED BY THE SUBCOMMITTEE ON SPACE ON APRIL 9, 2014

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the "National Aeronautics and Space Administration Authorization Act of 2014".

(b) TABLE OF CONTENTS.—The table of contents for 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 Administration.

(3) ORION CREW CAPSULE.—The term "Orion crew capsule" means the multipurpose crew vehicle described in section 303 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18323).

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

(5) SPACE LAUNCH SYSTEM.—The term "Space Launch System" means the follow-on Government-owned civil launch system developed, managed, and operated by the Administration to serve as a key component to expand human presence beyond low-Earth orbit, as described in section 302 of the Na-

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

TITLE I—AUTHORIZATION OF APPROPRIATIONS

SEC. 101. FISCAL YEAR 2014.

There are authorized to be appropriated to the Administration for fiscal year 2014 $17,646,500,000 as follows:

(1) For Space Exploration, $4,113,200,000, of which—

(A) $1,918,200,000 shall be for the Space Launch System, of which $318,200,000 shall be for Exploration Ground Systems;

(B) $1,197,000,000 shall be for the Orion crew capsule;

(C) $302,000,000 shall be for Exploration Research and Development; and

(D) $696,000,000 shall be for Commercial Crew Development activities.

(2) For Space Operations, $3,778,000,000, of which $2,984,100,000 shall be for the International Space Station Program.

(3) For Science, $5,151,200,000, of which—

(A) $1,826,000,000 shall be for Earth Science;

(B) $1,345,000,000 shall be for Planetary Science, of which $30,000,000 shall be for the Astrobiology Institute;

(C) $668,000,000 shall be for Astrophysics;

(D) $658,200,000 shall be for the James Webb Space Telescope; and

(E) $654,000,000 shall be for Heliophysics.

(4) For Aeronautics, $566,000,000.

(5) For Space Technology, $576,000,000.

(6) For Education, $116,600,000.

(7) For Cross-Agency Support, $2,793,000,000.

(8) For Construction and Environmental Compliance and Restoration, $515,000,000.

(9) For Inspector General, $37,500,000.

TITLE II—HUMAN SPACE FLIGHT

Subtitle A—Exploration

SEC. 201. SPACE EXPLORATION POLICY.

(a) POLICY.—Human exploration deeper into the solar system shall be a core mission of the Administration. It is the policy of the United States that the goal of the Administration's exploration program shall be to successfully conduct a crewed mission to the surface of Mars to begin human exploration of that planet. The use of the

surface of the Moon, cis-lunar space, near-Earth asteroids, Lagrangian points, and Martian moons may be pursued provided they are properly incorporated into the Human Exploration Roadmap described in section 70504 of title 51, United States Code.

(b) VISION FOR SPACE EXPLORATION.—Section 20302 of title 51, United States Code, is amended—

(1) by adding at the end the following:

"(c) DEFINITIONS.—In this section:

"(1) ORION CREW CAPSULE.—The term 'Orion crew capsule' means the multipurpose crew vehicle described in 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 the follow-on Government-owned civil launch system developed, managed, and operated by the Administration to serve as a key component to expand human presence beyond low-Earth orbit, as described in section 302 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322).".

(c) 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" after the 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 accelerate the development of capabilities to enable a human exploration mission to the surface of Mars and beyond through the prioritization of those technologies and capabilities best suited for such a mission in accordance with the Human Exploration Roadmap under section 70504 of title 51, United States Code.".

(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 CAPABILITIES.—

"(1) IN GENERAL.—NASA may not obtain non-United States human space flight capabilities unless no domestic commercial or public-private partnership provider that the Administrator has determined to meet safety and affordability requirements estab-

lished by NASA for the transport of its astronauts is available to provide such capabilities.

"(2) DEFINITION.—For purposes of this subsection, the term 'domestic commercial provider' means a person providing space transportation services or other space-related activities, the majority control of which is held by persons other than a Federal, State, local, or foreign government, foreign company, or foreign national.".

(e) REPEAL OF 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.

SEC. 202. STEPPING STONE APPROACH TO EXPLORATION.

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

"§ 70504. Stepping stone approach to exploration

"(a) IN GENERAL.—In order to maximize the cost effectiveness of the long-term space exploration and utilization activities of the United States, the Administrator

shall direct the Human Exploration and Operations Mission Directorate, or its successor division, to develop a Human Exploration Roadmap to define the specific capabilities and technologies necessary to extend human presence to the surface of Mars and the sets and sequences of missions required to demonstrate such capabilities and technologies.

"(b) INTERNATIONAL PARTICIPATION.—The President should invite the United States partners in the International Space Station program and other nations, as appropriate, to participate in an international initiative under the leadership of the United States to achieve the goal of successfully conducting a crewed mission to the surface of Mars.

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

"(1) include the specific set of capabilities and technologies that contribute to extending human presence to the surface of Mars and the sets and sequences of missions necessary to demonstrate the proficiency of these capabilities and technologies with an emphasis on using or not using the International Space Station, lunar landings, cis-lunar space, trans-lunar space, Lagrangian points, and the natural satellites of Mars, Phobos and Deimos, as

testbeds, as necessary, and shall include the most appropriate process for developing such capabilities and technologies;

"(2) 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 International Space Station activities, and planned international collaborative activities, potential commercial contributions, and other activities relevant to the achievement of the goal established in section 201(a) of the National Aeronautics and Space Administration Authorization Act of 2014;

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

"(4) provide a specific process for the evolution of the capabilities of the fully integrated Orion crew capsule with the Space Launch System and how these systems demonstrate the capabilities and technologies described in paragraph (1);

"(5) provide a description of the capabilities and technologies that need to be demonstrated or research data that could be gained through the utilization of the International Space Station and the status of the development of such capabilities and technologies;

"(6) describe a framework for international cooperation in the development of all technologies and capabilities required in this section, as well as an assessment of the risks posed by relying on international partners for capabilities and technologies on the critical path of development;

"(7) describe a process for utilizing nongovernmental entities for future human exploration beyond trans-lunar space and specify what, if any, synergy could be gained from—

"(A) partnerships using Space Act Agreements (as defined in section 2 of the National Aeronautics and Space Administration Authorization Act of 2014); or

"(B) other acquisition instruments;

"(8) include in the Human Exploration Roadmap an addendum from the National Aeronautics and Space Administration Advisory Council, and an addendum from the Aerospace Safety Advisory

Panel, each with a statement of review of the Human Exploration Roadmap that shall include—

"(A) subjects of agreement;

"(B) areas of concern; and

"(C) recommendations; and

"(9) include in the Human Exploration Roadmap an examination of the benefits of utilizing current Administration launch facilities for trans-lunar missions.

"(d) UPDATES.—The Administrator shall update such Human Exploration Roadmap as needed but no less frequently than every 2 years and include it in the budget for that fiscal year transmitted to Congress under section 1105(a) of title 31, and describe—

"(1) the achievements and goals reached in the process of developing such capabilities and technologies during the 2-year period prior to the submission of the update to Congress; and

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

"(e) DEFINITIONS.—In this section, the terms 'Orion crew capsule' and 'Space Launch System' have the meanings given such terms in section 20302.".

(b) REPORT.—

(1) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit a copy of the Human Exploration Roadmap developed under section 70504 of title 51, United States Code, to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(2) UPDATES.—The Administrator shall transmit a copy of each updated Human Exploration Roadmap to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 7 days after such Human Exploration Roadmap is updated.

SEC. 203. SPACE LAUNCH SYSTEM.

(a) FINDINGS.—Congress finds that—

(1) the Space Launch System is the most practical approach to reaching the Moon, Mars, and beyond, and Congress reaffirms the policy and minimum capability requirements for the Space Launch System contained in section 302 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322);

(2) the primary goal for the design of the fully integrated Space Launch System is to 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)); and

(3) In order to promote safety and reduce programmatic risk, the Administrator shall budget for and undertake a robust ground test and uncrewed and crewed flight test and demonstration program for the Space Launch System and the Orion crew capsule and shall budget for an operational flight rate sufficient to maintain safety and operational readiness.

(b) SENSE OF CONGRESS.—It is the sense of Congress that the President's annual budget requests for the Space Launch System and Orion crew capsule development, test, and operational phases should strive to accurately reflect the resource requirements of each of those phases, consistent with the policy established in section 201(a) of this Act.

(c) IN GENERAL.—Given the critical importance of a heavy-lift launch vehicle and crewed spacecraft to enable the achievement of the goal established in section 201(a)

of this Act, as well as the accomplishment of intermediate exploration milestones and the provision of a backup capability to transfer crew and cargo to the International Space Station, the Administrator shall make the expeditious development, test, and achievement of operational readiness of the Space Launch System and the Orion crew capsule the highest priority of the exploration program.

(d) GOVERNMENT ACCOUNTABILITY OFFICE REVIEW.—Not later than 270 days after the date of enactment of this Act, the Comptroller General shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the Administration's acquisition of ground systems in support of the Space Launch System. The report shall assess the extent to which ground systems acquired in support of the Space Launch System are focused on the direct support of the Space Launch System and shall identify any ground support projects or activities that the Administration is undertaking that do not solely or primarily support the Space Launch System.

(e) UTILIZATION REPORT.—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)). This report shall also include consideration of the technical requirements of the scientific and national security communities related to such Space Launch System and shall directly assess the utility and estimated cost savings obtained by using such Space Launch System for national security and space science missions. The Administrator shall transmit such report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 180 days after the date of enactment of this Act.

(f) NAMING COMPETITION.—Beginning not later than 180 days after the date of enactment of this Act and concluding not later than 1 year after such date of enactment, the Administrator shall conduct a well-publicized competition among students in elementary and secondary schools to name the elements of the Administration's exploration program, including—

(1) a name for the deep space human exploration program as a whole, which includes the Space

Launch System, the Orion crew capsule, and future missions; and

(2) a name for the Space Launch System.

(g) ADVANCED BOOSTER COMPETITION.—

(1) REPORT.—Not later than 90 days after the date of enactment of this Act, the Associate Administrator of the Administration shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report that—

(A) describes the estimated total development cost of an advanced booster for the Space Launch System;

(B) details any reductions or increases to the development cost of the Space Launch System which may result from conducting a competition for an advanced booster; and

(C) outlines any potential schedule delay to the Space Launch System 2017 Exploration Mission–1 launch as a result of increased costs associated with conducting a competition for an advanced booster.

(2) COMPETITION.—If the Associate Administrator reports reductions pursuant to paragraph

(1)(B), and no adverse schedule impact pursuant to paragraph (1)(C), then the Administration shall conduct a full and open competition for an advanced booster for the Space Launch System to meet the requirements described in section 302(c) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18322(c)), to begin not later than 1 year after the Associate Administrator transmits the report required under paragraph (1).

SEC. 204. ORION CREW CAPSULE.

(a) IN GENERAL.—The Orion crew capsule shall meet the practical needs and the minimum capability requirements described in section 303 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18323).

(b) REPORT.—Not later than 60 days after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate—

(1) detailing those components and systems of the Orion crew capsule that ensure it is in compli-

ance with section 303(b) of such Act (42 U.S.C. 18323(b));

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

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

SEC. 205. SPACE RADIATION.

(a) STRATEGY AND PLAN.—

(1) IN GENERAL.—The Administrator shall develop a space radiation mitigation and management strategy and implementation plan to enable the achievement of the goal established in section 201 that includes key research and monitoring requirements, milestones, a timetable, and an estimate of facility and budgetary requirements.

(2) COORDINATION.—The strategy shall include a mechanism for coordinating Administration research, technology, facilities, engineering, operations, and other functions required to support the strategy and plan.

(3) TRANSMITTAL.—Not later than 1 year after the date of enactment of this Act, the Administrator shall transmit the strategy and plan to the Com-

mittee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(b) SPACE RADIATION RESEARCH FACILITIES.—The Administrator, in consultation with the heads of other appropriate Federal agencies, shall assess the national capabilities for carrying out critical ground-based research on space radiation biology and shall identify any issues that could affect the ability to carry out that research.

SEC. 206. PLANETARY PROTECTION FOR HUMAN EXPLORATION MISSIONS.

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

(b) SCOPE.—The study shall—

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

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

(3) develop a methodology, if possible, for defining and classifying the degree of concern associated with each likely destination;

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

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

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

Subtitle B—Space Operations

SEC. 211. INTERNATIONAL SPACE STATION.

(a) IN GENERAL.—The following is the policy of the United States:

(1) The United States International Space Station program shall have two primary objectives: supporting achievement of the goal established in section 201 of this Act and pursuing a research pro-

gram that advances knowledge and provides benefits to the Nation. It shall continue to be the policy of the United States to, in consultation with its international partners in the International Space Station program, support full and complete utilization of the International Space Station.

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

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

(A) take all necessary measures to support the operation and full utilization of the International Space Station; and

(B) seek to minimize, to the extent practicable, the operating costs of the International Space Station.

(4) Reliance on foreign carriers for crew transfer is unacceptable, and the Nation's human space flight program must acquire the capability to launch United States astronauts on United States rockets

from United States soil as soon as is safe and practically possible, whether on Government-owned and operated space transportation systems or privately owned systems that have been certified for flight by the appropriate Federal agencies.

