

Calendar No. 696

114TH CONGRESS }
2d Session }

SENATE

{ REPORT
114-390

NATIONAL AERONAUTICS AND SPACE AD-
MINISTRATION TRANSITION AUTHORIZA-
TION ACT OF 2016

R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND
TRANSPORTATION

ON

S. 3346



DECEMBER 5, 2016.—Ordered to be printed

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED FOURTEENTH CONGRESS

SECOND SESSION

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION TRANSITION AUTHORIZATION ACT OF 2016

DECEMBER 5, 2016.—Ordered to be printed

Mr. THUNE, from the Committee on Commerce, Science, and
Transportation, submitted the following

R E P O R T

[To accompany S. 3346]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 3346) to authorize the programs of the National Aeronautics and Space Administration, and for other purposes, having considered the same, reports favorably thereon with an amendment (in the nature of a substitute) and recommends that the bill (as amended) do pass.

PURPOSE OF THE BILL

The purpose of S. 3346 is to address concerns related to potential instability at the National Aeronautics and Space Administration (NASA) during a presidential transition and to provide direction to the agency to continue to pursue current commitments and investments. The bill would reaffirm key policies and authorities to advance space exploration and science with an overall authorization level of \$19.508 billion for fiscal year (FY) 2017.

BACKGROUND AND NEEDS

As NASA prepares to transition from one presidential administration to the next, this bill would provide timely reaffirmation of congressional support for sustaining a national, Government-led space program. Challenges related to past unilateral shifts in NASA core programs disrupted progress in U.S. human space exploration. This bill would provide stability and consistency of legislative direction for the agency. This includes continuing development of the Space Launch System (SLS) and Orion for deep space exploration, continuing development of the James Webb Space Tel-

escape (JWST), and the continued operation of the International Space Station (ISS).

Since Congress enacted the NASA Authorization Act of 2010 (42 U.S.C. 18301 et seq.; 2010 Act), there has been significant progress in developing the authorized capabilities, including the SLS and Orion. NASA continues to build on the success of the Commercial Resupply Services Program (CRS Program) to deliver cargo to the ISS. Additionally, NASA is working with private sector companies as part of the Commercial Crew Program to develop launch vehicles that will transport United States government astronauts to the ISS from U.S. soil for the first time since the retirement of the Space Shuttle. This would reduce reliance on United States government astronauts traveling to the ISS via the Russian Soyuz spacecraft.

International Space Station

For 15 years, the ISS has operated continuously, serving as a key testbed for space exploration, and since 2010, as a National Laboratory for scientific discovery. The U.S. Commercial Space Launch Competitiveness Act (Public Law 114–90; 129 Stat. 704), enacted on November 25, 2015, directs NASA to take necessary steps to extend the life of the ISS until 2024.¹ The NASA Transition Authorization Act of 2016 would support continued operations of the ISS, building on the success of the CRS Program, and continued development of the Commercial Crew Program.

NASA’s Commercial Resupply Services Program and Commercial Crew Program

Part of NASA’s current balanced approach to space exploration is the development of vehicles for both commercial and Government missions. NASA has partnered with the commercial space industry for cargo and crew delivery to the ISS as part of both the CRS Program and Commercial Crew Program.² To address the cargo resupply needs, NASA initiated the Commercial Orbital Transportation Services Program (COTS Program) in 2006 to partner with commercial aerospace companies to develop orbital transportation services for delivering cargo to the ISS. The COTS Program resulted in two companies, Space Exploration Technologies (SpaceX) and Orbital ATK, developing two new U.S. launch vehicles and two automated cargo spacecraft that currently are providing orbital transportation services and are supplying cargo to the ISS under the CRS Program.³ In addition, on January 14, 2016, NASA awarded three CRS-2 contracts to SpaceX, Orbital ATK, and Sierra Nevada Corporation to fulfill the next phase of cargo delivery service missions to and from the ISS.⁴

Since NASA’s retirement of the Space Shuttle fleet in 2011, the United States has been entirely dependent on the Russian Soyuz spacecraft for transporting astronauts to and from the ISS. This

¹NASA Human Exploration and Operations Mission Directorate, “FY 2015 Program Review,” p.3, March 2014.

²NASA Authorization Act of 2010. P.L. 111-267. Sections 401-402, at http://www.nasa.gov/pdf/649377main_PL_111-267.pdf.

³NASA Commercial Crew and Cargo Program Office, “Overview,” at <http://www.nasa.gov/offices/c3po/home/#.U78CUPldURo>.

⁴Sierra Nevada Corporation, “NASA Selects Sierra Nevada Corporation’s Dream Chaser® Spacecraft for Commercial Resupply Services 2 Contract,” N.p., January 14, 2016, at <http://www.sncorp.com/AboutUs/NewsDetails/2754>.

costs the United States upwards of \$70 million per seat.⁵ Ultimately, the COTS Program also envisioned the development of a crew transportation service, and that effort formed the basis of the Commercial Crew Program. On September 16, 2014, NASA announced awards to Boeing and SpaceX to further develop crewed launch and in-space transportation services to the ISS.⁶ Once U.S. commercial partners are able to provide access to low-Earth orbit (LEO) and the ISS for crew, NASA could transport United States government astronauts and reduce its reliance on the Russian Soyuz.

Space Launch System and Orion

As U.S.-based commercial space companies focus on developing and improving capabilities for transportation to and from the ISS, NASA is developing the capabilities for exploration of deep space. To that end, the agency has been developing the heavy-lift SLS rocket and the Orion. The SLS program is proceeding in development and will utilize key hardware from the Space Shuttle program, the most recognizable of which are a variant of the side-mounted solid rocket boosters for the first phase of flight. Once completed as designed, the Orion will be able to transport four crew to deep space. The first test flight of the Orion, Exploration Flight Test 1, was successfully completed on December 5, 2014.

The first flight of the SLS with an uncrewed Orion is anticipated in November 2018. Once ready, the test flight, dubbed Exploration Mission-1 (EM-1), is planned to demonstrate the capability of both the SLS rocket and Orion as an integrated system. Then, in 2021, the first manned mission for SLS and Orion is scheduled to launch along the same trajectory as EM-1, to a lunar flyby, bringing the crew to space for up to two weeks.⁷ This heavy-lift rocket will have more than two and one half times the lift capability of any rocket currently in operation, and 20 percent more thrust than the Saturn V rocket used during the Apollo era. The SLS and Orion will enable space exploration beyond LEO for the first time since the 1970s.

