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National Aeronautics and Space Administration Transition Authorization Act of 2016

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Sponsor

Name: Sen. Cruz, Ted [R-TX]
Party: Republican • **State:** TX • **Chamber:** Senate

Cosponsors (8 total)

Cosponsor	Party / State	Role	Date Joined
Sen. Nelson, Bill [D-FL]	D · FL		Sep 15, 2016
Sen. Peters, Gary C. [D-MI]	D · MI		Sep 15, 2016
Sen. Rubio, Marco [R-FL]	R · FL		Sep 15, 2016
Sen. Udall, Tom [D-NM]	D · NM		Sep 15, 2016
Sen. Wicker, Roger F. [R-MS]	R · MS		Sep 15, 2016
Sen. Cantwell, Maria [D-WA]	D · WA		Sep 19, 2016
Sen. Thune, John [R-SD]	R · SD		Sep 19, 2016
Sen. Murray, Patty [D-WA]	D · WA		Sep 27, 2016

Committee Activity

Committee	Chamber	Activity	Date
Commerce, Science, and Transportation Committee	Senate	Reported By	Dec 5, 2016

Subjects & Policy Tags

Policy Area:

Science, Technology, Communications

Related Bills

Bill	Relationship	Last Action
114 HR 6531	Related bill	**Dec 20, 2016:** Referred to the House Committee on Science, Space, and Technology.
114 HR 6076	Related bill	**Dec 8, 2016:** Received in the Senate.

Summary (as of Dec 10, 2016)

National Aeronautics and Space Administration Transition Authorization Act of 2016

TITLE I--AUTHORIZATION OF APPROPRIATIONS

(Sec. 101) This bill authorizes appropriations to the National Aeronautics and Space Administration (NASA) for FY2017 for:

- exploration;
- space operations;
- science;
- aeronautics;
- space technology;
- education;
- safety, security, and mission services;
- construction and environmental compliance and restoration; and
- the NASA Inspector General.

TITLE II--SUSTAINING NATIONAL SPACE COMMITMENTS

(Sec. 201) The bill expresses the sense of Congress that NASA should be a multi-mission space agency and should have a balanced and robust set of core missions in space science, space technology, aeronautics, human space flight and exploration, and education.

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

(Sec. 301) The bill states that the primary objectives of the International Space Station (ISS) program shall be to:

- achieve the long-term goal and objectives for human space flight and exploration as specified in the National Aeronautics and Space Administration Authorization Act of 2010, and
- pursue a research program that advances knowledge and provides other benefits to the nation.

The bill restates that it shall be U.S. policy, in consultation with its international partners in the ISS program, to support full and complete utilization of the ISS through at least 2024.

In furthering such policy, NASA shall:

- pursue international, commercial, and intragovernmental means to maximize ISS logistics supply, maintenance, and operational capabilities, reduce risks to ISS systems sustainability, and offset and minimize U.S. operations costs relating to the ISS;
- utilize the ISS for the development of capabilities and technologies needed for the future of human space exploration beyond low-Earth orbit; and
- utilize the ISS for Science Mission Directorate missions in low-Earth orbit.

(Sec. 302) It is the sense of Congress that:

- NASA should build upon the success of the Commercial Orbital Transportation Services and Commercial Resupply

Services programs that have allowed private sector companies to partner with NASA to deliver cargo and scientific experiments to the ISS since 2012, and
- the 21st Century Launch Complex Program should be continued so as to leverage state and private investments to achieve such program's goals.

Congress reaffirms:

- its commitment to the use of a commercially developed, private sector launch and delivery system to the ISS for crew missions; and
- the requirement that NASA shall make use of U.S. commercially provided ISS crew transfer and crew rescue services.

The federal government may not acquire human space flight transportation services from a foreign entity unless:

- there is no U.S. government-operated human space flight capability available,
- there is no U.S. commercial provider available, and
- it is a qualified foreign entity.

The bill declares that nothing in this section shall prevent NASA from negotiating or entering into human space flight transportation arrangements with foreign entities to ensure safety of flight and continued ISS operations.

NASA shall protect the safety of government astronauts by ensuring that each commercially provided transportation system under the Commercial Crew Program meets all applicable human rating requirements under specified federal law.

Consistent with the findings and recommendations of the Columbia Accident Investigation Board, NASA shall ensure that safety and the minimization of the probability of loss of crew are the critical priorities of such program.

NASA 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.

The Commercial Orbital Transportation Services Program is renamed the Commercial Resupply Services Program.

The bill declares that it is U.S. policy that, in order to foster the competitive development, operation, improvement, and commercial availability of space transportation services, and to minimize the life cycle cost to NASA, NASA shall procure services for federal government access to and return from the ISS by fair and open competition for well-defined, milestone-based, Federal Acquisition Regulation-based contracts.