(b) REAFFIRMATION OF POLICY.—Congress reaffirms—

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

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

(3) that the Orion crew capsule shall provide an alternative means of delivery of crew and cargo to the International Space Station, in the event other vehicles, whether commercial vehicles or partner-sup-

plied vehicles, are unable to perform that function; and

(4) the policy stated in section 501(b) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18351(b)) that the Administration shall pursue international, commercial, and intragovernmental means to maximize International Space Station logistics supply, maintenance, and operational capabilities, reduce risks to International Space Station systems sustainability, and offset and minimize United States operations costs relating to the International Space Station.

(c) ASSURED ACCESS TO LOW-EARTH ORBIT.—Section 70501(a) of title 51, United States Code, is amended to read as follows:

"(a) POLICY STATEMENT.—It is the policy of the United States to maintain an uninterrupted capability for human space flight and operations in low-Earth orbit, and beyond, as an essential instrument of national security and the capability to ensure continued United States participation and leadership in the exploration and utilization of space.".

(d) REPEALS.—

(1) USE OF SPACE SHUTTLE OR ALTERNATIVES.—Chapter 701 of title 51, United States

Code, and the item relating to such chapter in the table of chapters for such title, are repealed.

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

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

(e) EXTENSION CRITERIA REPORT.—Not later than 1 year after the date of enactment of this Act, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the feasibility of extending the operation of the International Space Station that includes—

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

(2) any necessary contributions to enabling execution of the Human Exploration Roadmap developed under section 70504 of title 51, United States Code;

(3) cost estimates for operating the International Space Station to achieve the criteria required under paragraph (1);

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

(5) an assessment of how the defined criteria under paragraph (1) respond to the National Academies Decadal Survey on Biological and Physical Sciences in Space; and

(6) an identification of the actions and cost estimate needed to deorbit the International Space Station once a decision is made to deorbit the laboratory.

(f) STRATEGIC PLAN FOR INTERNATIONAL SPACE STATION RESEARCH.—

(1) IN GENERAL.—The Director of the Office of Science and Technology Policy, in consultation with the Administrator, academia, other Federal agencies, the International Space Station National Laboratory Advisory Committee, and other potential stakeholders, shall develop and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a strategic plan for conducting competitive, peer-reviewed

research in physical and life sciences and related technologies on the International Space Station through at least 2020.

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

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

(B) provide a research timeline and identify resource requirements for its implementation, including the facilities and instrumentation necessary for the conduct of such research; and

(C) identify—

(i) criteria for the proposed research, including—

(I) a justification for the research to be carried out in the space microgravity environment;

(II) the use of model systems;

(III) the testing of flight hardware to understand and ensure its functioning in the microgravity environment;

(IV) the use of controls to help distinguish among the direct and indirect effects of microgravity, among other effects of the flight or space environment;

(V) approaches for facilitating data collection, analysis, and interpretation;

(VI) procedures to ensure repetition of experiments, as needed;

(VII) support for timely presentation of the peer-reviewed results of the research;

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

(IX) how these activities enable the Human Exploration Roadmap described in section 70504 of title 51, United States Code;

(ii) instrumentation required to support the measurements and analysis of the research to be carried out under the strategic plan;

(iii) the capabilities needed to support direct, real-time communications between

astronauts working on research experiments onboard the International Space Station and the principal investigator on the ground;

(iv) a process for involving the external user community in research planning, including planning for relevant flight hardware and instrumentation, and for utilization of the International Space Station, free flyers, or other research platforms;

(v) the acquisition strategies the Administration plans to use to acquire any new capabilities which are not operational on the International Space Station as of the date of enactment of this Act and which have an estimated total life cycle cost of $10,000,000 or more, along with a justification of any anticipated use of less than full and open competition and written approval therefor from the Administration's Assistant Administrator for Procurement; and

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

(3) REPORT.—

(A) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Comptroller General of the United States shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the progress of the organization chosen for the management of the International Space Station National Laboratory as directed in section 504 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18354).

(B) SPECIFIC REQUIREMENTS.—The report shall assess the management, organization, and performance of such organization and shall include a review of the status of each of the 7 required activities listed in section 504(c) of such Act (42 U.S.C. 18354(c)).

SEC. 212. COMMERCIAL CREW PROGRAM.

(a) SENSE OF CONGRESS.—It is the sense of Congress that once developed and certified to meet the Administration's safety and reliability requirements, United States commercially provided crew transportation systems offer the potential of serving as the primary means of

transporting American astronauts and international partner astronauts to and from the International Space Station and serving as International Space Station emergency crew rescue vehicles. At the same time, the budgetary assumptions used by the Administration in its planning for the Commercial Crew Program have consistently assumed significantly higher funding levels than have been authorized and appropriated by Congress. It is the sense of Congress that credibility in the Administration's budgetary estimates for the Commercial Crew Program can be enhanced by an independently developed cost estimate. Such credibility in budgetary estimates is an important factor in understanding program risk.

(b) OBJECTIVE.—The objective of the Administration's Commercial Crew Program shall be to assist the development of at least one crew transportation system to carry Administration astronauts safely, reliably, and affordably to and from the International Space Station and to serve as an emergency crew rescue vehicle as soon as practicable within the funding levels authorized. The Administration shall not use any considerations beyond this objective in the overall acquisition strategy.

(c) SAFETY.—Consistent with the findings and recommendations of the Columbia Accident Investigation Board, the Administration shall—

(1) ensure that, in its evaluation and selection of contracts for the development of commercial crew transportation capabilities, safety is the highest priority; and

(2) seek to ensure that minimization of the probability of loss of crew shall be an important selection criterion of the Commercial Crew Transportation Capability Contract.

(d) 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.

(e) TRANSPARENCY.—Transparency is the cornerstone of ensuring a safe and reliable commercial crew transportation service to the International Space Station. The Administrator shall, to the greatest extent practicable, ensure that every commercial crew transportation services provider has provided evidence-based support for their costs and schedule.

(f) INDEPENDENT COST AND SCHEDULE ESTIMATE.—

(1) REQUIREMENT.—Not later than 30 days after the Federal Acquisition Regulation-based contract for the Commercial Crew Transportation Capa-

bility Contract is awarded, the Administrator shall arrange for the initiation of an Independent Cost and Schedule Estimate for—

(A) all activities associated with the development, test, demonstration, and certification of commercial crew transportation systems;

(B) transportation and rescue services required by the Administration for International Space Station operations through calendar year 2020 or later if Administration requirements so dictate; and

(C) the estimated date of operational readiness for the program each assumption listed in paragraph (2) of this subsection.

(2) ASSUMPTIONS.—The Independent Cost and Schedule Estimate shall provide an estimate for each of the following scenarios:

(A) An appropriation of $600,000,000 over the next 3 fiscal years.

(B) An appropriation of $700,000,000 over the next 3 fiscal years.

(C) An appropriation of $800,000,000 over the next 3 fiscal years.

(D) The funding level assumptions over the next 3 fiscal years that are included as part

of commercial crew transportation capability contract awards.

(3) TRANSMITTAL.—Not later than 180 days after initiation of the Independent Cost and Schedule Estimate under paragraph (1), the Administrator shall transmit the results of the Independent Cost and Schedule Estimate to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(g) IMPLEMENTATION STRATEGIES.—

(1) REPORT.—Not later than 60 days after the completion of the Independent Cost and Schedule Estimate under subsection (f), the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report containing 4 distinct implementation strategies based on such Independent Cost and Schedule Estimate for the final stages of the commercial crew program.

(2) REQUIREMENTS.—These options shall include—

(A) a strategy that assumes an appropriation of $600,000,000 over the next 3 fiscal years;

(B) a strategy that assumes an appropriation of $700,000,000 over the next 3 fiscal years;

(C) a strategy that assumes an appropriation of $800,000,000 over the next 3 fiscal years; and

(D) a strategy that has yet to be considered previously in any budget submission but that the Administration believes could ensure the flight readiness date of 2017 for at least one provider.

(3) INCLUSIONS.—Each strategy shall include the contracting instruments the Administration will employ to acquire the services in each phase of development or acquisition and the number of commercial providers the Administration will include in the program.

TITLE III—SCIENCE

Subtitle A—General

SEC. 301. SCIENCE PORTFOLIO.

(a) BALANCED AND ADEQUATELY FUNDED ACTIVITIES.—Section 803 of the National Aeronautics and Space

Administration Authorization Act of 2010 (124 Stat. 2832) is amended to read as follows:

"SEC. 803. OVERALL SCIENCE PORTFOLIO—SENSE OF THE CONGRESS.

"Congress reaffirms its sense, expressed in the National Aeronautics and Space Administration Authorization Act of 2010, that a balanced and adequately funded set of activities, consisting of research and analysis grants programs, technology development, small, medium, and large space missions, and suborbital research activities, contributes to a robust and productive science program and serves as a catalyst for innovation and discovery.".

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

SEC. 302. RADIOISOTOPE POWER SYSTEMS.

(a) SENSE OF CONGRESS.—It is the sense of Congress that conducting deep space exploration requires radioisotope power systems, and establishing continuity in the production of the material needed to power these systems is paramount to the success of these future deep space missions. It is further the sense of Congress that

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 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;

(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) TRANSMITTAL.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit the results of the analysis to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 303. CONGRESSIONAL DECLARATION OF POLICY AND PURPOSE.

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

"(10) The direction of the unique competence of the Administration to the search for life's origin,

evolution, distribution, and future in the Universe. In carrying out this objective, the Administration may use any practicable ground-based, airborne, or space-based technical means and spectra of electromagnetic radiation.".

Subtitle B—Astrophysics

SEC. 311. DECADAL CADENCE.

In carrying out section 301(b), the Administrator shall seek to ensure to the extent practicable a steady cadence of large, medium, and small astrophysics missions.

SEC. 312. EXTRASOLAR PLANET EXPLORATION STRATEGY.

(a) STRATEGY.—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. Such strategy shall—

(1) outline key scientific questions;

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

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

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

(5) make recommendations on the above as appropriate.

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

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

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

(c) REPORT TO CONGRESS.—Not later than 18 months after the date of enactment of this Act, the National Academies shall transmit a report to the Administrator, and to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, containing the strategy developed under subsection (a).

SEC. 313. JAMES WEBB SPACE TELESCOPE.

It is the sense of Congress that—

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

(2) the James Webb Space Telescope will enable American scientists to maintain their leadership in astrophysics and other disciplines;

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

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

(5) maintaining this progress will require the Administrator to 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 prior to launch.

SEC. 314. NATIONAL RECONNAISSANCE OFFICE TELESCOPE DONATION.

Not later than 90 days after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate outlining the cost of the Administration's potential plan for developing the Wide-Field Infrared Survey Telescope as described in the 2010 National Academies' astronomy and

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

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

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

(3) an assessment of how the Administration's existing science missions will be affected by the utilization of the donated asset described in this section; and

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

Subtitle C—Planetary Science

SEC. 321. DECADAL CADENCE.

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

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

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

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

SEC. 322. NEAR-EARTH OBJECTS.

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

(1) Near-Earth objects pose a serious and credible threat to humankind, as many scientists believe that a major asteroid or comet was responsible for the mass extinction of the majority of the Earth's species, including the dinosaurs, approximately 65,000,000 years ago.

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

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

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

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

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

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

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

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

(2) 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.—Subsequent to the initial report the Administrator shall annually transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report that provides—

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

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

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

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

(2) 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 this Act, the Administrator shall transmit the results of the assessment carried out under subsection (g) to the Committee on Science, Space, and Technology of the House of Representatives and the Com-

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

SEC. 323. 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 the Survey program.

(b) REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, Transportation of the Senate a report describing how the Administration can expand collaborative partnerships to detect, track, catalogue, and categorize near-Earth objects.

SEC. 324. ASTROBIOLOGY STRATEGY.

(a) STRATEGY.—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. 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 transmit a report to the Administrator, and to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, containing the strategy developed under subsection (a).

SEC. 325. ASTROBIOLOGY PUBLIC-PRIVATE PARTNERSHIPS.

Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, Transportation of the Senate a report describing how the Administration can expand collaborative partnerships to study life's origin, evolution, distribution, and future in the Universe.

SEC. 326. ASSESSMENT OF MARS ARCHITECTURE.

(a) ASSESSMENT.—The Administrator shall enter into an arrangement with the National Academies to assess—

(1) the Administration's revised post-2016 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 architecture's relationship to Mars-related activities to be undertaken by agencies and organizations outside of the United States; and

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

(b) TRANSMITTAL.—Not later than 18 months after the date of enactment of this Act, the Administrator shall transmit the results of the assessment to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

Subtitle D—Heliophysics

SEC. 331. DECADAL CADENCE.

In carrying out section 301(b), the Administrator shall seek to ensure to the extent practicable a steady cadence of large, medium, and small heliophysics missions.

Subtitle E—Earth Science

SEC. 341. REIMBURSEMENT FOR ADDITIONAL RESPONSIBILITIES.