Exploration Strategy

NASA's current human space exploration plan is to extend human presence into deep space and on to Mars, including a mission to explore a near-Earth asteroid, while continuing to develop both commercial cargo and commercial crew capabilities.⁸ The current long-term goal for NASA's exploration program is to ultimately send humans to Mars by the 2030s. In doing so, NASA expects that our human and robotic explorers will expand our knowledge and discover the potential for life beyond Earth.

⁵Spaceflight Now, "NASA buys six more seats on Russian Soyuz spacecraft," April 30, 2013, at <http://spaceflightnow.com/news/n1304/30soyuzcontract/#.UZHK8iIo6Uk>.

⁶NASA press release, "NASA Chooses American Companies to Transport U.S. Astronauts to the ISS," January 22, 2015, at <http://www.nasa.gov/press/2014/september/nasa-chooses-american-companies-to-transport-us-astronauts-to-international/#.VNURY514qX8>.

⁷NASA, *Exploration Systems Development*, at http://www.nasa.gov/sites/default/files/files/ESD_FactSheet_TAGGED.pdf.

⁸U.S. Congress, Subcommittee on Space, House Committee on Science, Space, and Technology, Testimony of NASA Administrator Charles Bolden, March 27, 2014, H. Hrg. 113-70, at <http://science.house.gov/sites/republicans.science.house.gov/files/documents/HHRG-113-SY16-WState-CBolden-20140327.pdf>.

According to NASA, the agency is implementing a multiple destination exploration strategy using a “capability driven approach.” The strategy is intended to enable the incremental buildup of capabilities over time to reach further into deep space and develop the sustainable architectures for more complex missions, such as a human mission to Mars.

SUMMARY OF PROVISIONS

This bill would authorize funding levels for all of NASA, but focus on policy direction designed to send a message of congressional support to sustain our existing national space commitments and investments. Matters not specifically addressed in S. 3346 defer to existing policy direction contained in the 2010 Act and title 51 of the United States Code (relating to National and Commercial Space Programs). The bill is arranged thematically by title to cover key transition issues rather than by the more traditional organization by NASA’s mission directorates.

Sustaining national space commitments

To address the main theme, sustaining national space commitments, the bill would address concerns related to instability at the agency during a presidential transition. The bill would reaffirm key policies and authorities to advance space exploration and science with an overall authorization level of \$19.508 billion for FY 2017. The bill also would direct the continued development of SLS and Orion crew for deep space exploration, operation of the ISS and JWST, and a continued commitment to a national, Government-led, space program.

Maximizing utilization of the International Space Station and low-Earth orbit

To address maximizing utilization of the ISS and LEO, the bill would support continued operations of the ISS and ISS National Laboratory. The bill also would build on the success of the CRS Program, and direct continued development of the Commercial Crew Program. Additionally, the bill would require NASA to submit a report to Congress outlining an ISS Transition Plan, to facilitate a transformation of Government operations in LEO to a more commercially viable concept of operations sometime in the future.

Advancing human deep space exploration

To address human deep space exploration, the bill would direct NASA to continue the development of the key deep space exploration programs. The bill would support continuing the development of SLS and Orion, including specific milestones for an uncrewed exploration mission by 2018, and a crewed exploration mission by 2021.

The bill also would require NASA to submit a plan to Congress on a strategic framework and critical decision plan on extending human presence beyond LEO to deep space and eventually to Mars, including the cadence of future exploration missions. The bill also would amend existing law and direct NASA to manage human space flight programs to enable humans to explore Mars and other destinations. Amid growing costs and concerns about the Asteroid Robotic Redirect Mission (ARRM), the bill would direct NASA to

provide an evaluation of alternative approaches, in addition to ARRM, for demonstrating technologies and capabilities needed for a human mission to Mars.

To address the long-term effects of space on astronaut's health, the bill would authorize NASA to provide for the medical monitoring, diagnosis, and treatment of astronauts, including scientific and medical tests for psychological and medical conditions, deemed by NASA to be associated with human space flight. The bill also would recognize insights gained from United States government astronaut Scott Kelly's 340-day space mission aboard the ISS.

Advancing space science

To address advancing space science, the bill would continue progress on a balanced science portfolio, including the JWST, Wide-Field Infrared Survey Telescope (WFIRST), Mars 2020 Rover, and a Europa mission.

Maximizing efficiency and improving cybersecurity

To maximize efficiency, the bill would direct steps to improve agency-wide management and oversight over information technology operations and investments and information security programs for the protection of NASA systems. The bill also would implement a number of Office of Inspector General and Government Accountability Office (GAO) identified deficiencies. Additionally, the bill would improve inter-disciplinary collaboration and planning across NASA's mission directorates to maximize outcomes for projects or missions.

To improve cybersecurity, the bill would require the Administrator of NASA to develop an agency-wide security plan. The bill also would require the Administrator of NASA to ensure the NASA Chief Information Officer (NASA CIO) has a significant role in relevant management and oversight.

LEGISLATIVE HISTORY

On September 15, 2016, S. 3346, the National Aeronautics and Space Administration Transition Authorization Act of 2016, was introduced and was referred to the Committee on Commerce, Science, and Transportation of the Senate. S. 3346 is sponsored by Senator Cruz and cosponsored by Senators Nelson, Rubio, Peters, Wicker, Udall, Thune, Cantwell, and Murray.

The Committee held a related hearing entitled "NASA at a Crossroads: Reasserting American Leadership in Space Exploration" on July 13, 2016, and received testimony from: Mr. William H. Gerstenmaier, Associate Administrator of Human Exploration and Operations, NASA; Dr. Mary Lynne Dittmar, Executive Director, Coalition for Deep Space Exploration; Mr. Mike Gold, Vice President of Washington Operations, SSL; Mr. Mark Sirangelo, Vice President of Space Systems Group, Sierra Nevada Corporation; and Professor Dan Dumbacher, Professor of Engineering Practice, Purdue University. The hearing focused on the importance of ensuring consistency in policy to best leverage investments made in human space exploration. The hearing also explored questions facing the agency related to the upcoming presidential transition.