NASA shall, in a manner that does not add costs or schedule delays to the Commercial Crew and Commercial Resupply Services programs, ensure that all providers of such programs furnish evidence-based support for their costs and schedules.

NASA shall submit to Congress a report:

- identifying the lessons learned to date from previous and existing Commercial Resupply Services contracts,
- indicating whether changes are needed as to the manner in which NASA procures and manages similar services prior to the issuance of future Commercial Resupply Services procurement opportunities, and
- identifying any lessons learned from the Commercial Resupply Services contracts that should be applied to the

procurement and management of commercially provided crew transfer services to and from the ISS or to other future procurements.

(Sec. 303) NASA shall develop a plan for transitioning the ISS from the current regime that relies heavily on NASA sponsorship to a regime where NASA could be one of many customers of a low-Earth orbit non-governmental human space flight enterprise.

NASA shall submit biennial reports until 2023 which include:

- a description of the progress NASA is making in achieving its deep space human exploration objectives on the ISS and prospects for accomplishing future mission requirements, space exploration objectives, and other research objectives on future commercially supplied low-Earth orbit platforms or migration of those objectives to cis-lunar space;
- steps NASA is taking and will take, including demonstrations that could be conducted on the ISS, to stimulate and facilitate commercial demand and supply of products and services in low-Earth orbit;
- identification of barriers preventing the commercialization of low-Earth orbit;
- the cost estimates for extending operations of the ISS to 2024, 2028, and 2030;
- evaluation of the feasible and preferred service life of the ISS beyond September 30, 2024, through at least 2028, as a unique scientific, commercial, and exploration-related facility; and
- the impact on deep space exploration capabilities, including a crewed mission to Mars in the 2030s, if the preferred service life of the ISS is extended beyond 2024 and NASA maintains a flat budget profile.

The bill defines "cis-lunar space" as the region of space from the Earth out to and including the region around the surface of the Moon.

If additional government crew, power, and transportation resources are available after meeting NASA's requirements for ISS activities as defined in the Human Exploration Roadmap to be developed pursuant to section 432 of this bill and related research, demonstrations identified in the biennial reports may:

- test the capabilities needed to meet future mission requirements, space exploration objectives, and other research objectives described in such reports; and
- demonstrate or test capabilities, including those for commercial modules or deep space habitats, Environmental Control and Life Support Systems, orbital satellite assembly, and exploration space suits.

(Sec. 304) NASA shall develop a plan for meeting NASA's projected space communication and navigation needs for low-Earth orbit and deep space operations in the 20-year period following enactment of this bill.

Such plan shall include:

- the lifecycle cost estimates and a 5-year funding profile,
- the performance capabilities required to meet NASA's projected space communication and navigation needs,
- an identification of the projected space communications and navigation network and infrastructure needs,
- an identification of the projected Tracking and Data Relay Satellite System needs in the 20-year period following this bill's enactment, and
- the measures NASA is taking to mitigate threats to electromagnetic spectrum use.

(Sec. 305) Any contract between NASA and a provider (a person that provides domestic launch or domestic reentry

services to the federal government) may provide that the United States will indemnify that provider against successful claims (including reasonable expenses of litigation or settlement) by third parties for death, bodily injury, or loss of or damage to property resulting from launch services and reentry services carried out under the contract that are defined in it as unusually hazardous or nuclear in nature, but only to the extent the total amount of successful claims related to the activities under that contract:

- is more than the amount of insurance or demonstration of financial responsibility, and
- is not more than $1.5 billion (plus additional amounts necessary to reflect inflation occurring after January 1, 1989) above such insurance or financial responsibility amount.

A contract made under this section that provides indemnification shall provide for:

- notice to the United States of any claim or suit against the provider for death, bodily injury, or loss of or damage to property; and
- control of or assistance in the defense by the United States, at its election, of such claim or suit and approval of any settlement.

A provider that has a contract with NASA under this section shall obtain liability insurance or demonstrate financial responsibility in amounts to compensate for the maximum probable loss from claims by:

- a third party for death, bodily injury, or property damage or loss resulting from a launch service or reentry service carried out under the contract; and
- the federal government for damage or loss to government property resulting from a launch service or reentry service carried out under such contract.

NASA shall determine maximum probable losses within 90 days of the provider requesting such a determination and submitting all of the information that NASA requires. NASA may revise such a determination based on new information.

For the total claims related to one launch or reentry, a provider shall not be required to obtain insurance or demonstrate financial responsibility of more than:

- $500 million with respect to a third party, or $100 million with respect to the federal government; or
- the maximum liability insurance available on the world market at reasonable cost.

An insurance policy or demonstration of financial responsibility regarding this section shall protect to the extent of their potential liability for involvement in launch services or reentry services the federal government, its personnel and related entities, related entities of the provider, and government astronauts.

NASA may not indemnify a provider under this section until there is a cross-waiver between NASA and the provider.