It is the sense of Congress that the Administration is being asked to undertake important Earth science activities in an environment of increasingly constrained fiscal resources, and that any transfer of additional responsibilities to the Administration, such as climate instrument development and measurements that are currently part of the portfolio of the National Oceanic and Atmospheric Administration, should be accompanied by the provision of additional resources to allow the Administration to carry out the increased responsibilities without adversely impacting its implementation of its existing Earth science programs and priorities.

TITLE IV—AERONAUTICS

SEC. 401. SENSE OF CONGRESS.

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 and leverage resources; and

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

SEC. 402. AERONAUTICS RESEARCH GOALS.

The Administrator shall ensure that the Administration maintains a strong aeronautics research portfolio ranging from fundamental research through integrated systems research with specific research goals, including the following:

(1) ENHANCE AIRSPACE OPERATIONS AND SAFETY.—The Administration's Aeronautics Research Mission Directorate shall address research

needs of the Next Generation Air Transportation System and identify critical gaps in technology which must be bridged to enable the implementation of the Next Generation Air Transportation System so that safety and productivity improvements can be achieved as soon as possible.

(2) IMPROVE AIR VEHICLE PERFORMANCE.—The Administration's Aeronautics Research Mission Directorate shall conduct research to improve aircraft performance and minimize environmental impacts. The Associate Administrator for the Aeronautics Research Mission Directorate shall consider and pursue concepts to reduce noise, emissions, and fuel consumption while maintaining high safety standards, and shall conduct research related to the impact of alternative fuels on the safety, reliability and maintainability of current and new air vehicles.

(3) STRENGTHEN AVIATION SAFETY.—The Administration's Aeronautics Research Mission Directorate shall proactively address safety challenges associated with current and new air vehicles and with operations in the Nation's current and future air transportation system.

(4) DEMONSTRATE CONCEPTS AT THE SYSTEM LEVEL.—The Administration's Aeronautics Research

Mission Directorate shall mature the most promising technologies to the point at which they can be demonstrated in a relevant environment and shall integrate individual components and technologies as appropriate to ensure that they perform in an integrated manner as well as they do when operated individually.

SEC. 403. UNMANNED AERIAL SYSTEMS RESEARCH AND DEVELOPMENT.

(a) IN GENERAL.—The Administrator, in consultation with the Administrator of the Federal Aviation Administration and other Federal agencies, shall carry out research and technological development to facilitate the safe integration of unmanned aerial systems into the National Airspace System, including—

(1) positioning and navigation systems;

(2) sense and avoid capabilities;

(3) secure data and communication links;

(4) flight recovery systems; and

(5) human systems integration.

(b) ROADMAP.—The Administrator shall update a roadmap for unmanned aerial systems research and development and transmit this roadmap to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science,

and Transportation of the Senate not later than 180 days after the date of enactment of this Act.

(c) COOPERATIVE UNMANNED AERIAL VEHICLE ACTIVITIES.—Section 31504 of title 51, United States Code, is amended by inserting "Operational flight data derived from these cooperative agreements shall be made available, in appropriate and usable formats, to the Administration and the Federal Aviation Administration for the development of regulatory standards." after "in remote areas.".

SEC. 404. RESEARCH PROGRAM ON COMPOSITE MATERIALS USED IN AERONAUTICS.

(a) PURPOSE OF RESEARCH.—The Administrator shall continue the Administration's cooperative research program with industry to identify and demonstrate more effective and safe ways of developing, manufacturing, and maintaining composite materials for use in airframes, subsystems, and propulsion components.

(b) CONSULTATION.—The Administrator, in overseeing the Administration's work on composite materials, shall consult with relevant Federal agencies and partners in industry to accelerate safe development and certification processes for new composite materials and design methods while maintaining rigorous inspection of new composite materials.

(c) REPORT.—Not later than 1 year after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate detailing the Administration's work on new composite materials and the coordination efforts among Federal agencies.

SEC. 405. HYPERSONIC RESEARCH.

Not later than 1 year after the date of enactment of this Act, the Administrator, in consultation with other Federal agencies, shall develop and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a research and development roadmap for hypersonic aircraft research with the objective of exploring 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. The roadmap shall prescribe appropriate agency contributions, coordination efforts, and technology milestones.

SEC. 406. 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.—Not later than 1 year after the date of enactment of this Act, the Administrator shall develop and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a roadmap that allows for flexible funding profiles for supersonic aeronautics research and development with the objective of developing and demonstrating, 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. The roadmap shall include—

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

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

(3) a research plan to address such challenges, as well as a project timeline for accomplishing relevant research goals;

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

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

SEC. 407. RESEARCH ON NEXTGEN AIRSPACE MANAGEMENT CONCEPTS AND TOOLS.

(a) IN GENERAL.—The Administrator shall, in consultation with other Federal agencies, review at least annually the alignment and timing of the Administration's research and development activities in support of the NextGen airspace management modernization initiative, and shall make any necessary adjustments by reprioritizing or retargeting the Administration's research

and development activities in support of the NextGen initiative.

(b) ANNUAL REPORTS.—The Administrator shall report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate annually regarding the progress of the Administration's research and development activities in support of the NextGen airspace management modernization initiative, including details of technologies transferred to relevant Federal agencies for eventual operation implementation, consultation with other Federal agencies, and any adjustments made to research activities.

SEC. 408. ROTORCRAFT RESEARCH.

Not later than 1 year after the date of enactment of this Act, the Administrator, in consultation with other Federal agencies, shall prepare and transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a roadmap for research relating to rotorcraft and other runway-independent air vehicles, with the objective of developing and demonstrating improved safety, noise, and environmental impact in a relevant environment. The roadmap shall include specific goals for the research, a timeline for imple-

mentation, metrics for success, and guidelines for collaboration and coordination with industry and other Federal agencies.

SEC. 409. TRANSFORMATIVE AERONAUTICS RESEARCH.

It is the sense of Congress that the Administrator, in looking strategically into the future and ensuring that the Administration's Center personnel are at the leading edge of aeronautics research, should encourage investigations into the early-stage advancement of new processes, novel concepts, and innovative technologies that have the potential to meet national aeronautics needs. The Administrator shall continue to ensure that awards for the investigation of these concepts and technologies are open for competition among Administration civil servants at its Centers, separate from other awards open only to non-Administration sources.

SEC. 410. STUDY OF UNITED STATES LEADERSHIP IN AERONAUTICS RESEARCH.

(a) STUDY.—The Administrator shall enter into an arrangement with the National Academies for a study to benchmark the position of the United States in civil aeronautics research compared to the rest of the world. The study shall—

(1) seek to define metrics by which relative leadership in civil aeronautics research can be determined;

(2) ascertain how the United States compares to other countries in the field of civil aeronautics research and any relevant trends; and

(3) provide recommendations on what can be done to regain or retain global leadership, including—

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

(B) defining appropriate roles for the Administration;

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

(D) estimating the impact on the Administration's budget should such recommendations be implemented.

(b) REPORT.—Not later than 18 months after the date of enactment of this Act, the Administrator shall provide the results of the study to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

TITLE V—SPACE TECHNOLOGY

SEC. 501. SENSE OF CONGRESS.

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

(1) enabling a new class of Administration missions beyond low-Earth orbit;

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

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

SEC. 502. SPACE TECHNOLOGY PROGRAM.

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

"§ 70507. Space Technology Program authorized

"(a) PROGRAM AUTHORIZED.—The Administrator shall establish a Space Technology Program to pursue the research and development of advanced space technologies that have the potential of delivering innovative solutions and to support human exploration of the solar system or advanced space science. The program established by the Administrator shall take into consideration the recommendations of the National Academies' review of the Administration's Space Technology roadmaps and prior-

ities, as well as applicable enabling aspects of the Human Exploration Roadmap specified in section 70504. In conducting the space technology program established under this section, the Administrator shall—

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

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

"(3) undertake partnerships with other Federal agencies, universities, private industry, and other spacefaring nations, as appropriate.

"(b) 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 Space Technology Program.

"(c) NONDUPLICATION CERTIFICATION.—The Administrator shall include in the budget for each fiscal year, as transmitted to Congress under section 1105(a) of title 31, a certification that no project, program, or mission undertaken by the Space Technology Program is duplica-

tive of any other project, program, or mission conducted by another office or directorate of the Administration.".

(b) COLLABORATION, COORDINATION, AND ALIGNMENT.—The Administrator shall 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 and that results from such work are shared and leveraged within the Administration. Projects, programs, and activities 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. The Administrator shall ensure that 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. The Administrator shall provide the rationale in the report specified in subsection (d).

(c) REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall provide to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report comparing the Administration's space technology invest-

ments 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. The Administrator shall identify how the Administration will address any gaps between the agency's investments and the recommended technology areas, including a projection of funding requirements.

(d) 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.

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

"70507. Space Technology Program authorized.".

SEC. 503. UTILIZATION OF THE INTERNATIONAL SPACE STATION FOR TECHNOLOGY DEMONSTRATIONS.

The Administrator shall utilize the International Space Station and commercial services for space technology demonstration missions in low-Earth orbit whenever it is practical and cost effective to do so.

TITLE VI—POLICY PROVISIONS

SEC. 601. ASTEROID RETRIEVAL MISSION.

(a) ASTEROID RETRIEVAL REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall provide to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the proposed Asteroid Retrieval Mission. Such report shall include—

(1) a detailed budget profile, including cost estimates for the development of all necessary technologies and spacecraft required for the mission;

(2) a detailed technical plan that includes milestones and a specific schedule;

(3) a description of the technologies and capabilities anticipated to be gained from the proposed mission that will enable future human missions to Mars which could not be gained by lunar missions;

(4) a description of the technologies and capabilities anticipated to be gained from the proposed mission that will enable future planetary defense missions, against impact threats from near-Earth objects equal to or greater than 140 meters in diameter, which could not be gained by robotic missions; and

(5) a complete assessment by the Small Bodies Assessment Group and the National Aeronautics and Space Administration Advisory Council of how the proposed mission is in the strategic interests of the United States in space exploration.

(b) MARS FLYBY REPORT.—Not later than 60 days after the date of enactment of this Act, an independent, private systems engineering and technical assistance organization contracted by the Human Exploration Operations Mission Directorate shall transmit to the Administrator, the Committee on Science, Space, and Technology of the House of Representatives, and the Committee on Commerce, Science, and Transportation of the Senate a report analyzing the proposal for a Mars Flyby human spaceflight mission to be launched in 2021. Such report shall include—

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

(2) a description of the benefits in scientific knowledge and technologies demonstrated by a Mars Flyby mission to be launched in 2021 suitable for future Mars missions; and

(3) an annual budget profile, including cost estimates, for the development test, fielding, and operations plan to carry out a Mars Flyby mission through 2021 and comparison of that budget profile to the 5-year budget profile contained in the President's Budget request for fiscal year 2015.

(c) ASSESSMENT.—Not later than 60 days after transmittal of the report specified in subsection (b), the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate an assessment by the National Aeronautics and Space Administration Advisory Council of whether the proposal for a Mars Flyby Mission to be launched in 2021 is in the strategic interests of the United States in space exploration.

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

SEC. 602. TERMINATION LIABILITY.

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

(1) The International Space Station, the Space Launch System, and the Orion crew capsule will en-

able the Nation to continue operations in low-Earth orbit and to send its astronauts to deep space. The James Webb Space Telescope will revolutionize our understanding of star and planet formation and how galaxies evolved and advance the search for the origins of our universe. 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.

(2) In addition, 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. As a result, hundreds of millions of taxpayer dollars are unavailable for meaningful work on these programs.

(3) According to the Government Accountability Office, the Administration procures most of its goods and services through contracts, and it terminates very few of them. In fiscal year 2010, the Administration terminated 28 of 16,343 active contracts and orders—a termination rate of about 0.17 percent.

(4) Providing processes requiring congressional notification on termination of these high-priority programs would enable contractors to apply taxpayer dollars to making maximum progress in meeting the established technical goals and schedule milestones of these programs.

(b) ADMINISTRATION TERMINATION LIABILITY.—

(1) GENERAL RULE.—Termination liability costs for a covered program shall be provided only pursuant to this subsection.

(2) PROHIBITION ON RESERVING FUNDS.—The Administrator may not reserve funds from amounts appropriated for a covered program, or require the reservation of funds by the prime contractor, for potential termination liability costs with respect to a covered program.

(3) INTENT OF CONGRESS.—It is the intent of Congress that funds authorized to be appropriated for covered programs be applied in meeting established technical goals and schedule milestones.

(4) APPLICATION OF PRIOR RESERVED FUNDS.—Funds that have been reserved before the date of enactment of this Act for potential termination liability shall be promptly used to make max-

imum progress in meeting the established goals and milestones of the covered program.

(5) NOTIFICATION.—The Administrator shall notify the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate at least 12 months in advance of initiating termination for convenience or termination for cause of a prime contract on a covered program.