A related bill, H.R. 810, the National Aeronautics and Space Administration Authorization Act of 2015, was introduced in the

House of Representatives on February 9, 2015, by Representatives Palazzo, Edwards, Smith, Johnson, and Brooks. H.R. 810 would provide funding levels for FY 2015 and is largely based on a measure introduced by the Committee on Science, Space, and Technology of the House of Representatives in a prior Congress. That committee did not mark up the measure. The House of Representatives passed H.R. 810 by voice vote on February 10, 2015.

Subsequently in the House of Representatives, H.R. 2039, the National Aeronautics and Space Administration Authorization Act for 2016 and 2017, was introduced by Representatives Palazzo, Smith, Culberson, Lucas, Bridenstine, Weber, Loudermilk, Rohrabacher, McCaul, Hultgren, Moolenaar, Knight, Babin, Comstock, Brooks, Johnson, and Posey on April 28, 2015. This bill was favorably reported out of the Committee on Science, Space, and Technology of the House of Representatives on April 30, 2015, by a vote of 19-15. H.R. 2039 was not considered by the full House of Representatives.

On September 21, 2016, the Committee on Commerce, Science, and Transportation of the Senate met in open Executive Session to consider S. 3346, and ordered, by voice vote, the bill to be reported favorably with an amendment (in the nature of a substitute).

Several amendments were adopted by voice vote. Senator Blumenthal sponsored an amendment, as modified, which would alter the provision on advanced space suit capability. Senators Cruz and Nelson sponsored two amendments: one to make a few exploration-related changes; and the other to authorize NASA to indemnify certain launch providers for missions that are not licensed commercially by the Federal Aviation Administration and thus are not afforded the indemnification regime under the Commercial Space Launch Act (Public Law 98-575; 98 Stat. 3055). Senator Gardner sponsored two amendments: one amendment, as modified, to provide for the leveraging of commercial satellite servicing capabilities across NASA mission directorates; and the other amendment, as modified, to improve the provision in the bill on the strategic framework for human spaceflight and exploration. Senators Nelson, Cruz, and Rubio sponsored an amendment to improve the section of the bill on commercial space launch cooperation. Senator Udall sponsored an amendment, as modified, to expand the development of technology payloads for scientific research. There were no second degree amendments.

ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

S. 3346—National Aeronautics and Space Administration Transition Authorization Act of 2016

Summary: S. 3346 would amend current law and authorize the appropriation of \$19.5 billion in 2017 for the National Aeronautics and Space Administration (NASA). The legislation would reaffirm existing policy regarding use of the International Space Station (ISS) and would require NASA to develop a transition plan that would enable greater participation in the ISS and low-earth orbit

by NASA's industry partners and additional partner countries. It also would require NASA to develop propulsion technologies intended to reduce travel time to Mars and a strategic framework for human space flight to Mars.

Assuming appropriation of the specified amount, CBO estimates that implementing the legislation would cost \$19.4 billion over the 2017–2021 period.

CBO also estimates that enacting the legislation would increase net direct spending by \$35 million over the 2017–2026 period; therefore, pay-as-you-go procedures apply. Enacting the bill would not affect revenues.

CBO estimates that enacting the bill would not increase net direct spending or on-budget deficits by more than \$5 billion in any of the four consecutive 10-year periods beginning in 2027.

S. 3346 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA) and would impose no costs on state, local, or tribal governments.

Estimated cost to the Federal Government: The estimated budgetary effect of S. 3346 is shown in the following table. The costs of this legislation fall within budget function 250 (general science, space, and technology).

	By fiscal year, in millions of dollars—											
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2017– 2021	2017– 2026
INCREASES IN SPENDING SUBJECT TO APPROPRIATION												
Estimated Authorization Level	19,509	0	0	0	0	0	0	0	0	0	19,509	19,509
Estimated Outlays	12,266	5,917	947	233	79	0	0	0	0	0	19,442	19,442
INCREASES IN DIRECT SPENDING												
Estimated Budget Authority	0	2	3	4	4	5	5	5	6	6	13	40
Estimated Outlays	0	1	2	3	4	4	5	5	5	6	10	35

Basis of estimate: For this estimate, CBO assumes S. 3346 will be enacted before the end of calendar year 2016 and that the necessary amounts will be appropriated for that year. Estimated outlays are based on historical spending patterns for existing programs.

Spending subject to appropriation

S. 3346 would authorize appropriations totaling \$19.5 billion to finance the activities of NASA for fiscal year 2017. In 2016, NASA received an appropriation of \$19.3 billion. Based on historical spending patterns, CBO estimates that implementing the bill would cost \$19.4 billion over the 2017–2021 period. Specifically, the bill would authorize appropriations for the following activities:

- \$5.4 billion for programs under NASA's Science account. In 2016, those programs received an appropriation of \$5.6 billion;
- \$4.5 billion for NASA activities related to space exploration. In 2016, exploration programs received an appropriation of \$4.0 billion;
- \$5.0 billion for programs within space operations. In 2016, those programs received an appropriation of \$5.0 billion;
- \$2.8 billion for NASA expenses related to safety, security, and mission services. Those programs received an appropriation of \$2.8 billion in 2016; and

- \$1.8 billion in 2017 for other NASA activities, including aeronautics, space technology, education, construction and environmental compliance and restoration, and the NASA inspector general. In 2016, those programs received appropriations totaling \$1.9 billion.

Direct spending

By authorizing private parties to provide funds or other in-kind support for improvements to NASA's space transportation infrastructure, CBO estimates that enacting S. 3346 would increase direct spending by \$40 million over the next 10 years. Provisions of the bill that would modify NASA's authority to indemnify contractors for certain losses also could affect direct spending, but CBO estimates that any such effects would not be significant over the 10-year period.

Financing of Space Transportation Infrastructure. Section 623 would authorize NASA to accept funds, services, and equipment from nonfederal entities for improvements to the agency's space transportation infrastructure. Agreements with nonfederal entities would be subject to various conditions, including criteria focused on promoting greater use of NASA's facilities by the private sector, requirements for documenting the ownership and usage rights for the affected assets or services, restrictions on investors' ability to directly recover their costs from the government, and directives for NASA to treat such cash or in-kind investments in a manner consistent with existing laws regarding the sale or use of space transportation property or services.