The bill states that NASA shall reciprocally waive claims with a provider under which each party agrees to be responsible and agrees to ensure that its related entities are responsible for damage or loss to its property, or for losses resulting from any injury or death sustained by its employees or agents. Such a waiver shall apply only to the extent that the claims are more than the amount of insurance or demonstration of financial responsibility.

Indemnification under this section may exclude claims that result from the willfull misconduct of the provider or its related entities.

No payment may be made under this section unless NASA or its designee certifies that the amount is just and reasonable.

NASA may not provide indemnification under this section for an activity requiring a license or permit under provisions relating to commercial space launch activities.

TITLE IV--ADVANCING HUMAN DEEP SPACE EXPLORATION

Subtitle A--Human Space Flight and Exploration Goals and Objectives

(Sec. 411) The bill states that the long-terms goals for the human space flight and exploration efforts of NASA shall be:

- to expand permanent human presence beyond low-Earth orbit, and to do so where practical, with the involvement of international, academic, and industry partners ,
- crewed missions and progress toward achieving the expansion of human presence beyond low-Earth orbit to enable the potential for subsequent human exploration and the extension of human presence throughout the solar system, and
- to enable a capability to extend human presence, including potential human habitation on another celestial body and a thriving space economy in the 21st Century.

(Sec. 412) The key U.S. objectives for human expansion into space shall include achieving human exploration of Mars and beyond through the prioritization of those technologies and capabilities best suited for such a mission in accordance with the stepping stone approach to exploration specified in federal law.

(Sec. 413) NASA shall manage human space flight programs, including the Space Launch System (SLS) and the Orion multipurpose crew vehicle, to enable humans to explore Mars and other space destinations.

(Sec. 414) NASA may conduct missions to intermediate destinations, including the surface of Mars, cis-lunar space, near-Earth asteroids, Lagrangian points, and Martian moons, in order to achieve the objective of human exploration of Mars.

The bill declares that in order to maximize the cost-effectiveness of the long-term exploration and utilization activities of the United States, NASA shall take all necessary steps, including engaging international, academic, and industry partners, to ensure that activities in NASA's human exploration program balance how those activities might also help meet the requirements of future exploration and utilization activities leading to human habitation on the surface of Mars.

Within budgetary considerations, once an exploration-related project enters its development phase, NASA shall seek to complete such project without any undue delays.

Furthermore, in order to achieve the goal of successfully conducting a crewed mission to the surface of Mars, the President may invite U.S. partners in the ISS program and other nations, as appropriate, to participate in an international initiative under the leadership of the United States.

(Sec. 415) NASA shall implement an exploration research and technology development program for enabling human and robotic operations.

(Sec. 417) The bill declares that in order to ensure continuous U.S. participation and leadership in the exploration and use of space and as an essential instrument of national security, it is U.S. policy to maintain uninterrupted capability for

human space flight and operations:

- in low-Earth orbit; and
- beyond low-Earth orbit once the capabilities described in section 421 of this bill become available.

NASA shall submit annual reports to Congress which describe the progress being made toward the development of the SLS and Orion.

Subtitle B--Assuring Core Capabilities for Exploration

(Sec. 421) Congress reaffirms the policy and minimum capability requirements for the SLS.

NASA should budget for and undertake a ground test and uncrewed and crewed flight test and demonstration program for the SLS and Orion in order to promote safety and reduce programmatic risk.

NASA shall continue the development of the fully integrated SLS, including an upper stage needed to go beyond low-Earth orbit, in order to safely enable human space exploration of the Moon, Mars, and beyond over the course of the next century.

NASA shall also continue the development of:

- an uncrewed exploration mission to demonstrate the capability of the SLS and Orion as an integrated system by 2018;
- a crewed exploration mission to demonstrate the SLS, including the core stage and exploration upper stages by 2021;
- subsequent missions beginning with the EM-3 at operational flight rate sufficient to maintain safety and operational readiness using the SLS and Orion to extend into cis-lunar space and eventually to Mars; and
- a deep space habitat as a key element in a deep space exploration architecture along with the SLS and Orion.

NASA shall assess the utility of the SLS for use by the science community and for other federal government launch needs, including considering the overall cost and schedule savings from reduced transit times and increased science returns enabled by the capabilities of the SLS.

NASA, in consultation with the Department of Defense and the Office 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 SLS configuration specified in federal law.

In preparing such report NASA shall:

- consider the technical requirements of the scientific and national security communities related to a cargo variant of the SLS; and
- assess the utility and estimated cost savings obtained by using such a cargo variant for national security and space science missions.

Subtitle C--Journey to Mars

(Sec. 432) NASA shall develop a human exploration roadmap, including a critical decision plan, for expanding human presence beyond low-Earth orbit to the surface of Mars and beyond, considering potential interim destinations such as cis-lunar space and the moons of Mars.