(6) SUPPLEMENTAL APPROPRIATION REQUEST.—

(A) REQUEST.—If the Administrator initiates termination of a prime contract on a covered program pursuant to paragraph (5), and sufficient unobligated appropriations are not available to cover termination liability costs in the appropriations account that is funding the prime contract being terminated, the Administrator shall provide to Congress a notification that an authorization of appropriations is necessary not later than 120 days in advance of the proposed contract termination settlement for the covered program.

(B) INTENT OF CONGRESS.—It is the intent of Congress to provide additional authorization for appropriations as may be necessary to pay termination liability costs on prime contracts for covered programs if Congress deems it appropriate that the Administration terminate such prime contracts. The Administration shall be responsible for applying these additional funds for payment of all allowable and reasonable negotiated termination liability costs if the Administration terminates a prime contract for a covered program. If the Administration terminates a prime contract for a covered program for the convenience of the Federal Government, then the Federal Government is responsible for payment of all allowable and reasonable negotiated termination liability costs on the prime contract.

(c) REPORTING.—Not later than 6 months after the date of enactment of this Act, and every 6 months thereafter for the duration of the prime contracts on covered programs, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce,

Science, and Transportation of the Senate a report that provides—

(1) the estimated termination liability costs for each of the prime contracts; and

(2) the basis for how such estimate was determined.

(d) DEFINITIONS.—For purposes of this section:

(1) COVERED PROGRAM.—The term "covered program" means the International Space Station, the Space Launch System, the Orion crew capsule, and the James Webb Space Telescope.

(2) PRIME CONTRACT.—The term "prime contract" means a contract entered directly between a person or entity and the Federal Government for the performance of all or the majority of the responsibilities for developing, integrating, fielding, operating, or sustaining a covered program.

(3) PRIME CONTRACTOR.—The term "prime contractor" means a person or entity contracting directly with the Federal Government on a covered program.

(4) TERMINATION LIABILITY COSTS.—The term "termination liability costs" means any costs incurred by a prime contractor, or by any subcontractor of a prime contractor, for which the Federal

Government is liable as a result of termination of a prime contract by the Administrator.

SEC. 603. BASELINE AND COST CONTROLS.

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

(1) in subsection (a)(1), by striking "Procedural Requirements 7120.5c, dated March 22, 2005" and inserting "Procedural Requirements 7120.5E, dated August 14, 2012"; and

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

SEC. 604. PROJECT AND PROGRAM RESERVES.

(a) SENSE OF CONGRESS.—It is the sense of Congress that the judicious use of program and project reserves provides the Administration's project and program managers with the flexibility needed to manage projects and programs to ensure that the impacts of contingencies can be mitigated.

(b) REPORT.—Not later than 180 days after the date of enactment of this Act the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Com-

merce, Science, and Transportation of the Senate a report describing—

(1) the Administration's criteria for establishing the amount of reserves held at the project and program levels;

(2) how such criteria relate to the agency's policy of budgeting at a 70-percent confidence level; and

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

SEC. 605. INDEPENDENT REVIEWS.

Not later than 270 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report describing—

(1) the Administration's procedures for conducting independent reviews of projects and programs at lifecycle milestones and how the Administration ensures the independence of the individuals who conduct those reviews prior to their assignment;

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

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

SEC. 606. 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. 607. NATIONAL AERONAUTICS AND SPACE ADMINISTRATION ADVISORY COUNCIL.

(a) STUDY.—The Administrator shall enter into an arrangement with the National Academy of Public Administration for an assessment of the effectiveness of the National Aeronautics and Space Administration Advisory Council, any organizational or other issues that the Academy determines need to be addressed, and any recommendations for improving the Council's effectiveness.

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

(c) SUNSET.—Subsection (b) shall expire on September 30, 2014.

SEC. 608. COST ESTIMATION.

(a) SENSE OF CONGRESS.—It is the sense of Congress that realistic cost estimating is critically important to the ultimate success of major space development projects. The Administration has devoted significant efforts over the past five 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 programs and projects and in a manner consistent with the Administration's Space Flight Program and Project Management Requirements—

(1) guidance on when an Independent Cost Estimate and Independent Cost Assessment should be used; and

(2) the criteria to be used to make such a determination.

(c) REPORT.—Not later than 270 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report—

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

(2) describing the mechanisms the Administration is using and will continue to use to ensure that adequate resources are dedicated to cost estimation;

(3) listing the steps the Administration is undertaking to advance consistent implementation of the joint cost and schedule process;

(4) identifying criteria used by programs and projects in determining when to conduct an Independent Cost Estimate and Independent Cost Assessment; and

(5) listing—

(A) the costs of each individual Independent Cost Estimate or Independent Cost Assessment activity conducted in fiscal year 2011, fiscal year 2012, and fiscal year 2013;

(B) the purpose of the activity;

(C) identification of the primary Administration unit or outside body that conducted the activity; and

(D) key findings and recommendations.

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

SEC. 609. 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 elements identified in subsection (b).

(b) ELEMENTS.—The revised regulations required by 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 assistance 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) ensure that the Administration receives 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 may be 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. 610. FACILITIES AND INFRASTRUCTURE.

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

(1) the Administration must reverse the deteriorating condition of its facilities and infrastructure, as this condition is hampering the effectiveness and efficiency of research performed by both the Administration and industry participants making use of Administration facilities, thus reducing the competitiveness of the United States aerospace industry;

(2) the Administration has a role in providing laboratory capabilities to industry participants that are 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 seek to establish strategic part-

nerships with other Federal agencies, academic institutions, 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 future Administration and other Federal agencies' laboratory needs, including those required to meet the activities supporting the Human Exploration Roadmap required by section 70504 of title 51, United States Code.

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

(c) PLAN.—The Administrator shall develop a plan that has the goal of positioning the Administration to have the facilities, laboratories, tools, and approaches necessary to address future Administration requirements. Such plan shall identify—

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

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

(A) the National Space Policy;

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

(C) National Aeronautics and Space Administration Authorization Acts; and

(D) the Human Exploration Roadmap specified in section 70504 of title 51, United States Code;

(3) a strategy for the maintenance, repair, upgrading, and modernization of the Administration's laboratories, facilities, and equipment;

(4) criteria for prioritizing deferred maintenance tasks and also for upgrading or modernizing laboratories, facilities, and equipment and implementing processes, plans, and policies for guiding the Administration's Centers on whether to maintain, repair, upgrade, or modernize a facility and for determining the type of instrument to be used;

(5) 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

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

(d) POLICY.—Not later than 180 days after the date of enactment of this Act, the Administrator shall establish and make publically 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. This policy shall establish criteria for the use of authorities, best practices, standardized procedures, and guidelines for how to appropriately manage property, infrastructure, and facilities.

(e) TRANSMITTAL.—Not later than one year after the date of enactment of this Act, the Administrator shall transmit the plan developed under subsection (c) to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

(f) ESTABLISHMENT OF CAPITAL FUND.—The Administrator shall establish a capital fund for the modernization of facilities and laboratories. The Administrator shall ensure to the maximum extent practicable that all financial savings achieved by closing outdated or surplus facilities at an Administration Center shall be made available to that Center for the purpose of modernizing the Center's facilities and laboratories and for upgrading the infrastructure at the Center.

(g) REPORT ON CAPITAL FUND.—Expenditures and other activities of the fund established under subsection (f) shall require review and approval by the Administrator and the status, including the amounts held in the capital fund, shall be reported to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate in conjunction with the Administration's annual budget request justification for each fiscal year.

SEC. 611. DETECTION AND AVOIDANCE OF COUNTERFEIT ELECTRONIC PARTS.

(a) REGULATIONS.—

(1) IN GENERAL.—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 address the detection and avoidance of counterfeit electronic parts.

(2) CONTRACTOR RESPONSIBILITIES.—The revised regulations issued pursuant to paragraph (1) shall provide that—

(A) Administration contractors who supply electronic parts or products that include electronic parts are responsible for detecting and

avoiding the use or inclusion of counterfeit electronic parts or suspect counterfeit electronic parts in such products and for any rework or corrective action that may be required to remedy the use or inclusion of such parts; and

(B) the cost of counterfeit electronic parts and suspect counterfeit electronic parts and the cost of rework or corrective action that may be required to remedy the use or inclusion of such parts are not allowable costs under Administration contracts, unless—

(i) the covered contractor has an operational system to detect and avoid counterfeit parts and suspect counterfeit electronic parts that has been reviewed and approved by the Administration or the Department of Defense;

(ii) the covered contractor provides timely notice to the Administration pursuant to paragraph (4); or

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

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

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

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

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

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

(i) notification of the Administration; and

(ii) inspection, testing, and authentication of electronic parts that the Admin-

istration or an Administration contractor or 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 the Administration 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 Administration contractors and subcontractors to identify and use additional suppliers beyond those identified pursuant to subparagraph (C), provided that—

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

(ii) the contractor or subcontractor assumes responsibility for the authenticity of parts provided by such suppliers as provided in paragraph (2); and

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

(4) TIMELY NOTIFICATION.—The revised regulations issued pursuant to paragraph (1) shall require that any Administration contractor or subcontractor who becomes aware, or has reason to suspect, that any end item, component, part, or material contained in supplies purchased by the Administration, or purchased by a contractor or subcontractor for delivery to, or on behalf of, the Administration, contains counterfeit electronic parts or suspect counterfeit electronic parts, shall provide notification to the applicable Administration contracting officer within 30 calendar days.

(b) DEFINITIONS.—In this section, 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. 612. SPACE ACT AGREEMENTS.

(a) COST SHARING.—To the extent that the Administrator determines practicable, the funds provided by the Government under a funded Space Act Agreement shall

not exceed the total amount provided by other parties to the Space Act Agreement.

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

(c) PUBLIC NOTICE AND COMMENT.—The Administrator shall make available for public notice and comment each proposed Space Act Agreement at least 30 days before entering into such agreement, with appropriate redactions for proprietary, sensitive, or classified information.

(d) TRANSPARENCY.—The Administrator shall publicly disclose on the Administration's website and make available in a searchable format each Space Act Agreement, with appropriate redactions for proprietary, sensitive, or classified information, not later than 60 days after such agreement is signed.

(e) ANNUAL REPORT.—

(1) REQUIREMENT.—Not later than 90 days after the end of each fiscal year, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Trans-

portation of the Senate 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, nonreimbursable, 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 also include a list of all anticipated reimbursable, nonreimbursable, and funded Space Act Agreements for the upcoming fiscal year.

(4) CUMULATIVE PROGRAM BENEFITS.—The report shall also include, with respect to the Space Act Agreements covered by the report, a summary of—

(A) the technology areas in which research projects were conducted under such agreements;

(B) the extent to which the use of the Space Act Agreements—

(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 pursuant to such Space Act Agreements.

SECTION–BY–SECTION ANALYSIS OF

H.R. 4412, THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 2014, AS AMENDED BY THE SUBCOMMITTEE ON SPACE

Section 1. Short Title; Table of Contents.

This Act may be cited as the "National Aeronautics and Space Administration Authorization Act of 2014."

Section 2. Definitions.

This section provides relevant definitions within the Act.

TITLE I–AUTHORIZATION OF APPROPRIATIONS

Sec. 101. Fiscal Year 2014.

This section authorizes NASA at levels in line with the Consolidated Appropriations Act, 2014 (P.L. 113–76).

TITLE II–HUMAN SPACE FLIGHT

SUBTITLE A–EXPLORATION

Sec. 201. Space Exploration Policy.

Section 201 states that exploration deeper into the solar system shall be a core mission of NASA. It further states that it is the policy of the United States that the goal of NASA's exploration program to successfully conduct a crewed mission to the surface of Mars to begin human exploration of that planet. This section adds relevant definitions to title 51 and also adds language to title 42 regarding the acceleration of development of capabilities to enable a human exploration mission to the surface of Mars and beyond through the prioritization of those technologies and capabilities best suited for such a mission in accordance with the Exploration Roadmap under title 51. This section states that non-United States human space flight capabilities should only be used as a contingency when no domestic commercial or public-private partnership provider that meets NASA's safety requirements is available.

Sec. 202. Stepping Stone Approach to Exploration.

This section requires the development of a Mars Human Exploration Roadmap defining the capabilities and technologies necessary to extend human presence to the surface of Mars. This section establishes requirements for the content of the roadmap. The roadmap must be transmitted to Congress, updated no less frequently than every two years, and include addenda from the NASA Advisory Council and Aerospace Safety Advisory Panel, each with a statement of review.

Sec. 203. Space Launch System.

Section 203 contains findings regarding the importance of the SLS and describes its intended uses. It includes a sense of Congress stating that the President's budget requests for the Space Launch System and Orion multipurpose crew vehicle development, test, and operational phases should strive to accurately reflect the resource requirements of each of those phases. This section requires the Administrator to make expeditious development, test, and achievement of operational readiness of the Space Launch System and the Orion crew capsule the highest priority of the exploration program. It requires a Government Accountability Office review of NASA's acquisition of ground systems in support of the Space Launch System, and establishes requirements for the review. This section requires the Administrator to report on the effort and budget required to enable and utilize a cargo variant of the SLS configuration. This section further requires NASA to conduct a competition among students in elementary and secondary schools to name the elements of NASA's exploration program. Section 203 requires a report to Congress describing the estimated cost of an advanced booster for SLS, detailing changes in development costs that may result from conducting a competition for an advanced booster, and outlining potential schedule delay resulting from a competition. It directs NASA to conduct a competition for an advanced booster if the Associate Administrator reports

the results would be cost reductions and no adverse schedule impact in the required report.