Based on information from NASA, CBO expects that this new authority would primarily be used at the Kennedy Space Center (KSC) in Florida and the Wallops Flight Facility in Virginia. NASA's strategic plans for those sites call for NASA to retain ownership and control over the land and key assets but to gradually shift operational and financial responsibility for most space launch services to nonfederal entities.¹ As part of that transition, NASA has transferred certain launch pads, buildings, and services to the states and private-sector firms by exercising its existing leasing and contractual authorities. Reports on aeronautical facilities in Florida suggest that nonfederal entities are able to obtain financing for projects at such sites when they can secure the debt with project cash flows, liens on assets, or assignments of rights to use federal facilities, where applicable.²

CBO expects that the authorities provided by section 623 would be used for projects that could not be implemented using NASA's existing authorities to obtain financing; such projects would probably involve infrastructure or services that are owned or controlled by NASA with the new agreements providing the contractual assurances necessary to allow private partners to secure financing. There is a mix of federal and nonfederal uses at KSC and the Wallops Flight Facility and CBO estimates that federal users would receive about half of the benefit of those investments. Although the

¹See Kennedy Space Center, *Future Development Concept, 2012–2031*, p. 17. http://www.nasa.gov/centers/kennedv/pdf/634026main_future-concept.pdf.

²See Space Florida, *Florida Economic Development Financing and Incentives Available to Aerospace Companies*, June, 2013. <http://www.spaceflorida.gov/docs/fact-sheets/florida-economic-development-incentives-update-6-4-2013.pdf?sfvrsn=2>.

legislation would prohibit commercial firms from directly charging NASA for the cost of any infrastructure improvements to federal facilities, CBO expects those firms would recover some of their investments from NASA. CBO considers private financing on behalf of the federal government for government activities to be similar to an agency using federal borrowing authority to improve its physical infrastructure. Such indefinite borrowing authority is classified as direct spending because funding to cover the full cost of the project is not provided in advance in appropriation acts.

Considering trends in NASA's capital expenditures and spending by private firms on aeronautical facilities, CBO estimates that implementing S. 3346 would increase net direct spending by an average of about \$4 million a year, or \$35 million over the 2017–2026 period. Such spending would be equivalent to less than 5 percent of the average amounts appropriated for construction-related activities at KSC over the last five years, reflecting CBO's expectation that the legal and financial complexity of these transactions would limit their use during this period. That cost also would be less than 10 percent of the \$480 million in financing arranged by the state of Florida for aerospace facilities over the 2000–2013 period.

Indemnification of Launch and Recovery Services. Section 304 would modify the statutory framework governing NASA's liability for certain third-party claims stemming from space launch or reentry activities that are classified as nuclear or unusually hazardous in nature. CBO estimates that implementing section 304 would change the allocation of risk to NASA from its contractors but would have no significant net effect on direct spending or spending subject to appropriation.

NASA's existing authority and policy is to indemnify contractors involved in activities using nuclear or unusually hazardous materials from any liability that exceeds \$500 million per vehicle launch or reentry.³ Any federal payments for damage claims made under this existing authority are not subject to appropriation.

Under the bill, NASA could set the liability of its contractors for each vehicle launch or reentry at an estimate of the maximum probable loss from the launch or reentry, subject to a ceiling of either \$500 million or the amount of liability insurance available on the world market at a reasonable cost. The bill also would allow NASA to limit the government's liability for third-party claims to \$3 billion (plus additional amounts to account for future changes in inflation). Finally, NASA would initially be required to pay any such claims using funds provided in appropriation acts.⁴

CBO estimates that NASA's liability for claims of less than \$500 million probably would increase under the bill because firms historically have been required to provide less than \$100 million in primary insurance when the coverage is based on estimates of the maximum probable loss. On the other hand, the bill also would allow NASA to limit the government's liability for third party losses to \$3 billion. CBO estimates that those changes would have no significant net budgetary effect over the 2017–2026 period be-

³NASA's existing authority derives from a 1958 statute regarding national defense contracts (Public Law 85–804), which was made applicable to NASA by Executive Order 10789, as amended.

⁴If NASA were obligated to pay claims in excess of the amounts available from private insurance and appropriations, CBO assumes that any additional payments would be made from the Claims and Judgments Fund. Such spending would be an increase in direct spending.

cause the probability of events leading to significant damage claims by third-parties is very small and because private insurance has been sufficient to cover previous claims associated with vehicle launches and reentries.

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 S. 3346, AS ORDERED REPORTED BY THE SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION ON SEPTEMBER 21, 2016

	By fiscal year, in millions of dollars—												
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2017–2021	2017–2026	
	NET INCREASE IN THE DEFICIT												
Statutory Pay-As-You-Go Impact	0	1	2	3	4	4	5	5	5	6	10	35	

Increase in long-term direct spending and deficits: CBO estimates that enacting the bill would not increase net direct spending or on-budget deficits by more than \$5 billion in any of the four consecutive 10-year periods beginning in 2027.

Intergovernmental and private-sector impact: S. 3346 contains no intergovernmental or private-sector mandates as defined in UMRA and would impose no costs on state, local, or tribal governments.

Estimate prepared by: Federal costs: Tiffany Arthur and Kathleen Gramp; Impact on state, local, and tribal governments: Jon Sperl; Impact on the private sector: Paige Piper-Bach.

Estimate approved by: H. Samuel Papenfuss, Deputy Assistant Director for Budget Analysis.

REGULATORY IMPACT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported:

NUMBER OF PERSONS COVERED

The bill would cover the employees of NASA and a portion of the employees at companies that contract with NASA. S. 3346 would not expand the number of people affected by Government regulations. Entities participating in NASA programs already participate subject to regulations and the Committee does not anticipate expansion of those covered.

ECONOMIC IMPACT

The bill would authorize additional spending by the Federal Government. Under the bill, authorizations of appropriations for NASA for fiscal year 2017 would be \$19.508 billion.

PRIVACY

Recent data breaches at NASA have shown that NASA’s security posture is ineffective and that changes are required to protect the personal privacy of NASA employees, contractors, and others.

S. 3346 would direct: updated requirements reducing impacts on personal privacy based on directives for NASA to update, streamline, and improve its management, governance, and oversight related to information technology operations; and investments and information security programs for the protection of NASA systems.

PAPERWORK

The bill would require NASA to produce 12 reports, plans, and evaluations, some of which are updated existing reports, and some of which are required annually or periodically based on certain circumstances.

CONGRESSIONALLY DIRECTED SPENDING

In compliance with paragraph 4(b) of rule XLIV of the Standing Rules of the Senate, the Committee provides that no provisions contained in the bill, as reported, meet the definition of congressionally directed spending items under the rule.