The human exploration roadmap shall include:

- an integrated set of exploration, science, and other goals and objectives of a U.S. human space exploration program with the long-term goal of human missions near or on thesurface of Mars in the 2030s;
- sets and sequences of precursor missions in cis-lunar space and other missions or activities necessary to demonstrate the proficiency of the specific capabilities and technologies identified in the roadmap and to meet the goals and objectives developed under the human space exploration program, including anticipated timelines and missions for the SLS and Orion;
- an identification of the specific capabilities and technologies, including the SLS, Orion, a deep space habitat, and other capabilities, that facilitate the goals and objectives developed under such program; and
- a description of how cis-lunar elements, objectives, and activities advance the human exploration of Mars.

As part of the human exploration roadmap, NASA shall include a critical decision plan that:

- identifies and defines key decisions to guide human space exploration priorities and plans that need to be made by June 30, 2020;
- define decisions needed to maximize efficiencies and resources for reaching the near, intermediate, and long-term goals and objectives of space exploration; and
- identifies and defines timelines and milestones for a sustainable cadence of missions beginning with EM-3 for the SLS and Orion to extend human exploration from cis-lunar space to the surface of Mars.

NASA shall submit an initial human exploration roadmap, including a critical decision plan, by December 1, 2017, and updated roadmaps at least biennially.

(Sec. 433) NASA shall submit a plan for achieving an advanced space suit capability that aligns with crew needs for exploration enabled by the SLS and Orion, including an evaluation of the merit of delivering the planned suit system for use on the ISS.

(Sec. 434) NASA shall evaluate:

- those alternative approaches to the Asteroid Robotic Redirect Mission that demonstrate the technologies and capabilities needed for a human mission to Mars;
- the scientific and technical benefits of those approaches; and
- the commercial benefits of those approaches, including their impact on the development of domestic solar electric propulsion technology to bolster U.S. competitiveness in the global marketplace.

(Sec. 435) NASA shall contract with an independent, non-governmental systems engineering and technical assistance organization to study the feasibility of the launch of a human space flight mission to Mars in 2033.

Such study shall include:

- a technical development, test, fielding, and operations plan using the SLS, Orion, and other systems to successfully launch such a mission to Mars by 2033; and
- an annual budget profile, including cost estimates, for the technical development, test, fielding, and operations plan to carry out such a mission.

NASA shall submit an assessment by the NASA Advisory Council as to whether the proposal for the launch of a human space flight mission to Mars in 2033 is in the strategic interests of the United States in space exploration.

Subtitle D--TREAT Astronauts Act

To Research, Evaluate, Assess, and Treat Astronautct or the TREAT Astronauts Act

(Sec. 443) NASA may provide for:

- the medical monitoring and diagnosis of a former U.S. government astronaut or former payload specialist for conditions that NASA considers potentially associated with human space flight; and
- the treatment of such an astronaut or payload specialist for conditions that NASA considers associated with human space flight, including scientific and medical tests for psychological and medical conditions.

The bill states that such medical monitoring, diagnosis, or treatment shall be provided without any deductible, copayment, or other cost sharing obligation.

Such medical monitoring, diagnosis, and treatment may be provided by a local health care provider if it is unadvisable due to the health of a former astronaut or former payload specialist for such astronaut or payload specialist to travel to the Lyndon B. Johnson Space Center.

Payment or reimbursement for medical monitoring, diagnosis, or treatment shall be secondary to any obligation of the federal government or any third party to pay for or provide that monitoring, diagnosis, or treatment.

Costs for items and services that may be provided by NASA for medical monitoring, diagnosis, or treatment that are not paid for or provided because of the application of deductibles, copayments, coinsurance, other cost sharing, are reimbursable by NASA on behalf of the former U.S. government astronaut or former payload specialist to the extent that those items or services are authorized to be provided by NASA for such monitoring, diagnosis, or treatment.

NASA may provide for conditional payments for or provide medical monitoring, diagnosis, or treatment if:

- payment for such medical monitoring, diagnosis, or treatment services has not been made or cannot reasonably be expected to be made promptly; and
- such payment by NASA is conditioned on reimbursement by the United States or such third party for such medical monitoring, diagnosis, or treatment.

NASA may not:

- provide for medical monitoring, or diagnosis of a former U.S. astronaut or former payload specialist for any psychological or medical condition that is not potentially associated with human space flight;
- provide for treatment of such an astronaut or payload specialist for any psychological or medical condition that is not associated with human space flight; or
- require such an astronaut or payload specialist to participate in the medical monitoring, diagnosis, or treatment authorized by this section.

NASA shall protect the privacy of all medical records generated with respect to such medical monitoring, diagnosis, and treatment and accessible to NASA.

The term "government astronaut" does not include individuals who are international partner astronauts.

NASA may use or disclose data acquired in the course of medical monitoring, diagnosis, or treatment of a former U.S. government astronaut or former payload specialist. Participation by such an astronaut or payload specialist in medical

monitoring, diagnosis, or treatment under this section shall constitute consent for NASA to use or disclose such data.