Sec. 204. Orion Crew Capsule.

Section 204 states that Orion must meet the practical needs and the minimum capability requirements described in law. It requires a report to Congress detailing the components and systems of Orion that ensure it is in compliance with the law and the expected date that Orion will be available to transport crew and cargo to the ISS, as well as certification that the requirements of the law will be met in time for the first crewed test flight in the year 2021.

Sec. 205. Space Radiation.

This section requires the Administrator to develop a space radiation mitigation and management strategy and implementation plan. The strategy and plan must be submitted to Congress. The Administrator, in consultation with the heads of other agencies, must assess the national capabilities for carrying out critical ground-based research on space radiation biology.

Sec. 206. Planetary Protection for Human Exploration Missions.

This section requires the Administrator to contract with the National Academies for a study to explore the planetary protection ramifications of future missions by astronauts. The study must be submitted to Congress.

SUBTITLE B–SPACE OPERATIONS

Sec. 211. International Space Station (ISS).

This section states that the ISS shall have two primary objectives: supporting the goal established in Section 201 of this Act and pursuing a research program that advances knowledge and provides benefits to the Nation. It shall continue to 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. Section 211 states that the ISS shall be utilized to the maximum extent practicable for the development of capabilities and technologies needed for the future of human exploration beyond low-Earth orbit. This section requires the Administrator to take all necessary steps to support the operation and full utilization of the ISS and seek to minimize the operating costs of the ISS. It further states that reliance on foreign carriers for crew and cargo is unacceptable and the Nation's human space flight program must acquire the capability to launch American astronauts on American rockets from American soil as soon as possible. It reaffirms Congress' commitment to the development of a commercially developed launch and delivery system to the ISS for crew missions. This section reaffirms that NASA shall make use of the United States' commercially provided ISS crew transfer and crew rescue services to the maximum extent practicable. Section 211 reaffirms that the Orion crew capsule shall provide an alternative means to deliver crew and cargo to the International Space Station, in the event other vehicles are unable to perform that function. It also reaffirms that NASA shall pursue means to maximize ISS logistics capabilities, reduce risks to ISS systems sustainability, and minimize United States operations costs relating to the ISS. This section amends the law to state that it is the policy of the United States to maintain an uninterrupted capability for human space flight and operations in low-Earth orbit and beyond as an essential instrument of national security and the capability to ensure continued United States participation and leadership in the exploration and utilization of space. This section requires the Administrator to submit a report to Congress on the feasibility of extending the operation of the ISS and also requires the Director of OSTP to develop and transmit to Congress a strategic plan for conducting research in the physical and life sciences and related technologies on the ISS through at least 2020. Finally, this section requires the Comptroller General to submit a report to Congress on the progress of the chosen not-for-profit entity for management of the National Laboratory.

Sec. 212. Commercial Crew Program.

Section 212 states it is the sense of Congress that United States commercially-provided crew transportation systems offer the potential of serving as the primary means of transporting American astronauts to and from the ISS and serving as ISS emergency crew rescue vehicles. It is the sense of Congress that credibility in the

Administration's budgetary estimates for the Commercial Crew Program can be enhanced by an independently developed cost estimate. This section states that the objective of the Commercial Crew Program shall be to assist the development of at least one crew transportation system to carry NASA astronauts safely, reliably, and affordably to and from the ISS and to serve as an emergency crew rescue vehicle as soon as practicable under the funding levels authorized in this Act. This section requires NASA to take steps established by the Columbia Accident Investigation Board to ensure safety. It requires the Administrator to strive through the competitive selection process, to minimize the Program's lifecycle cost to NASA. Section 212 requires the Administrator to ensure that every crew transportation services provider has provided evidence-based support for their costs and schedule. This section requires the Administrator to arrange for the initiation of an Independent Cost and Schedule Estimate, to be provided to Congress, which meets specified requirements. This section also requires the Administrator to transmit an implementation plan based on the estimate with four distinct options for the final stage of the Commercial Crew program: a strategy that assumes an appropriation of $600 million over three years; a strategy that assumes an appropriation of $700 million over three years; a strategy that assumes an appropriation of $800 million over three years; and a strategy that has yet to be considered previously, but that NASA believes could ensure the flight readiness date of 2017 for at least one provider or decrease the program cost. Each strategy shall include the contracting instruments NASA will employ to acquire the services in each phase of development or acquisition and the number of commercial providers NASA will include in the program.

TITLE III–SCIENCE

SUBTITLE A–GENERAL

Sec. 301. Science Portfolio.

Section 301 amends the law to state that a balanced and adequately funded set of activities contributes to a robust and productive science program that serves as a catalyst for innovation and discovery. This section states that unless otherwise directed by Congress, NASA shall take into account the current decadal surveys from the National Academies when submitting the President's budget request to Congress.

Sec. 302. Radioisotope Power Systems.

This section requires the Administrator to conduct and transmit to Congress an analysis of NASA requirements for radioisotope power system material needed to carry out high priority robotic missions in the solar system and other surface exploration activities beyond low-Earth orbit, as well as the risks to NASA missions in meeting those requirements due to a lack of adequate domestic production of radioisotope power system material.

Sec. 303. Congressional Declaration of Policy and Purpose.

This section amends current law to add the search for life's origin, evolution, distribution, and future in the Universe to the list of objectives of NASA's activities.

SUBTITLE B–ASTROPHYSICS

Sec. 311. Decadal Cadence.

This section states that the Administrator shall ensure to the maximum extent practicable a steady cadence of large, medium, and small missions when following the guidance provided by the decadal surveys.

Sec. 312. Extrasolar Planet Exploration Strategy.

This section requires the Administrator to contract with the National Academies to develop a strategy for the study and exploration of extrasolar planets that would provide a foundation for NASA roadmaps, strategic plans, and activities related to exoplanet research and exploration.

Sec. 313. James Webb Space Telescope.

This section states that it is the sense of Congress that the James Webb Space Telescope (JWST) program will revolutionize our understanding of star and planet formation and how galaxies evolved and advance the search for the origins of the universe; the JWST program will enable American scientists to maintain their leadership in astrophysics and other disciplines; the JWST program is making steady progress towards a lunch in 2018; the on-time and on-budget delivery of JWST is a high congressional priority; and maintaining this progress will require the Administrator to ensure that integrated testing is appropriately timed and sufficiently comprehensive to enable potential issues to be identified and addressed early enough to handle within JWST's development schedule.

Sec. 314. National Reconnaissance Office Telescope Donation

This section requires the Administrator to report to Congress on NASA's plan for developing the Wide-Field Infrared Survey Telescope including a plan for the Wide-Field Infrared Survey Telescope 2.4, which includes the donated 2.4-meter aperture National Reconnaissance Office telescope.

SUBTITLE C–PLANETARY SCIENCE

Sec. 321. Decadal Cadence.

This section states that when following the guidance provided by the decadal surveys, the Administrator shall ensure to the greatest extent practicable that NASA carries out a balanced set of programs in accordance with the priorities established in the most recent decadal survey, including: a Discovery-class mission at least once every 24 months; a New Frontiers-class mission at least once every 60 months; and a Flagship-class mission at least once per decadal survey period, starting with a Europa mission with a goal of launching by 2021.

Sec. 322. Near Earth Objects.

This section requires the Administrator to continue to detect, track, catalogue, and characterize the physical characteristic of near-Earth objects equal to or greater than 140 meters in diameter in order to assess the threat of such near-Earth objects to Earth. It shall be the goal of the Survey to achieve 90 percent completion of its near-Earth object catalogue by 2020. Section 322 reaffirms the policy in title 51 relating to detecting, tracking, cataloguing, and characterizing asteroids and comets. This section requires the Office of Science and Technology Policy to transmit to Congress an initial report that provides the following: recommendations and a proposed budget to carry out the Survey program; an analysis of possible options NASA could employ to divert an object on a likely collision course with Earth; and 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. It further requires the Administrator to transmit an annual report that provides a summary of all activities and expenditures taken with regards to the Survey since the enactment of this act. This section requires a technical and scientific assessment of the capabilities and resources to accelerate the Survey and expand NASA's Near-Earth Object program to include detection, tracking, cataloging, and characterizing potentially hazardous near-Earth objects less than 140 meters in diameter.

Sec. 323. Near-Earth Object Public-Private Partnerships.

This section states it is the sense of Congress that NASA should seek to leverage the capabilities of private sector and philanthropic organizations in carrying out the Near-Earth Object Survey program in order to meet the goal of the Survey program. It requires the Administrator to transmit a report to Congress describing how the Administration can expand collaborative partnerships to detect, catalogue, and categorize near-Earth asteroids.

Sec. 324. Astrobiology Strategy.

This section would require the Administrator to contract with the National Academies to develop a science strategy for astrobiology to be used in planning and funding research and other activities and initiatives in the field of astrobiology. This section would also require the Administrator to transmit a report containing the strategy to Congress.

Sec. 325. Astrobiology Public-Private Partnerships.

This section requires a report to Congress describing how NASA can expand collaborative public-private partnerships to study life's origin, evolution, distribution, and future in the Universe.

Sec. 326. Assessment of Mars Architecture.

This section requires the Administrator to contract with the National Academies to assess NASA's revised post-2016 Mars exploration architecture and its responsiveness to the National Academies' planetary science decadal surveys and other relevant National Academies Mars-related reports; the long-term goals of NASA's Mars Exploration Program and the program's ability to optimize the science return; the Mars architecture's relationship to Mars-related activities to be undertaken by agencies and organizations outside of the United States; and the extent to which the Mars architecture represents a reasonably balanced mission portfolio. The results of the assessment must be transmitted to Congress.

SUBTITLE D–HELIOPHYSICS

Sec. 331. Decadal Cadence.

This section states that the Administrator shall ensure to the extent practicable a steady cadence of large, medium, and small heliophysics missions when following the guidance provided by the decadal surveys.

SUBTITLE E–EARTH SCIENCE

Sec. 341. Reimbursement for Additional Responsibilities.

This section states it is the sense of Congress that NASA is being asked to undertake important Earth science activities in an environment of increasingly constrained fiscal resources, and that any transfer of additional responsibilities to NASA should be accompanied by the provision of additional resources to allow NASA to carry out the increased responsibilities without adversely impacting its implementation of its existing Earth science programs and priorities.

TITLE IV–AERONAUTICS

Sec. 401. Sense of Congress.

Section 401 states that it is the sense of Congress that 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. It further states that aeronautics research is essential to NASA's mission and should be supported and that the Administrator should coordinate with other stakeholders to minimize duplication and leverage resources. This section states that carrying aeronautics research to a level of maturity that allows NASA's research results to be transitioned to the users is critical to their eventual adoption.

Sec. 402. Aeronautics Research Goals.

This section instructs the Administrator to ensure that NASA maintains a strong aeronautics research portfolio, ranging from fundamental research through integrated systems research, with specific research goals including: enhance airspace operations and safety; improve air vehicle performance; strengthen aviation safety; and demonstrate concepts at the system level.

Sec. 403. Unmanned Aerial Systems Research and Development.

This section requires the Administrator to direct research and technological development to facilitate the safe integration of unmanned aerial systems into the National Airspace System. It requires the Administrator to update and transmit to Congress a roadmap for unmanned aerial systems research and development. This section requires that operational flight data from specified cooperative agreements be made available to NASA and the FAA for the development of regulatory standards.

Sec. 404. Research Program on Composite Materials Used In Aeronautics.

Section 404 requires the Administrator to continue NASA's cooperative research program with industry to identify and demonstrate more effective and safe ways of developing, manufacturing, and maintaining composite materials. This section states that the Administrator, in overseeing NASA's work on composite materials, shall consult with relevant Federal agencies and partners in industry to accelerate safe development and certification processes for new composite materials and design methods while maintaining rigorous inspection of new composite materials. It requires the Administrator to transmit to Congress a report detailing the work of NASA on new composite materials and the coordination efforts among agencies.

Sec. 405. Hypersonic Research.

This section requires the Administrator to develop and transmit to Congress a roadmap for hypersonic aircraft research.

Sec. 406. Supersonic Research.

This section contains findings regarding the importance of supersonic overland flight and continuing NASA's research program in supersonic flight. It requires the Administrator to develop and transmit to Congress a roadmap for supersonic aeronautics research and development with the goal of developing and demonstrating, in a relevant environment, airframe and propulsion technologies to minimize the environmental impact of supersonic overland flight in an efficient and economical manner.

Sec. 407. Research on NextGen Airspace Management Concepts And Tools.