SECTION-BY-SECTION ANALYSIS

Section 1. Short title; table of contents.

This section would provide the short title and table of contents for the Act.

Section 2. Definitions.

This section would provide definitions for key terms used throughout the Act.

Title I – Authorization of appropriations

Section 101. Fiscal year 2017.

This section would authorize appropriations for NASA for FY 2017 at \$19.508 billion.

Title II – Sustaining national space commitments

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

This section would state the sense of Congress that the United States should sustain and build upon its national space commitments and investments across presidential administrations with a continuity of purpose to advance recent achievements in space exploration and space science. Further, this section would state the sense of Congress that: the United States can best leverage its space program investments by continuing to develop a balanced portfolio for space exploration and space science, including the continued development of the SLS and Orion; and having a national, Government-led space program is of critical importance to the United States.

Finally, this section would make clear the sense of Congress that NASA is, and should remain, a multi-mission agency with a balanced and robust set of core missions in science, space technology, aeronautics, human space flight and exploration, and education.

Section 202. Findings.

This section would make the finding that challenges of the past have: disrupted the completion of major space systems thereby impeding the planning and pursuit of national objectives in human space exploration; placed the Nation's investment in space exploration at risk; and substantially degraded the industrial base for aerospace. This section also would make it clear that the 2010 Act reflects a broad, bi-partisan agreement on the path forward for NASA's core missions, and serves as the foundation for the policy updates found in this Act. Additionally, this section would underscore that Congress finds that it is imperative that the United States sustain the investment and maximize the utilization of the ISS and ISS National Laboratory, and would highlight the importance of NASA continuing to make progress with the development of the Commercial Crew Program and of NASA having a continuity of purpose.

Title III – Maximizing utilization of the ISS and low-Earth orbit

Section 301. Operation of the ISS.

This section would state the sense of Congress that: after 15 years of continuous human presence in LEO, the ISS continues to overcome challenges and operate safely; the expansion of partnerships, scientific research, commercial applications, and exploration testbed capabilities of the ISS is essential to ensuring the greatest return on U.S. investments; the stable and successful Commercial Cargo Program and Commercial Crew Program are critical to ensuring timely provisioning of the ISS and to reestablishing the capability to launch United States government astronauts from U.S. soil into orbit; sustaining U.S. leadership and progress in human space exploration is enabled by continuing utilization of the ISS; NASA should continue to support the development of the Commercial Crew Program as planned to end reliance upon Russian transport of United States government astronauts to the ISS which has not been possible since the retirement of the Space Shuttle program in 2011; and the ISS should continue to provide a platform for fundamental microgravity, discovery-based space life and physical sciences research.

This section also would reaffirm that it is the policy of the United States, in consultation with its international partners, to support full and complete utilization of the ISS through at least 2024.

Section 302. Transportation to ISS.

This section would state the sense of Congress that: NASA should build upon the success of the COTS Program and CRS Program that have allowed private sector companies to partner with NASA to deliver cargo and scientific experiments to the ISS since 2012; and once certified and fully operational, the Commercial Crew Program transportation systems should serve as the primary means of transporting United States government astronauts and international partner astronauts from U.S. soil to and from the ISS; and these transportation systems should have the capability of serving as ISS emergency crew rescue vehicles. This section also would make it clear that it is the sense of Congress that the 21st

Century Launch Complex Program has enabled significant modernization and infrastructure improvements at launch sites across the United States and that the program should be continued in a manner that leverages State and private investments to achieve the goals of the program.

This section also would state the policy of the United States that services for Federal Government access to, and return from, the ISS, whenever practicable, shall be procured via fair and open competition for well-defined, milestone-based, Federal Acquisition Regulation-based contracts. This section also would make a technical amendment to existing law and direct NASA to protect the safety of U.S. crews by ensuring commercial crew systems meet all applicable human rating requirements in accordance with law.

Section 303. ISS transition plan.

This section would include the findings of Congress that NASA has been both the primary supplier and consumer of human space flight capabilities and services of the ISS and in LEO. The section would express the sense of Congress that an orderly transition is needed for U.S. human space flight activities in LEO from the current regime, that relies heavily on NASA sponsorship, to a regime where NASA is one of many customers of a LEO commercial human space flight enterprise.

This section would direct NASA, in coordination with the ISS management entity, ISS partners, and the commercial space sector, to develop a plan to transition in a step-wise approach from the current regime to a regime where NASA is one of many customers of a LEO commercial human space flight enterprise. Further, this section would require NASA to submit a report to the appropriate committees of Congress, not later than December 1, 2017, and triennially thereafter until 2023, that includes an outline of specific details of an ISS transition.

Section 304. Indemnification; NASA launch services and reentry services.

This section would amend subchapter III of chapter 201 of title 51, United State Code, to grant NASA the authority to indemnify contractors providing launch services for the agency for launches that are by the Government and for the Government and thus are not commercially licensed by the Secretary of Transportation and are accordingly not afforded the indemnification protection provided by the United States Government for such launches. The authority would largely mirror the Secretary of Transportation's existing authority for commercially licensed launches. The section would authorize the Administrator of NASA in a contract with a provider to indemnify the provider against successful claims by third parties for death, bodily injury, or loss of or damage to property resulting from launch services and reentry services carried out under the contract that the contract defines as unusually hazardous or nuclear in nature. Further, this section would describe the scope of the indemnification by the United States Government, the terms of indemnification, and the required liability insurance of the provider.

The section would require a provider to obtain insurance or demonstrate financial responsibility for the maximum probable losses,

as determined by the Administrator, in an amount not to exceed \$500 million for third party losses and \$100 million for losses by the Government, or the maximum liability insurance available on the global market at reasonable cost. The section would limit indemnification to the limit on commercial launch indemnification provided in section 50915 of title 51, United States Code. The section would require that the insurance policy or demonstration of financial responsibility protect the Government and its personnel and related entities, the provider and its related entities, and any government astronauts involved in the launch services.

The section also would require that the Government and provider enter into a reciprocal waiver of claims with certain limitations. The authority would require that any payment made under the section be certified to be just and reasonable by the Administrator of NASA and that such payments be subject to congressional appropriations. The section would clarify that the authority granted does not in any way limit the Administrator of NASA from using other appropriate authorities to provide indemnification for Government contractors.