NASA shall publish annual reports on its activities, including a cost accounting of those activities and a five-year budget estimate.

NASA shall arrange with an independent external organization to undertake an independent cost estimate of the cost to NASA and the federal government in the implementation and administration of such activities.

NASA shall study any potential privacy or legal issues related to the possible sharing beyond the federal government of data acquired under the activities of NASA under this section.

The NASA Inspector General shall periodically audit or review NASA's activities under this section to prevent waste, fraud, and abuse.

TITLE V--ADVANCING SPACE SCIENCE

(Sec. 501) The bill states that it is U.S. policy to ensure a steady cadence of large, medium, and small science missions.

(Sec. 502) In accordance with the priorities established in the most recent decadal survey for planetary science, NASA shall ensure the completion of a balanced set of Discovery, New Frontiers, and Flagship missions at the cadence recommended by such survey.

Consistent with such set of missions and while maintaining the continuity of scientific data and steady development of capabilities and technologies, NASA may seek, if necessary, adjustments to mission priorities, schedule, and scope as a result of changing budget projections.

(Sec. 503) NASA should continue robust surveillance of the performance of the James Webb Space Telescope project and continue to improve the reliability of cost estimates and contractor performance data and other major spaceflight projects so as to enhance its ability to deliver the telescope on-time and within budget.

NASA should ensure that integrated testing is appropriately timed and sufficiently comprehensive to enable potential issues to be identified and addressed early enough to be handled within the telescope's development schedule and prior to its launch.

(Sec. 504) NASA should make progress on the technologies and capabilities needed to position it to meet the objectives of the Wide-Field Infrared Survey Telescope (WFIRST), 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.

NASA shall ensure that the concept definition and pre-formulation activities of the WFIRST mission continue while the James Webb Space Telescope is being completed.

(Sec. 505) The bill expresses the sense of Congress that the Mars 2020 mission, to develop a Mars rover and to enable the return of samples to Earth, should remain a priority for NASA.

Such mission should also:

- significantly increase our understanding of Mars,
- help determine whether life previously existed on that planet, and

provide opportunities for gathering knowledge and demonstrating technologies that address the challenges of future human expeditions to Mars.

(Sec. 506) The bill expresses the sense of Congress that a scientific, robotic exploration mission to Europa (a moon orbiting Jupiter), as prioritized in the previous and current Planetary Science Decadal Surveys, should be supported.

(Sec. 507) The bill includes the search for life's origin, evolution, distribution, and future in the universe as an objective of U.S. aeronautical and space activities.

(Sec. 508) NASA shall arrange 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 telescopes, spacecraft, or instruments, as appropriate.

The strategy shall:

- outline key scientific questions;
- identify the most promising research in the field;
- indicate the extent to which the mission priorities in existing decadal surveys address the key extrasolar planet research and exploration goals;
- identify opportunities for coordination with international, commercial, and not-for-profit partners; and
- make recommendations regarding these activities, as appropriate.

NASA shall use this strategy to:

- inform its roadmaps, strategic plans, and other activities as they relate to extrasolar planet research and exploration; and
- provide a foundation for future activities and initiatives related to such research and exploration.

The National Academies shall submit a report to NASA and Congress containing the strategy.

(Sec. 509) NASA shall arrange 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.

This strategy shall include recommendations for coordinating with international partners.

NASA shall use such strategy in planning and funding research and other activities and initiatives in the field of astrobiology.

The National Academies shall submit a report to NASA and Congress containing the strategy.

(Sec. 510) NASA shall submit a report that describes how it can expand collaborative partnerships to study life's origins, evolution, distribution, and future in the universe.

(Sec. 511) The Office of Science and Technology Policy (OSTP) and NASA shall submit an initial report that provides:

- recommendations for carrying out the Near-Earth Object Survey program and an associated proposed budget;

an analysis of possible options that 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 it in the event of the discovery of such an object.

NASA shall submit annual reports that include:

- a summary of all activities carried out under the Survey program since this bill's enactment, including the progress toward achieving 90% completion of the Near-Earth Object Survey to detect, track, catalogue, and characterize the physical characteristics of near-Earth objects that are equal to or greater than 140 meters in diameter in order to assess their threat to the Earth; and
- a summary of the expenditures for all activities carried out under the survey program since this bill's enactment.

NASA shall carry out a technical and scientific assessment of the capabilities and resources to:

- accelerate the survey; and
- expand such program to include the detection, tracking, cataloguing, and characterization of potentially hazardous near-Earth objects that are less than 140 meters in diameter.

(Sec. 512) NASA shall report on how it can expand collaborative partnerships for the detection, tracking, cataloguing, and categorizing of near-Earth objects.

(Sec. 513) NASA shall carry out triennial (under current law, biennial) reviews within each of its 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.