This section requires the Administrator, in consultation with the relevant federal agencies, to review NASA's research and development activities in support of NextGen and make any necessary adjustments to NASA's research and development activities in support of NextGen. It also requires the Administrator to report to Congress regarding the progress of NASA's research and development activities in support of the NextGen airspace management modernization initiative, including details of technology transfer to other agencies, consultation with other agencies, and any adjustments made to research activities.

Sec. 408. Rotorcraft Research.

This section requires the Administrator to prepare and transmit to Congress a plan for research relating to rotorcraft and other runway-independent air vehicles. The plan must 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.

Sec. 409. Transformative Aeronautics Research.

This section states that it is the sense of Congress that the Administrator should encourage investigations into the early-stage advance of new processes, novel concepts, and innovative technology that have the potential to meet national aeronautics needs.

Sec. 410. Study of United States Leadership in Aeronautics Research.

This section requires the Administrator to enter into an arrangement with the National Academies for a study to assess the position of the United States in civil aeronautics research compared to the rest of the world. This section establishes requirements for the study. The study must be transmitted to Congress.

TITLE V–SPACE TECHNOLOGY

Sec. 501. Sense of Congress.

This section contains a sense of Congress regarding the importance of space technology.

Sec. 502. Space Technology Program.

Section 502 creates a Space Technology Program to pursue the development of technologies that enable exploration of the solar system or advanced space science through various elements of NASA. This section also states that the Administrator shall organize and manage NASA's Small Business Innovation Research program and Small Business Technology Transfer program within the Space Technology Program. Additionally, this section requires the Administrator to certify that no project within the Space Technology Program is also under development in any established mission directorate. It requires the Administrator to ensure that NASA's work in space technology is fully coordinated, aligned, and leveraged within NASA. Work being conducted by the Human Exploration and Operations Mission Directorate in support of advanced space technologies and systems focusing on human space exploration should continue. This section requires a report to Congress comparing NASA's space technology investments with the high-priority technology areas identified by the National Academies in the National Research Council's report on NASA's Space Technology Roadmaps. It requires an annual submission with the budget for each fiscal year describing 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.

Sec. 503. Utilization of the International Space Station for Technology Demonstrations.

This section requires the Administrator to utilize the ISS and commercial services for Space Technology Demonstration missions in low-Earth orbit wherever it is practical and cost effective to do so.

TITLE VI–Other Provisions

Sec. 601. Asteroid Retrieval Mission.

This section requires the Administrator to report to Congress on the proposed Asteroid Retrieval Mission including a detailed budget profile; a detailed technical plan; a description of the technologies and capabilities anticipated to be gained that will enable future missions to Mars that could not be gained by lunar missions; a description of the technologies and capabilities anticipated to be gained from the proposed mission that will enable future planetary defense missions; and a review by the Small Bodies Assessment Group and the NASA Advisory Council. This section requires a report conducted by an independent, private systems engineering and technical assistance organization analyzing the proposal for a Mars Flyby human spaceflight mission to be launched in 2021. The report must be transmitted to Congress.

Sec. 602 . Termination Liability.

This section directs that funds set aside for contract termination liability shall be utilized for development work.

Sec. 603. Baseline and Cost Controls.

This section amends requirements associated with Baseline and Cost Controls to make the reporting more timely.

Sec. 604. Project and Program Reserves.

This section states that it is the sense of Congress that the judicious use of program and project reserves provides NASA managers with the flexibility needed to manage projects and programs to ensure that the impacts of contingencies can be mitigated. It requires the Administrator to report to Congress on NASA's criteria for establishing the amount of reserves at the project and program levels; how such criteria relate to NASA's policy of budgeting at a 70 percent confidence level; and NASA's criteria for waiving the policy of budgeting at a 70 percent confidence level, and strategies for controlling costs when a waiver is granted.

Sec. 605. Independent Reviews.

This section requires the Administrator to report to Congress on NASA's procedure for independent reviews of projects and programs at lifecycle milestones and

how NASA ensures the independence of the individuals conducting those reviews as well as the independence of internal and external entities that conduct review of projects and programs at lifecycle milestones.

Sec. 606. Commercial Technology Transfer Program.

This section adds "protecting national security" to the considerations used to evaluate when to transfer technology.

Sec. 607. NASA Advisory Council

This section requires the Administrator to contract with the National Academy of Public Administration for an assessment of the effectiveness of the NASA Advisory Council, any organizational or other issues that the Academy determines need to be addressed, and any recommendations for improving the Council's effectiveness. It amends current law to state that in the performance of its functions, the Administrator is authorized to appoint such advisory committees as may be appropriate for purposes of consultation and advice to the Administration and Congress. The inclusion of "Congress" will sunset on September 30, 2014.

Sec. 608. Cost Estimation.

This section states that it is the sense of Congress that realistic cost estimating is important to the success of major development projects, and that it is important that NASA continue its efforts to develop and implement guidance in establishing realistic cost estimates. It requires the Administrator to provide guidance on when an Independent Cost Assessment should be used and the criteria to be used to make such a determination to program and projects. This section requires a report to Congress on the implementation of more effective cost estimation practices.

Sec. 609. Avoiding Organizational Conflicts of Interest in Major NASA Acquisition Programs.

This section requires the Administrator to revise the NASA 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 specified concerns.

Sec. 610. Facilities and Infrastructure.

This section states that it is the sense of Congress that NASA must reverse the deteriorating condition of its facilities and infrastructure; NASA has a role in providing laboratory capabilities to industry participants that are economically viable as commercial entities and thus are not available elsewhere; NASA should seek to establish strategic partnerships with other Federal agencies, academic institutions, and industry, as appropriate; and decisions on whether to dispose of, maintain, or modernize existing facilities must be made in the context of meeting future NASA and other Federal agencies' laboratory needs, including those required to meet the activities supporting the Roadmap required by Sec 202. It further states that it is the policy of the United States that NASA maintain reliable and efficient facilities and that decisions on whether to dispose of, maintain, or modernize existing facilities be made in the context of meeting future NASA needs. This section requires the Administrator to develop a plan that has the goal of positioning NASA to have the facilities, laboratories, tools, and approaches necessary to address future NASA requirements. It requires the Administrator to establish and make publically available a policy that guides the agency'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. This section requires the Administrator to establish a capital fund for the modernization of facilities and laboratories.

Sec. 611. Detection and Avoidance of Counterfeit Electronic Parts.

This section requires NASA to revise the NASA Supplement for the Federal Acquisition Regulation to address the detection and avoidance of counterfeit electronic parts. The revised regulations must provide that contractors who supply electronic parts or products including electronic parts are responsible for detecting and avoiding the use or inclusion of counterfeit electronic parts or suspect counterfeit parts in such products, and for any corrective actions that may be required to remedy the

use of such parts. The costs of counterfeit electronic parts and the cost of corrective action are not allowable costs under Agency contracts except under specified exemptions. It sets requirements for acquisition of electronic parts by NASA contractors and subcontractors to ensure authenticity. This section requires that any contractor or subcontractor who becomes aware of a possible counterfeit part must notify NASA within 30 calendar days.

Sec. 612. Space Act Agreements.

This section sets the following conditions for Space Act Agreements: funds provided by the government under a funded Space Act Agreement should not exceed the total amount provided by other parties to the agreement or other transaction; a Space Act Agreement may be used only when the use of a standard contract, grant, or cooperative agreement is not feasible or appropriate; Space Act Agreements must be available for public notice and comment prior to agreement; the Administrator shall publically disclose on NASA's website and make available in a searchable format all Space Act Agreements with appropriate redactions for proprietary information in a timely manner; and the Administrator must submit to Congress an annual report on the use of Space Act Agreement authority by NASA during the previous fiscal year. The report must include a list of anticipated agreements for the upcoming fiscal year. The report must also include a discussion of the benefits NASA has accumulated by using Space Act Agreements.

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AMENDMENT TO H.R. 4412

OFFERED BY MS. EDWARDS OF MARYLAND AND MR. PALAZZO OF MISSISSIPPI

Page 14, line 2, strike "is to enable" and insert ", including an upper stage needed to go beyond low-Earth orbit, is to safely carry a total payload to enable".

Page 18, lines 8 through 10, strike "to begin not later" and all that follows through "under paragraph (1)" and insert "to begin as soon as practicable after the development of the upper stage has been initiated".

Page 21, line 20, through page 26, line 14, redesignate subsections (a) through (f) as subsections (b) through (g), respectively.

Page 21, after line 19, insert the following new subsection:

(a) FINDINGS.—Congress finds the following:

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

(2) The use of the private market to provide cargo and crew transportation services is currently the most expeditious process to restore domestic ac-

cess to the International Space Station and low-Earth orbit.

(3) Government access to low-Earth orbit is paramount to the continued success of the International Space Station and National Laboratory.

Page 30, line 20, redesignate section 212 as section 215 (and conform the table of contents accordingly).

Page 30, after line 19, insert the following new sections (and conform the table of contents accordingly):

SEC. 212. BARRIERS IMPEDING ENHANCED UTILIZATION OF THE ISS'S NATIONAL LABORATORY BY COMMERCIAL COMPANIES.

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

(1) enhanced utilization of the International Space Station's National Laboratory requires a full understanding of the barriers impeding such utilization and actions needed to be taken to remove or mitigate them to the maximum extent practicable; and

(2) doing so will allow the Administration to encourage commercial companies to invest in microgravity research using National Laboratory research facilities.

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

(1) identify barriers impeding enhanced utilization of the International Space Station's National Laboratory;

(2) recommend ways to encourage commercial companies to make greater use of the International Space Station's National Laboratory, including corporate investment in microgravity research; and

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

(c) TRANSMITTAL.—Not later than one year after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate the results of the assessment described in subsection (b).

SEC. 213. UTILIZATION OF INTERNATIONAL SPACE STATION FOR SCIENCE MISSIONS.

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

SEC. 214. INTERNATIONAL SPACE STATION CARGO RESUPPLY SERVICES LESSONS LEARNED.

Not later than 120 days after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate that—

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

(2) indicates whether changes are needed to the manner in which the Administration procures and manages similar services upon the expiration of the existing Commercial Resupply Services contract; and

(3) identifies any lessons learned from the Commercial Resupply Services contract that should be applied to the procurement and management of commercially provided crew transfer services to and from the International Space Station.

Page 35, after line 20, insert the following new section (and conform the table of contents accordingly):

SEC. 216. SPACE COMMUNICATIONS.

(a) PLAN.—The Administrator shall develop a plan, in consultation with relevant Federal agencies, for updating the Administration's space communications and navigation architecture for low-Earth orbital and deep space

operations so that it is capable of meeting the Administration's communications needs over the next 20 years. The plan shall include lifecycle cost estimates, milestones, estimated performance capabilities, and 5-year funding profiles. The plan shall also include an estimate of the amounts of any reimbursements the Administration is likely to receive from other Federal agencies during the expected life of the upgrades described in the plan. At a minimum, the plan shall include a description of the following:

(1) Steps to sustain the existing space communications and navigation network and infrastructure and priorities for how resources will be applied and cost estimates for the maintenance of existing space communications network capabilities.

(2) Upgrades needed to support space communications and navigation network and infrastructure requirements, including cost estimates and schedules and an assessment of the impact on missions if resources are not secured at the level needed.

(3) Projected space communications and navigation network requirements for the next 20 years, including those in support of human space exploration missions.

(4) Projected Tracking and Data Relay Satellite System requirements for the next 20 years, including those in support of other relevant Federal agencies, and cost and schedule estimates to maintain and upgrade the Tracking and Data Relay Satellite System to meet projected requirements.

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

(6) Steps the Administration is taking to mitigate threats to electromagnetic spectrum use.

(b) SCHEDULE.—The Administrator shall transmit the plan developed under this section to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 1 year after the date of enactment of this Act.

Page 40, after line 5, insert the following new sections (and conform the table of contents accordingly):

SEC. 304. UNIVERSITY CLASS SCIENCE MISSIONS.

(a) SENSE OF CONGRESS.—It is the sense of Congress that principal investigator-led small orbital science missions, including CubeSat class, University Explorer (UNEX) class, Small Explorer (SMEX) class, and Ven-

ture class, offer valuable opportunities to advance science at low cost, train the next generation of scientists and engineers, and enable participants in the program to acquire skills in systems engineering and systems integration that are critical to maintaining the Nation's leadership in space and to enhancing the United States innovation and competitiveness abroad.

(b) REVIEW OF PRINCIPAL INVESTIGATOR-LED SMALL ORBITAL SCIENCE MISSIONS.—The Administrator shall conduct a review of the science missions described in subsection (a). The review shall include—

(1) the status, capability, and availability of existing small orbital science mission programs and the extent to which each program enables the participation of university scientists and students;

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

(3) the opportunities such mission programs provide for training and education, including scientific and engineering workforce development, including for the Administration's scientific and engineering workforce; and

(4) the extent to which commercial applications such as hosted payloads, free flyers, and data buys could provide measurable benefits for such mission

programs, while preserving the principle of independent peer review as the basis for mission selection.

(c) REPORT.—Not later than 270 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the review required under subsection (b) and on recommendations to enhance principal investigator-led small orbital science missions conducted by the Administration in accordance with the results of the review required by subsection (b).