Title IV – Advancing human deep space exploration

Subtitle A – Human exploration goals and objectives

Section 411. Human exploration long term goals.

This section would amend existing law regarding the long term goals of the human space flight and exploration efforts of NASA. The amendment made by this section would add to the long term goals of the human space flight and exploration efforts of NASA by authorizing the inclusion of academic and industry partners in NASA’s efforts to expand permanent human presence beyond LEO. The long term goals also would include the peaceful settlement of a location in space or on another celestial body and a thriving space economy in the 21st Century.

Section 412. Goals and objectives.

This section would amend existing law to add the achievement of human exploration of Mars, including the establishment of a capability to extend human presence, including potential human habitation, on the surface of Mars, as one of the goals and objectives of NASA.

Section 413. Vision for space exploration.

This section would amend existing law to direct NASA to manage human space flight programs to enable humans to explore Mars and other destinations by defining a series of sustainable steps and conducting mission planning and research and technology development on a timetable that is technically and fiscally possible.

Section 414. Exploration plan and programs.

This section would amend existing law to authorize NASA to implement an exploration research and technology development program to enable human and robotic operations.

Section 415. Stepping stone approach to exploration.

This section would amend existing law to direct NASA to take all necessary steps to ensure that activities in its human exploration program are 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 leading to human habitation on the surface of Mars. Further, this section would require NASA, within budgetary considerations, to seek to complete any exploration-related project, once it has entered its development phase, without delay.

Subtitle B – Assuring core capabilities for exploration

Section 421. Space Launch System and Orion.

This section would include the findings of Congress that NASA has made steady progress in developing and testing the SLS and Orion exploration systems. It would further state that through the 21st Century Launch Complex Program and Exploration Ground Systems Programs, NASA has made significant progress in transforming exploration ground systems infrastructure to meet NASA's mission requirements for the SLS and Orion. Finally, it would recognize that these programs are meeting mission objectives to modernize NASA's launch complexes to the benefit of the civil, defense, and commercial space sectors.

This section would express the sense of Congress that the United States National Space Program should continue to make progress on its commitment by fully developing the SLS, Orion, and related exploration ground systems. Further, Congress would express its support for NASA providing its contractors with the proper indemnification for launch vehicles, launch vehicle hardware, and launch services procured by NASA in support of NASA missions. This would include application of indemnification under Public Law 85–804 (50 U.S.C. 1431 et seq.) to the SLS and Orion, which are being contemplated for a wide range of missions, and would facilitate the national defense, science, and exploration objectives of the United States. Finally, it would express the sense of Congress that the United States should have continuity of purpose for the SLS and Orion in deep space exploration missions.

Further, this section would direct NASA to continue the development of an uncrewed exploration mission to demonstrate the capability of both the SLS and Orion as an integrated system by 2018. The section would direct NASA to continue development toward a crewed exploration mission to demonstrate the SLS, including the Core Stage and Exploration Upper Stage, and the crewed Orion by 2021. The section further would direct NASA to develop subsequent missions beginning with EM-3 using the SLS and Orion to extend into cis-lunar space and eventually to Mars, and a deep space habitat as the next element in a deep space exploration architecture along with the SLS and Orion. Finally, this section would direct NASA to assess the utility of the SLS for use by the science community and for other Federal Government launch needs.

*Subtitle C – Journey to Mars**Section 431. Space technology infusion.*

This section would express the sense of Congress that advancing propulsion technology would improve the efficiency of trips to Mars and could shorten travel time to Mars and reduce astronaut health risks, reduce radiation exposure, consumables, and mass of materials required for the journey. This section would direct NASA to develop technologies to support its core missions while also supporting sustained investments in early stage innovation and fundamental research and technologies to expand the boundaries of the national aerospace enterprise. Finally, this section would state that one goal of the propulsion technologies developed under the direction in this section is to reduce human travel time to Mars.

Section 432. Findings on human space exploration.

This section would state that Congress finds that the National Academies of Sciences, Engineering, and Medicine, through its Committee on Human Spaceflight, conducted a review of the goals, core capabilities, and direction of human space flight, and published the findings and recommendations in a 2014 report entitled, “Pathways to Exploration: Rationales and Approaches for a U.S. Program of Human Space Exploration.” This section would highlight some of the findings and recommendations in that report, including affirmation that Mars is the appropriate long-term goal for the human space flight program and a recommendation that NASA define a series of sustainable steps and conduct mission planning and technology development as needed to eventually place humans on the surface of Mars.

Section 433. Strategic framework for human spaceflight and exploration.

This section would express the sense of Congress that expanding human presence beyond LEO and advancing toward human missions to Mars in the 2030s requires early planning and timely decisions to be made in the near-term; specifically, decisions on the necessary courses of action for commitments to achieve short-term and long-term goals and objectives. Further, this section would express the sense of Congress that for strong and sustained U.S. leadership, a need exists to advance a strategic framework addressing exploration objectives, in collaboration with international, academic, and industry partners.

This section would direct NASA to develop a strategic framework, including a critical decision plan, to expand human presence beyond LEO, including cis-lunar space, the moons of Mars, the surface of Mars, and beyond. The framework and the critical decision plan would both be required to include specific details and would need to be developed and submitted to the appropriate committees of Congress before December 1, 2017. An updated strategic framework, including an updated critical decision plan, would be required every 2 years thereafter.

Section 434. Advanced space suit capability.

This section would direct NASA to submit a detailed plan for achieving an advanced space suit capability that aligns with the

crew needs for exploration enabled by the SLS and Orion, including an evaluation of the merit of delivering the planned space suit system for use on the ISS, to the appropriate committees of Congress no later than 90 days after the date of enactment of this Act.

Section 435. Asteroid Robotic Redirect Mission.

This section would include the findings of Congress that the costs of the ARRM are growing and that NASA must evaluate whether to accept the increase in cost or reduce the ARRM's scope to stay within the \$1.25 billion cost cap previously set by the Administrator of NASA.

Additionally, this section would state that Congress finds that, in the past, the NASA Advisory Council has made recommendations to NASA regarding the cost and scope of the ARRM and has expressed its concern to NASA about the potential for growing costs for the program. This section would highlight that the NASA Advisory Council believes the development of high power solar electric propulsion and the ability to maneuver in a low gravity environment in deep space are the key priorities of the ARRM. This section also would state that Congress finds that the ARRM is competing for resources with other critical exploration development programs, including the SLS, Orion, commercial crew, and habitation module.