In conducting such an assessment, NASA shall consider whether and how extending missions impacts the start of future missions.

When deciding whether to extend a mission that has an operational component, NASA shall:

- consult with any affected federal agency; and
- take into account the potential benefits of instruments on such missions that are beyond their planned mission lifetime.

NASA shall report on any such assessment that was carried out during the previous year.

(Sec. 514) NASA may not terminate science operations of the Stratospheric Observatory for Infrared Astronomy before December 31, 2017.

(Sec. 515) OSTP and NASA shall analyze:

- NASA requirements 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
- the risks to NASA missions in meeting those requirements, or any additional requirements, resulting from a lack of adequate radioisotope power system material.

(Sec. 516) NASA shall arrange with National Academies of Science, Engineering, and Medicine to assess:

NASA's Mars exploration architecture and its responsiveness to the strategies, priorities, and guidelines put forward by the National Academies' planetary decadal surveys and other relevant National Academies Mars-related reports;
- the long-term goals of NASA's Mars Exploration Program and that program's ability to optimize the science return, given its current fiscal posture;
- the Mars exploration architecture's relationship to Mars-related activities to be undertaken by foreign agencies and organizations; and
- the extent to which such architecture represents a reasonably balanced mission portfolio.

(Sec. 517) NASA shall continue to develop first-of-a-kind instruments that, once proved, can be transitioned to other agencies for operations. Whenever responsibilities for the development of sensors or for measurements are transferred to NASA from another agency, NASA shall seek to be reimbursed for assuming those responsibilities.

TITLE VI--AERONAUTICS

(Sec. 602) The bill expresses the sense of Congress that NASA should look strategically into the future and ensure that its Center personnel are at the leading edge of aeronautics research by encouraging investigations into the early-stage advancement of new processes, novel concepts, and innovative technologies that have the potential to meet the nation's aeronautics needs.

(Sec. 603) NASA shall submit to Congress a research and development roadmap for hypersonic aircraft research, the objective of which is the exploration of hypersonic science and technology using air-breathing propulsion concepts.

Such roadmap shall recommend appropriate federal agency contributions, coordination efforts, and technology milestones.

(Sec. 604) NASA shall submit to Congress a roadmap that allows for flexible funding profiles for supersonic aeronautics research and development, the objective of which is the development and demonstration of airframe and propulsion technologies to minimize the environmental impact, including noise, of supersonic overland flight.

(Sec. 605) NASA shall submit a roadmap for research relating to rotocraft and other runway-independent air vehicles, the objective of which is the development and demonstration of improved safety, noise, and environmental impact of such vehicles.

TITLE VII--SPACE TECHNOLOGY

(Sec. 701) The bill states it is U.S. policy that NASA shall develop propulsion technologies to support:

- its core missions in science, aeronautics, and human space flight and exploration; and
- sustained investments in early stage innovation, fundamental research, and technologies to expand the boundaries of the nation's aerospace enterprise.

Furthermore, a goal of such technologies shall be to significantly reduce the amount of time it takes for human travel to Mars.

(Sec. 702) NASA shall conduct a space technology program to research and develop advanced space technologies that could deliver innovative solutions across NASA's space exploration and science missions.

In conducting the program, NASA shall consider:

- the recommendations of the National Academies' review of NASA's Space Technology roadmaps and priorities; and
- the applicable enabling aspects of the stepping stone approach to space exploration.

In conducting the program, NASA shall:

- use a competitive process to select research and development projects;
- use small satellites and NASA's suborbital and ground-based platforms to demonstrate space technology concepts and developments; and
- partner with other federal agencies, universities, private industry, and foreign countries, as appropriate.

NASA shall organize and and manage its Small Business Innovation Research and Small Business Technology Transfer Programs within the program.

NASA shall submit a budget for each fiscal year, as transmitted to Congress for the President's annual budget submission, which avoids duplication of projects, programs, or missions conducted under the program with others conducted by another office or directorate of NASA.

NASA shall ensure that:

- its projects, programs, and activities in support of technology research and development of advanced space technologies are fully coordinated and aligned;
- the results of such projects, programs, and activities are shared and leveraged within NASA; and
- the organizational responsibility for research and development activities in support of human space exploration not initiated as of this bill's enactment is established based on sound rationale.

It is the sense of Congress that projects, programs, and missions being conducted by the Human Exploration and Operations Mission Directorate in support of research and development of advanced space technologies and systems focusing on human space exploration should continue in such directorate.

NASA shall provide a report to Congress that:

- compares 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; and
- identifies how NASA will address any gaps between its investments and the recommended technology areas (including a projection of funding requirements), and
- identifies the sound rationale upon which the organizational responsibility for research and development activities in support of human space exploration not yet initiated shall be based.