SEC. 305. 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) ASSESSMENT.—The Administrator shall carry out biennial 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. The assessment shall take into consideration 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 consult with any affected Federal agency and shall take into account the potential benefits of instruments on missions that are beyond their planned mission lifetime.

"(c) REPORT.—The Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, 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 required by subsection (a) that was carried out during the previous year.".

Page 43, after line 17, insert the following new sections (and conform the table of contents accordingly):

SEC. 315. WIDE-FIELD INFRARED SURVEY TELESCOPE.

(a) SENSE OF CONGRESS.—It is the sense of Congress that the Administrator, to the extent practicable, should make progress on the technologies and capabilities needed to position the Administration to meet the objectives of the Wide-Field Infrared Survey Telescope mission, 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. It is further the sense of Congress that the Wide-Field Infrared Survey Telescope mission has the potential to enable scientific discoveries that will transform our understanding of the universe.

(b) CONTINUITY OF DEVELOPMENT.—The Administrator shall ensure that the concept definition and pre-formulation activities of a Wide-Field Infrared Survey Telescope mission continue while the James Webb Space Telescope is being completed.

SEC. 316. STRATOSPHERIC OBSERVATORY FOR INFRARED ASTRONOMY.

The Administrator shall not use any funding appropriated to the Administration for fiscal year 2014 for the shutdown of the Stratospheric Observatory for Infrared Astronomy or for the preparation therefor.

Page 44, line 6, strike "starting with" and insert "including".

Page 48, after line 18, insert the following new section (and redesignate succeeding sections and conform the table of contents accordingly):

SEC. 324. RESEARCH ON NEAR-EARTH OBJECT TSUNAMI EFFECTS.

(a) REPORT ON POTENTIAL TSUNAMI EFFECTS FROM NEAR-EARTH OBJECT IMPACT.—The Administrator, in collaboration with the Administrator of the National Oceanic and Atmospheric Administration and other relevant agencies, shall prepare a report identifying and describing existing research activities and further research objectives that would increase our understanding of the nature of the effects of potential tsunamis that could occur if a near-Earth object were to impact an ocean of Earth.

(b) TRANSMITTAL.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit the report required and prepared under subsection (a) to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

Page 51, after line 5, insert the following new section (and conform the table of contents accordingly):

SEC. 332. REVIEW OF SPACE WEATHER.

(a) REVIEW.—The Director of the Office of Science and Technology Policy, in consultation with the Administrator, the Administrator of the National Oceanic and Atmospheric Administration, the Director of the National Science Foundation, and heads of other relevant Federal

agencies, shall enter into an arrangement with the National Academies to provide a comprehensive study that reviews current and planned ground-based and space-based space weather monitoring requirements and capabilities, identifies gaps, and identifies options for a robust and resilient capability. The study shall inform the process of identifying national needs for future space weather monitoring, forecasts, and mitigation. The National Academies shall give consideration to international and private sector efforts and collaboration that could potentially contribute to national space weather needs. The study shall also review the current state of research capabilities in observing, modeling, and prediction and provide recommendations to ensure future advancement of predictive capability.

(b) REPORT TO CONGRESS.—Not later than 14 months after the date of enactment of this Act, the National Academies shall transmit a report containing the results of the study provided under subsection (a) to the Director of the Office of Science and Technology Policy, and to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

Page 51, lines 6 through 20, amend subtitle E to read as follows:

Subtitle E—Earth Science

SEC. 341. GOAL.

(a) SENSE OF CONGRESS.—It is the sense of Congress that the Administration is being asked to undertake important Earth science activities in an environment of increasingly constrained fiscal resources, and that any transfer of additional responsibilities to the Administration, such as climate instrument development and measurements that are currently part of the portfolio of the National Oceanic and Atmospheric Administration, should be accompanied by the provision of additional resources to allow the Administration to carry out the increased responsibilities without adversely impacting its implementation of its existing Earth science programs and priorities.

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

(c) COLLABORATION.—The Administrator shall collaborate with other Federal agencies, including the National Oceanic and Atmospheric Administration, non-gov-

ernment entities, and international partners, as appropriate, in carrying out the Administration's Earth science program. The Administration shall continue to develop first-of-a-kind instruments that, once proved, can be transitioned to other agencies for operations.

(d) REIMBURSEMENT.—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.

SEC. 342. DECADAL CADENCE.

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

SEC. 343. VENTURE CLASS MISSIONS.

It is the sense of Congress that the Administration's Venture class missions provide opportunities for innovation in the Earth science program, offer low-cost approaches for high-quality competitive science investigations, enable frequent flight opportunities to engage the Earth science and applications community, and serve as a training ground for students and young scientists. It is further the sense of Congress that the Administration should seek to increase the number of Venture class

projects to the extent practicable as part of a balanced Earth science program.

SEC. 344. ASSESSMENT.

The Administrator shall carry out a scientific assessment of the Administration's Earth science global datasets for the purpose of identifying those datasets that are useful for understanding regional changes and variability, and for informing applied science research. The Administrator shall complete and transmit the assessment to the Committee on Science, Space, and Technology in the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 180 days after the date of enactment of this Act.

Page 66, line 1, through page 92, line 22, redesignate title VI as title VII, redesignate the sections therein accordingly (and conform the table of contents accordingly).

Page 65, after line 25, insert the following new title:

TITLE VI—EDUCATION

SEC. 601. EDUCATION.

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

(1) the Administration's missions are an inspiration for Americans and in particular for the next

generation, and that this inspiration has a powerful effect in stimulating interest in science, technology, engineering, and mathematics (in this section referred to as "STEM") education and careers;

(2) the Administration's Office of Education and mission directorates have been effective in delivering Administration educational content because of the strong engagement of Administration scientists and engineers in the Administration's education and outreach activities; and

(3) the Administration should be a central partner in contributing to the goals of the National Science and Technology Council's Federal Science, Technology, Engineering, and Mathematics (STEM) Education 5-Year Strategic Plan.

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

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

(2) improve public literacy in STEM;

(3) employ proven strategies for improving student learning and teaching;

(4) provide curriculum support materials; and

(5) create and support opportunities for professional development for STEM teachers.

(c) ORGANIZATION.—In order to ensure the inspiration and engagement of children and the general public, the Administration shall continue its STEM education and outreach activities within the Science, Aeronautics Research, Space Operations, and Exploration Mission Directorates.

(d) CONTINUATION OF EDUCATION AND OUTREACH ACTIVITIES AND PROGRAMS.—The Administrator shall continue to carry out education and outreach programs and activities through the Office of Education and the Administration mission directorates and shall continue to engage, to the maximum extent practicable, Administration and Administration-supported researchers and engineers in carrying out those programs and activities.

(e) CONTINUATION OF SPACE GRANT PROGRAM.—The Administrator shall continue to operate the National Space Grant College and Fellowship program through a national network consisting of a State-based consortium in each State that provides flexibility to the States, with the objective of providing hands-on research, training, and education programs, with measurable outcomes, to enhance America's STEM education and workforce.

(f) REAFFIRMATION OF POLICY.—Congress reaffirms its commitment to informal science education at science centers and planetariums as set forth in section 616 of

the National Aeronautics and Space Administration Authorization Act of 2005 (51 U.S.C. 40907).

SEC. 602. INDEPENDENT REVIEW OF THE NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM.

(a) SENSE OF CONGRESS.—It is the sense of Congress that the National Space Grant College and Fellowship Program, which was established in the National Aeronautics and Space Administration Authorization Act of 1988 (42 U.S.C. 2486 et seq.), has been an important program by which the Federal Government has partnered with State and local governments, universities, private industry, and other organizations to enhance the understanding and use of space and aeronautics activities and their benefits through education, fostering of interdisciplinary and multidisciplinary space research and training, and supporting Federal funding for graduate fellowships in space-related fields, among other purposes.

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

(1) a review of the National Space Grant College and Fellowship Program, including its structure and capabilities for supporting science, technology, engineering, and mathematics education and training consistent with the National Science and Tech-

nology Council's Federal Science, Technology, Engineering, and Mathematics (STEM) Education 5-Year Strategic Plan; and

(2) recommendations on measures, if needed, to enhance the Program's effectiveness and mechanisms by which any increases in funding appropriated by Congress can be applied.

(c) NATIONAL SPACE GRANT COLLEGE AND FELLOWSHIP PROGRAM AMENDMENTS.—

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

(A) by striking "and" at the end of paragraph (5);

(B) by striking the period at the end of paragraph (6) and inserting "; and"; and

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

"(7) support outreach to primary and secondary schools to help support STEM engagement and learning at the K-12 level and to encourage K-12 students to pursue postsecondary degrees in fields related to space.".

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

(A) in subsection (a)—

(i) by redesignating paragraphs (2) and (3) as paragraphs (3) and (4), respectively; and

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

"(2) INCLUSION OF 2-YEAR INSTITUTIONS.—A space grant regional consortium designated in paragraph (1)(B) may include one or more 2-year institutions of higher education."; and

(B) in subsection (b)(1), by striking "paragraphs (2)(C) and (3)(D)" and inserting "paragraphs (3)(C) and (4)(D)".

Page 71, line 7, strike "12 months" and insert "120 days".

Page 76, strike lines 14 through 20, and insert the following:

(a) STUDY.—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) qualifications for members of the Council;

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

(5) frequency of meetings of the Council;

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

(7) levels of professional staffing for the Council.

In carrying out the assessment, the Academy shall also assess the impacts of broadening the Council's role to advising Congress, and any other issues that the Academy determines could potentially impact the effectiveness of the Council. The Academy shall consider the past activities of the NASA Advisory Council, as well as the activities of other analogous federal advisory bodies in conducting its assessment. The results of the assessment, including any recommendations, shall be transmitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

Page 85, line 10, through page 89, line 20, amend section 711 (as so redesignated) to read as follows:

SEC. 711. DETECTION AND AVOIDANCE OF COUNTERFEIT ELECTRONIC PARTS.

(a) REGULATIONS.—

(1) IN GENERAL.—Not later than 270 days after the date of enactment of this Act, the Administrator shall revise the National Aeronautics and Space Administration Supplement to the Federal Acquisition Regulation to address the detection and avoidance of counterfeit electronic parts.

(2) CONTRACTOR RESPONSIBILITIES.—The revised regulations issued pursuant to paragraph (1) shall provide that—

(A) Administration contractors who supply electronic parts or products that include electronic parts are responsible for detecting and avoiding the use or inclusion of counterfeit electronic parts or suspect counterfeit electronic parts in such products and for any rework or corrective action that may be required to remedy the use or inclusion of such parts; and

(B) the cost of counterfeit electronic parts and suspect counterfeit electronic parts and the cost of rework or corrective action that may be required to remedy the use or inclusion of such parts are not allowable costs under Administration contracts, unless—

(i) the covered contractor has an operational system to detect and avoid counter-

feit parts and suspect counterfeit electronic parts that has been reviewed and approved by the Administration or the Department of Defense;

(ii) the covered contractor provides timely notice to the Administration pursuant to paragraph (4); or

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

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

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

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

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

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

(i) notification of the Administration; and

(ii) inspection, testing, and authentication of electronic parts that the Administration or an Administration contractor or 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 the Administration 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 Administration contractors and subcontractors to identify and use additional suppliers beyond those identified pursuant to subparagraph (C) provided that—

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

(ii) the contractor or subcontractor assumes responsibility for the authenticity of parts provided by such suppliers as provided in paragraph (2); and

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

(4) TIMELY NOTIFICATION.—The revised regulations issued pursuant to paragraph (1) shall require that any Administration contractor or subcontractor who becomes aware, or has reason to suspect, that any end item, component, part, or material contained in supplies purchased by the Administration, or purchased by a contractor or subcontractor for delivery to, or on behalf of, the Administration, contains counterfeit electronic parts or suspect counterfeit electronic parts, shall provide notifi-

cation to the applicable Administration contracting officer within 30 calendar days.

(b) REPORT.—Not later than 120 days after the revised regulations specified in subsection (a) have been implemented, the Administrator shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report updating the Administration's actions to prevent counterfeit electronic parts from entering the supply chain as described in its October 2011 report pursuant to section 1206(d) of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18444(d)).

(c) DEFINITION.—In this section, 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.

Page 92, after line 22, add the following new sections (and conform the table of contents accordingly):

SEC. 713. HUMAN SPACEFLIGHT ACCIDENT INVESTIGATIONS.

Section 70702(a) of title 51, United States Code, is amended by striking paragraph (3) and inserting the following:

"(3) any other orbital or suborbital space vehicle carrying humans—

"(A) that is owned by the Federal Government; or

"(B) that is being used pursuant to a contract or Space Act Agreement, as defined in section 2 of the National Aeronautics and Space Administration Authorization Act of 2014, with the Federal Government for carrying a researcher or payload funded by the Federal Government; or".

SEC. 714. FULLEST COMMERCIAL USE OF SPACE.

(a) REPORT.—Not later than 90 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on current and continuing efforts by the Administration to "seek and encourage, to the maximum extent possible, the fullest commercial use of space," as described in section 20102(c) of title 51, United States Code.