This section would express the sense of Congress that the technological and scientific goals of the ARRM may not be commensurate with the cost, and that alternative missions may provide a more cost effective and scientifically beneficial means to demonstrate the technologies needed for a human mission to Mars.

Finally, this section would require that, within 180 days of the date of enactment of this Act, NASA conduct and provide the appropriate committees of Congress with an evaluation and report consisting of: alternative approaches to the ARRM for demonstrating the technologies needed for a human mission to Mars; the scientific, technical, and commercial benefits of the alternative approaches identified; and a comparison of the estimated costs of the alternative approaches identified.

Subtitle D – Scott Kelly Human Space Flight and Exploration Act

Section 441. Short title.

This section would provide the short title for subtitle D of this Act.

Section 442. Findings; sense of Congress.

This section would state Congress' findings that human space exploration can pose significant challenges and is full of substantial risk, including increased health risks for astronauts who may be exposed to high levels of radiation. Additionally, this section would highlight Congress' finding that United States government astronaut Scott Kelly participated in a 1-year twins study in space to advance the goal of long-duration space flight missions. The section would find that NASA currently provides medical monitoring, diagnosis, and treatment for United States government astronauts during their active employment. Congress would also find that NASA has requested statutory authority from Congress to provide medical

monitoring, diagnosis, and treatment for former United States government astronauts or payload specialists due to the unknown long-term health consequences of long-duration space exploration.

This section would express the sense of Congress that the United States should continue to seek the unknown and lead the world in space exploration, that data relating to the health of astronauts will become increasingly valuable, and that NASA should provide monitoring, diagnosis, and treatment for United States government astronauts solely for conditions considered unique to the training or exposure to the spaceflight environment.

Further, this section would express the sense of Congress that NASA should not require any former United States government astronauts to participate in any medical monitoring. This section would express the sense of Congress that such monitoring, diagnosis, and treatment should not replace a former United States government astronaut's private health insurance, and that the expanded data acquired from such monitoring, diagnosis, and treatment should be used to tailor treatment, inform the requirements for new spaceflight medical hardware, and develop controls in order to prevent disease occurrence in the astronaut corps.

Finally, this section also would express the sense of Congress that the 340-day space mission of Scott Kelly aboard the ISS generated new insight into how the human body adjusts to weightlessness, isolation, radiation, and the stress of long-duration space flight and will help support the physical and mental well-being of astronauts during longer space exploration missions in the future.

Section 443. Medical monitoring and research relating to human space flight.

This section would amend subchapter III of chapter 201 of title 51, United States Code, to authorize NASA to provide for the medical monitoring, diagnosis, and treatment of a United States government astronaut, or a former United States government astronaut or payload specialist, for conditions that the Administrator of NASA considers associated with human space flight, including scientific and medical tests for psychological and medical conditions.

Further, the amendment made by this section would prohibit NASA from: requiring medical monitoring, diagnosis, or treatment of a United States government astronaut, or a former United States government astronaut or payload specialist, for any psychological or medical condition that is not associated with human space flight; or requiring a former United States government astronaut or payload specialist to participate in the monitoring authorized in this section.

Further, the amendment made by this section to title 51, United States Code, would require NASA to protect the privacy of all medical records generated as a result of the new section of that title in a way that is consistent with current privacy law, and to issue such regulations as are necessary to carry out the new section of that title.

*Title V – Advancing space science**Section 501. Maintaining a balanced space science portfolio.*

The amendment made by this section would restate the current sense of Congress that a balanced and adequately funded set of activities, consisting of research and analysis grants programs, technology development, suborbital research activities, and small, medium, and large space missions, contributes to a robust and productive science program and serves as a catalyst for innovation and discovery and that NASA should set science priorities by following the guidance provided by the scientific community through the National Academy of Sciences' decadal surveys.

Section 502. Planetary science.

This section would underscore that Congress finds that: NASA's support for planetary science is critical to enabling greater understanding of the solar system and the origin of the Earth; the United States leads the world in planetary science and can augment its success in that area with appropriate international partnerships; a mix of small, medium, and large planetary science missions is required to sustain a steady cadence of planetary exploration; and robotic planetary exploration is a key component of preparing for future human exploration.

This section would direct NASA to ensure, to the greatest extent practicable, the completion of a balanced set of Discovery, New Frontiers, and flagship missions that build on NASA's accomplishments with a promise of new, inspiring discoveries in the future. Additionally, this section would authorize NASA to seek, if necessary, adjustments to mission priorities, schedule, and scope in light of changing budget projections.

Section 503. James Webb Space Telescope.

This section would state that it is the sense of Congress that: the JWST should significantly advance our understanding and knowledge of star and planet formation and of the early universe, and should support U.S. leadership in astrophysics; and NASA should continue robust surveillance of the performance of the JWST project and continue to improve the reliability of cost estimates and contractor performance data and other major spaceflight projects in order to enhance NASA's ability to successfully deliver the JWST on-time and within budget.

Section 504. Sense of Congress on Wide-field Infrared Survey Telescope.

This section would state the sense of Congress that the WFIRST mission has the potential to enable scientific discoveries that will transform our understanding of the universe and that NASA, to the extent practicable, should make progress on the technologies and capabilities needed to meet the objectives, as outlined in the 2010 National Academies of Sciences, Engineering and Medicine's Astronomy and Astrophysics Decadal Survey, in a way that maximizes the scientific productivity of meeting those objectives for the resources invested.

Section 505. Sense of Congress on Mars 2020 rover.

This section would state the sense of Congress that the Mars 2020 mission should remain a priority for NASA and that the mission should significantly increase our understanding of Mars, should help determine whether life previously existed on that planet, and should provide opportunities to gather knowledge and demonstrate technologies that address the challenges of future human expeditions to Mars.

Section 506. Europa.

This section would state that Congress finds that: studies of Europa indicate that Europa may provide a habitable environment; NASA scientists observed water vapor around the south polar region of Europa, which provide potential evidence of water plumes in that region; the Europa mission has, for decades, consistently ranked as a high priority mission for the scientific community; and the Europa mission was ranked as the top priority mission in the previous Planetary Science Decadal Survey and ranked as the second-highest priority in the current Planetary Science Decadal Survey.