NASA shall include in its annual budget request for each fiscal year the rationale for assigning organizational responsibility for, in the year prior to the budget fiscal year, each initiated project, program, and mission focused on research and development of advanced technologies for human space exploration.

TITLE VIII--MAXIMIZING EFFICIENCY

Subtitle A--Agency Information Technology and Cybersecurity

(Sec. 811) NASA shall take specified actions governing its information technology operations and investments, including those that:

- ensure the NASA Chief Information Officer, Mission Directorates, and Centers have appropriate roles in the management, governance, and oversight processes related to information technology operations and investments and information security programs for the protection of NASA systems;
- ensure the NASA Chief Information Officer has the appropriate resources and insight to oversee NASA information technology and information security operations and investments;
- provide an information technology program management framework; and
- improve the operational linkage between the NASA Chief Information Officer and each NASA mission directorate, center, and mission support office.

The Government Accountability Office shall conduct a study of the effectiveness of NASA's Information Technology Governance to ensure that its information technology resources are aligned with its missions and are cost effective and secure.

(Sec. 812) NASA shall develop a specified information technology strategic plan to guide NASA information technology management and strategic objectives.

The plan shall include:

- near and long-term goals and objectives for leveraging information technology,
- a plan on how NASA will submit a list of information technology projects to Congress,
- an implementation overview for an agency-wide approach to information technology investments and operations,
- a plan to increase the efficiency and effectiveness of information technology investments,
- a plan for improving the information security of NASA information and NASA information systems, and
- submission by NASA to Congress of information regarding high risk projects and cybersecurity risks.

NASA shall submit such plan and any plan updates to Congress.

(Sec. 813) NASA shall implement a specified agency-wide information security plan to enhance information security for NASA information and information infrastructure.

The plan shall include:

- an overview of the requirements for the information security system;
- an agency-wide risk management framework for information security;
- an identification and assignment of the roles, responsibilities, and management commitment for information security at NASA; and
- the need to protect the information security of mission-critical systems and activities and high-impact and moderate-impact information systems.

(Sec. 814) NASA shall notify Congress when it has implemented the information security recommendations from the National Academy of Public Administration on foreign national access management, based on reports from January 2014 and March 2016.

(Sec. 815) NASA shall:

develop a plan to fully remediate security vulnerabilities in NASA web applications, and
- provide an update on it plan to implement the recommendations from the NASA Inspector General in a specified audit report to remove from the Internet or otherwise secure all of NASA's web applications in development or testing mode.

Subtitle B--Collaboration Among Mission Directorates and Other Matters

(Sec. 821) NASA shall encourage an interdisciplinary approach among all NASA mission directorates and divisions for projects or missions to:

- improve coordination, and encourage collaboration and early planning on scope;
- determine areas of overlap or alignment;
- leverage across divisional perspectives to maximize outcomes; and
- be more efficient with resources and funds.

(Sec. 822) NASA shall pursue a strategy for acquiring crewed transportation services and non-crewed launch services that continues to enhance communication, collaboration, and coordination between the Launch Services and Commercial Crew programs.

(Sec. 823) The bill expresses the sense of Congress that the presence of counterfeit electronic parts in NASA's supply chain poses a danger to astronauts, crew, and other NASA personnel and a risk to NASA overall.

NASA shall revise specified regulations to improve the detection and avoidance of counterfeit electronic parts in its supply chain and impose requirements on contractors for detecting and avoiding the use of counterfeit parts.

(Sec. 824) NASA shall continue engagement with the public and education opportunities for students using all NASA mission directorates.

NASA shall report on its near-term outreach plans for advancing space law education.

(Sec. 825) NASA shall identify orbital assets in specified mission directorates that could benefit from satellite servicing-related technologies and shall work across all NASA mission directorates to evaluate opportunities for the private sector to perform these services or advance technical capabilities by leveraging the technologies and techniques developed by NASA programs and other industry programs.

(Sec. 826) In order to conduct necessary research, NASA shall continue, and as appropriate, consider expanding the development of technology payloads for scientific research and the investigation of new or improved capabilities.

To carry out such purpose, NASA shall make funds available for flight testing, payload development, and hardware related to such research and investigation.

Congress reaffirms that NASA should provide flight opportunities for payloads to microgravity environments and suborbital altitudes.

(Sec. 827) The bill expresses the sense of Congress on specified small class launch missions.

(Sec. 828) The bill updates the number and date of the procedural requirements which are used to define the term "development" in assessing baseline and cost controls for major programs.

(Sec. 829) NASA's commercial technology transfer program shall be maintained in a manner that provides clear benefits for NASA, the domestic economy, and the research community (as under current law), while protecting national security.

(Sec. 830) NASA shall revise NASA's Supplement to the Federal Acquisition Regulation to provide uniform guidance and recommend revised requirements for organizational conflicts of interest by contractors in major acquisition programs in order to address the elements described in this section.