(b) ELEMENTS.—The report required under subsection (a) shall include—

(1) an assessment of the Administration's efforts to comply with the policy;

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

(3) a description of programs, policies, and activities the Administration is using, and will continue to use, to ensure compliance;

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

(5) a summary of all current and planned activities pursuant to this policy.

(c) BARRIERS TO FULLEST COMMERCIAL USE OF SPACE.—Not later than 90 days after the date of enactment of this Act, the Administrator shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on current and continuing efforts by the Administration to reduce impediments, bureaucracy, redundancy, and burdens to ensure the fullest commercial use of space as required by section 20102(c) of title 51, United States Code.

SEC. 715. ORBITAL DEBRIS.

(a) FINDINGS.—Congress finds that orbital debris poses serious risks to the operational space capabilities of the United States and that an international commitment and integrated strategic plan are needed to mitigate the

growth of orbital debris wherever possible. Congress finds the delay in the Office of Science and Technology Policy's submission of a report on the status of international coordination and development of mitigation strategies to be inconsistent with such risks.

(b) REPORTS.—

(1) COORDINATION.—Not later than 90 days after the date of enactment of this Act, the Administrator shall provide the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate with a report on the status of efforts to coordinate with countries within the Inter-Agency Space Debris Coordination Committee to mitigate the effects and growth of orbital debris as required by 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 provide the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate with 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. 716. REVIEW OF ORBITAL DEBRIS REMOVAL CONCEPTS.

(a) SENSE OF CONGRESS.—It is the sense of Congress that the amount of orbital debris in low-Earth orbit poses risks for human activities and robotic spacecraft and that this debris may increase due to collisions between existing debris objects. Understanding options to address and remove orbital debris is important for ensuring safe and effective spacecraft operations in low-Earth orbit.

(b) REVIEW.—The Administrator, in collaboration with other relevant Federal agencies, shall solicit and review concepts and technological options for removing orbital debris from low-Earth orbit. The solicitation and review shall also address the requirements for and feasibility of developing and implementing each of the options.

(c) TRANSMITTAL.—Not later than 270 days after the date of enactment of this Act, the Administrator shall provide a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the

Senate on the solicitation and review required under subsection (b).

SEC. 717. USE OF OPERATIONAL COMMERCIAL SUBORBITAL VEHICLES FOR RESEARCH, DEVELOPMENT, AND EDUCATION.

(a) POLICY.—The Administrator shall develop a policy on the use of operational commercial reusable suborbital flight vehicles for carrying out scientific and engineering investigations and educational activities.

(b) PLAN.—The Administrator shall prepare a plan on the Administration's use of operational commercial reusable suborbital flight vehicles for carrying out scientific and engineering investigations and educational activities. The plan shall—

(1) describe the purposes for which the Administration intends to use such vehicles;

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

(3) describe Administration, space flight operator, and supporting contractor responsibilities for developing standard payload interfaces and conducting payload safety analyses, payload integration

and processing, payload operations, and safety assurance for Administration-sponsored space flight participants, among other functions required to fly Administration-sponsored payloads and space flight participants on operational commercial suborbital vehicles;

(4) identify Administration-provided hardware, software, or services that may be provided to commercial reusable suborbital space flight operators on a cost-reimbursable basis, through agreements or contracts entered into under section 20113(e) of title 51, United States Code; and

(5) describe the United States Government and space flight operator responsibilities for liability and indemnification with respect to commercial suborbital vehicle flights that involve Administration-sponsored payloads or activities, Administration-supported space flight participants, or other Administration-related contributions.

(c) ASSESSMENT OF CAPABILITIES AND RISKS.—The Administrator shall assess and characterize the potential capabilities and performance of commercial reusable suborbital vehicles for addressing scientific research, including research requiring access to low-gravity and microgravity environments, for carrying out technology dem-

onstrations related to science, exploration, or space operations requirements, and for providing opportunities for educating and training space scientists and engineers, once those vehicles become operational. The assessment shall also characterize the risks of using potential commercial reusable suborbital flights to Administration-sponsored researchers and scientific investigations and flight hardware.

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

(e) ANNUAL PROGRESS REPORTS.—In conjunction with the Administration's annual budget request justification for each fiscal year, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate describing progress in carrying out the Commercial Reusable Suborbital Research Program, including the number and type of suborbital missions planned in each fiscal year.

(f) INDEMNIFICATION AND LIABILITY.—The Administrator shall not proceed with a request for proposals, award any contract, commit any United States Government funds, or enter into any other agreement for the provision of a commercial reusable suborbital vehicle launch service for an Administration-sponsored spaceflight participant until transmittal of the plan and assessment specified in subsections (b) and (c), the liability issues associated with the use of such systems by the United States Government have been addressed, and the liability and indemnification provisions that are planned to be included in such contracts or agreements have been provided to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 718. FUNDAMENTAL SPACE LIFE AND PHYSICAL SCIENCES RESEARCH.

(a) SENSE OF CONGRESS.—It the sense of Congress that fundamental, discovery-based space life and physical sciences research is critical for enabling space exploration, protecting humans in space, and providing societal benefits, and that the space environment facilitates the advancement of understanding of the life sciences and physical sciences. Space life and physical science research contributes to advancing science, technology, engineering, and

mathematics research, and provides careers and training opportunities in academia, Federal laboratories, and commercial industry. Congress encourages the Administrator to augment discovery-based fundamental research and to establish requirements reflecting the importance of such research in keeping with the priorities established in the National Academies' decadal survey entitled "Recapturing a Future for Space Exploration: Life and Physical Sciences Research for a New Era".

(b) BUDGET REQUEST.—The Administrator shall include as part of the Administration's annual budget request for each fiscal year a budget line for fundamental space life and physical sciences research, devoted to competitive, peer-reviewed grants, that is separate from the International Space Station Operations account.

(c) STRATEGIC PLAN.—

(1) DEVELOPMENT.—The Administrator, in consultation with academia, other Federal agencies, and other potential stakeholders, shall develop a strategic plan for carrying out competitive, peer-reviewed fundamental space life science and physical sciences and related technology research, among other activities, consistent with the priorities in the National Academies' decadal survey described in subsection (a).

(2) TRANSMITTAL.—Not later than 270 days after the date of enactment of this Act, the Administrator shall transmit the strategic plan developed under paragraph (1) to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 719. RESTORING COMMITMENT TO ENGINEERING RESEARCH.

(a) SENSE OF CONGRESS.—It is the sense of Congress that engineering excellence has long been a hallmark of the Administration's ability to make significant advances in aeronautics and space exploration. However, as has been noted in recent National Academies reports, increasingly constrained funding and competing priorities have led to an erosion of the Administration's commitment to basic engineering research. This research provides the basis for the technology development that enables the Administration's many challenging missions to succeed. If current trends continue, the Administration's ability to attract and maintain the best and brightest engineering workforce at its Centers as well as its ability to remain on the cutting edge of aeronautical and space technology will continue to erode and will threaten the Administra-

tion's ability to be a world leader in aeronautics research and development and space exploration.

(b) PLAN.—The Administrator shall develop a plan for restoring a meaningful basic engineering research program at the Administration's Centers, including, as appropriate, collaborations with industry, universities, and other relevant organizations. The plan shall identify the organizational approach to be followed, an initial set of basic research priorities, and a proposed budget.

(c) REPORT.—Not later than 180 days after the date of enactment of this Act, the Administrator shall transmit the plan specified in subsection (b) to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 720. LIQUID ROCKET ENGINE DEVELOPMENT PROGRAM.

The Administrator shall consult with the Secretary of Defense to ensure that any next generation liquid rocket engine made in the United States for national security space launch objectives can contribute, to the extent practicable, to the space programs and missions carried out by the Administration.

SEC. 721 REMOTE SATELLITE SERVICING DEMONSTRATIONS.

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

(1) the Administration plays a key role in demonstrating the feasibility of using robotic technologies for a spacecraft that could autonomously access, inspect, repair, and refuel satellites;

(2) demonstrating this feasibility would both assist the Administration in its future missions and provide other Federal agencies and private sector entities with enhanced confidence in the feasibility to robotically refuel, inspect, repair, and maintain their satellites in both near and distant orbits; and

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

(b) REPORT.—Not later than 120 days after the date of enactment of this Act, the Administrator shall transmit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate describing the Administration's—

(1) activities, tools, and techniques associated with the ultimate goal of autonomously servicing satellites using robotic spacecraft;

(2) efforts to coordinate its technology development and demonstrations with other Federal agencies and private sector entities that conduct programs, projects, or activities on on-orbit satellite inspection and servicing capabilities;

(3) efforts to leverage the work of these Federal agencies and private sector entities into the Administration's plans;

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

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

(6) demonstrations needed to increase confidence in the use of the technologies for operational missions, and the timeframe for these demonstrations.

SEC. 722. INFORMATION TECHNOLOGY GOVERNANCE.

(a) SENSE OF CONGRESS.—It is the sense of Congress that information security is central to the Administration's ability to protect information and information systems vital to its mission.

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

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

(2) the effectiveness of the Administration's decentralized information technology structure, decisionmaking processes and authorities and its ability to enforce information security; and

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

(c) REPORT.—Not later than 1 year after the date of enactment of this Act, the Comptroller General shall transmit a report detailing the results of the study conducted under subsection (b) to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

SEC. 723. STRENGTHENING ADMINISTRATION SECURITY.

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

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

(2) The assessment by the National Academy of Public Administration concluded that "NASA networks are compromised", that the Administration lacked a standardized and systematic approach to export compliance, and that individuals within the Administration were not held accountable when making serious, preventable errors in carrying out Foreign National Access Management practices and other security matters.

(b) REPORT.—Not later than 90 days after the date of enactment of this Act, the Administration shall report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on how it plans to address each of the recommendations made in

the security assessment by the National Academy of Public Administration.

(c) REVIEW.—Within one year of enactment of this Act, the Comptroller General of the United States shall report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate its assessment of how the Administration has complied with the recommendations of the National Academy of Public Administration.

SEC. 724. PROHIBITION ON USE OF FUNDS FOR CONTRACTORS THAT HAVE COMMITTED FRAUD OR OTHER CRIMES.

None of the funds authorized to be appropriated or otherwise made available for fiscal year 2014 or any fiscal year thereafter for the Administration may be used to enter into a contract with any offeror or any of its principals if the offeror certifies, pursuant to the Federal Acquisition Regulation, that the offeror or any of its principals—

(1) within a three-year period preceding this offer has been convicted of or had a civil judgment rendered against it for—

(A) commission of fraud or a criminal offense in connection with obtaining, attempting

to obtain, or performing a public (Federal, State, or local) contract or subcontract;

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

(C) commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating Federal criminal tax laws, or receiving stolen property;

(2) are presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in paragraph (1); or

(3) within a three-year period preceding this offer, has been notified of any delinquent Federal taxes in an amount that exceeds $3,000 for which the liability remains unsatisfied.

SEC. 725. PROTECTION OF APOLLO LANDING SITES.

(a) ASSESSMENT.—The Director of the Office of Science and Technology Policy, in consultation with all relevant agencies of the Federal Government and other appropriate entities and individuals, shall carry out a review and assessment of the issues involved in 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. The review and assessment shall, at a minimum, include determination of what risks to the protection and preservation of those sites and artifacts exist or may exist in the future, what measures are required to ensure such protection and preservation, the extent to which additional domestic legislation or international treaties or agreements will be required, and specific recommendations for protecting and preserving those lunar landing sites and artifacts.

(b) REPORT.—Not later than one year after the date of enactment of this Act, the Director shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate the results of the assessment required under subsection (a).

SEC. 726. ASTRONAUT OCCUPATIONAL HEALTHCARE.

(a) IN GENERAL.—The National Academies' Institute of Medicine report "Health Standards for Long Duration and Exploration Spaceflight: Ethics Principles, Responsibilities, and Decision Framework" found that the Administration has ethical responsibilities for and should adopt policies and processes related to health standards for long duration and exploration spaceflights that recognize those ethical responsibilities. In particular, the report

recommended that the Administration "provide preventative long-term health screening and surveillance of astronauts and lifetime health care to protect their health, support ongoing evaluation of health standards, improve mission safety, and reduce risks for current and future astronauts".

(b) RESPONSE.—The Administration shall prepare a response to the National Academies report recommendation described in subsection (a). The response shall include the estimated budgetary resources required for the implementation of those recommendations, and any options that might be considered as part of the response.

(c) TRANSMITTAL.—The response required under subsection (b) shall be transmitted to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate not later than 6 months after the date of enactment of this Act.

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COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
Full Committee Markup
April 29, 2014

AMENDMENT ROSTER

H.R. 4412, *the "National Aeronautics and Space Administration Authorization Act of 2014"*

No.	Amendment	Summary	
1	**Amendment Offered by Rep. Edwards (MD) and Rep. Palazzo (MS) (002)**	Reflects a bipartisan agreement on funding, direction, and policy guidance for NASA.	**Agreed to by Voice Vote**