(Sec. 831) The OSTP shall assess the issues relating to the protection and preservation of historically important Apollo Program landing sites and artifacts that reside on the surface of the Moon, including those pertaining to Apollo 11 and Apollo 17.

In conducting such assessment, OSTP shall include:

- a determination of what risks to the protection and preservation of such lunar landing sites and artifacts exist or may exist in the future;
- a determination of what measures are required to ensure their protection and preservation;
- a determination of the extent to which additional domestic legislation or international treaties or agreements will be required, and
- recommendations for protecting and preserving them.

(Sec. 832) The bill extends the authority that allows NASA to lease to any person or entity (as specified in federal law) non-excess real property or related personal property under its jurisdiction until December 31, 2018.

(Sec. 833) The bill expresses the sense of Congress that NASA should pursue a policy on termination liability that maximizes the use of its appropriated funds to make progress in meeting established technical goals and schedule milestones on the ISS, SLS, Orion, and James Webb Space Telescope.

(Sec. 834) NASA shall submit a report concerning its procedures for conducting independent reviews of projects and programs at lifecycle milestones.

(Sec. 835) NASA shall arrange with the National Academy of Public Administration to assess the effectiveness of the NASA Advisory Council and to recommend to Congress any changes to the council as specified in this section.

Such national academy shall submit to Congress the results of such assessment, including any recommendations.

NASA may appoint such advisory committees as may be appropriate for purposes of consultation and advice to Congress, as well as to NASA (under current law).

The bill sunsets such reference to Congress on September 30, 2017.

(Sec. 836) NASA shall provide to its acquisition programs and projects, consistent with its Space Flight Program and Project Management Requirements:

- guidance on when to use an Independent Cost Estimate and Independent Cost Assessment; and
- criteria to use in making such a determination.

(Sec. 837) The bill states it is U.S. policy that NASA maintain reliable and efficient facilities and infrastructure and that decisions on whether to dispose of, maintain, or modernize existing facilities or infrastructure be made in the context of meeting NASA's future needs.

NASA shall develop a facilities and infrastructure plan to position it to have the facilities and infrastructure (including laboratories, tools, and approaches) necessary to meet NASA and other federal agencies' future laboratory needs.

Such plan shall identify:

- current NASA and other federal agencies' laboratory needs;
- future NASA research and development and testing needs;
- a strategy for identifying facilities and infrastructure that are candidates for disposal, consistent with the national strategic direction set forth in the National Space Policy, National Aeronautics Research, Development, Test, and Evaluation Infrastructure Plan, specified NASA authorization acts, and the Human Exploration Roadmap;
- a strategy for the maintenance, repair, upgrading, and modernization of NASA facilities and infrastructure; and
- criteria for prioritizing deferred maintenance tasks.

(Sec. 838) The bill modifies requirements for the establishment of independent, nonpartisan commissions to investigate human space flight accidents and/or deaths by requiring the President to establish such a commission to investigate any accident that results in the loss of any orbital or suborbital space vehicle carrying humans that is:

- owned by the federal government; or
- being used pursuant to a contract or Space Act Agreement with the federal government to carry a government astronaut (as defined in federal law) or a researcher funded by the federal government.

(Sec. 839) NASA shall report to Congress on the status of its efforts to coordinate with foreign countries within the Inter-Agency Space Debris Coordination Committee to mitigate the effects and growth of orbital debris.

The OSTP shall report to Congress on the status of the orbital debris mitigation strategy.

(Sec. 840) NASA shall:

- in collaboration with other relevant federal agencies, solicit and review concepts and options for the removal of orbital debris from low-Earth orbit; and
- submit a report on such solicitation and review, including recommendations on the best options for decreasing the risks associated with orbital debris.

Actions Timeline

- **Dec 12, 2016:** Message on Senate action sent to the House.
- **Dec 12, 2016:** Received in the House.
- **Dec 12, 2016:** Held at the desk.
- **Dec 10, 2016:** Measure laid before Senate by unanimous consent. (consideration: CR S7135-7144)
- **Dec 10, 2016:** The committee substitute withdrawn by Unanimous Consent. (consideration: CR S7144)
- **Dec 10, 2016:** Passed/agreed to in Senate: Passed Senate with an amendment by Unanimous Consent.
- **Dec 10, 2016:** Passed Senate with an amendment by Unanimous Consent.
- **Dec 5, 2016:** Committee on Commerce, Science, and Transportation. Reported by Senator Thune with an amendment in the nature of a substitute. With written report No. 114-390.
- **Dec 5, 2016:** Placed on Senate Legislative Calendar under General Orders. Calendar No. 696.
- **Sep 21, 2016:** Committee on Commerce, Science, and Transportation. Ordered to be reported with an amendment in the nature of a substitute favorably.
- **Sep 15, 2016:** Introduced in Senate
- **Sep 15, 2016:** Read twice and referred to the Committee on Commerce, Science, and Transportation.