Further, this section would state the sense of Congress that the Europa mission could provide another avenue in which to capitalize on our Nation's current investment in the SLS that would significantly reduce the transit time for such a deep space mission and that a scientific, robotic exploration mission to Europa, as prioritized in both Planetary Science Decadal Surveys, should be supported.

Title VI – Maximizing efficiency

Subtitle A – Agency information technology and cybersecurity

Section 611. Information technology governance.

This section would direct several steps intended to improve agency-wide management and oversight over information technology operations and investments and information security programs for the protection of NASA systems. To achieve this, this section would require the Administrator of NASA to ensure the NASA CIO has a significant role in such management and oversight, require that the NASA CIO directly report to the Administrator of NASA, and establish a monetary threshold for NASA CIO project approval.

This section also would require the Administrator of NASA to provide an information technology management framework to increase the efficiency and effectiveness of information technology investments using a metrics-based approach to reduce duplication, waste, and cost, and improve the coordination between the NASA CIO and the Centers, Mission Directorates, and Mission Support Offices. This section also would direct a review of information technology investments and consideration of appropriate revisions to information technology boards and councils.

Section 612. Information technology strategic plan.

The section would outline an information technology strategic plan that would include: near and long-term goals and objectives; a plan for how the agency will implement an agency-wide central-

ized approach to information technology investments and operations, including reducing barriers to cross-center collaboration; increased coordination, efficiency and effectiveness of information technology investments; improving the information security of agency information systems; and informing Congress of high risk projects and cybersecurity risks.

Section 613. Cybersecurity.

This section would require the Administrator of NASA to develop an agency-wide information security plan consistent with requirements under the Federal Information Security Management Act of 2002 (Public Law 107–296; 116 Stat. 2259). The plan would be required to provide an overview of the requirements of NASA systems, identification of roles and responsibilities, and increased coordination among organizational entities.

Section 614. Oversight implementation progress.

This section would require the Administrator of NASA to provide an update to Congress on the response to or progress made toward implementation of the security plan, as well as toward any information security issues and recommendations identified by the NASA Inspector General and GAO in the last 5 years.

Section 615. Software oversight.

This section would direct the Administrator of NASA to develop a strategic plan to move away from legacy software, develop an agency-wide software license management policy, and direct an agency-wide inventory encompassing the agency's total software licenses and spending, including costs, benefits, usage, and trending data.

Section 616. Security management of foreign national access.

This section would require the Administrator of NASA to notify the appropriate members of Congress when the agency has implemented the information technology security recommendations from the National Academy of Public Administration on foreign national access management.

Section 617. Cybersecurity of web applications.

This section would direct the NASA CIO to develop a plan to fully remediate security vulnerabilities of web applications and implement the recommendation from the NASA Inspector General to remove from the Internet or secure with a web application firewall all agency web applications in development or testing mode.

Subtitle B – Collaboration among mission directorates and other matters

Section 621. Collaboration among mission directorates.

This section would direct NASA to encourage an interdisciplinary approach among all NASA mission directorates and divisions, where appropriate, for projects or missions in order to improve coordination, collaboration and early planning, to determine areas of overlap or alignment, to find ways to leverage across divisional per-

spectives to maximize the outcomes, and to be more efficient with resources and funds.

Section 622. NASA launch capabilities collaboration.

This section would include the findings of Congress that: the Launch Services Program is responsible for the acquisition, management, and technical oversight of commercial launch services for NASA's science and robotic missions; the Commercial Crew Program is responsible for the acquisition, management, and technical oversight of commercial crew transportation systems; the Launch Services Program and Commercial Crew Program have worked together to gain exceptional technical insight into the contracted launch service providers which are common to both programs; and the co-location of the Launch Services Program and Commercial Crew Program has allowed the Commercial Crew Program to efficiently tap into the launch vehicle technical expertise and provide engineering and analytical support to the Commercial Crew Program.

Further, this section would state the sense of Congress that the Launch Services Program and Commercial Crew Program benefit from communication and coordination of launch manifests, technical information, and common launch vehicle insight between the programs and that communication and coordination is enabled by the co-location of both programs.

Finally, this section would direct NASA to pursue a strategy for acquisition of crewed transportation services and non-crewed launch services that continues to enhance communication, collaboration, and coordination between the Launch Services Program and the Commercial Crew Program.

Section 623. Commercial space launch cooperation.

This section would find that Congress recognized the benefit of commercial space launch cooperation between the Federal Government and the private sector when it granted the Secretary of Defense authority to foster cooperation between the Department of Defense (DOD) and certain covered entities relating to space transportation infrastructure. This section also would express the sense of Congress that NASA should take into account the unique needs and obligations that multi-user, public State spaceports may have with the State government, as well as current and prospective contractual agreements with commercial and government customers when developing and carrying out agreements made under this new provision. Further, this section would state that the authority granted under this section is not intended to supersede or conflict with current law.

This section would amend chapter 505 of title 51, United States Code, to give NASA authority similar to the DOD authority discussed in the sense of Congress to enter into an agreement with a covered entity to provide the covered entity with support and services related to the space transportation infrastructure of NASA in order to achieve certain objectives. Further, the amendment made by this section would allow NASA to enter into an agreement with a covered entity on a cooperative and voluntary basis to accept payments for improvements to the space transportation infrastructure and contributions of services and equipment in specific

scenarios. The amendment made by this section also would set certain requirements with respect to these agreements.

Contributions made by a covered entity under the new section 50507 of title 51, United States Code, would not be allowable costs (direct or indirect) against another contract or agreement with the Government. The Committee is aware of concerns brought forward by some stakeholders regarding agreements between covered entities that entering into an agreement under this authority may limit their ability to recover the cost of their contribution through “any other agreement with the United States.” More specifically, the concern was raised about the ability of a covered entity to utilize infrastructure or services made possible under the new section 50507 in the fulfillment of fair market price contracts with the United States Government. For example, if NASA is building a new ground station, and a “covered entity” contributes to the costs of its construction the covered entity may be unable to recoup funds from another agreement if this new ground system is utilized during a launch for NASA.

Section 624. Detection and avoidance of counterfeit parts.

This section would state that Congress finds: that in 2012 an investigation by the Committee on Armed Services of the Senate on counterfeit electronic parts in the DOD supply chain from 2009 to 2010 involved 1,800 cases and exceeded 1,000,000 counterfeit parts, risking the lives and security of U.S. service members and threatening national security; and that in three reports since 2010, the GAO identified risks and challenges associated with counterfeit parts and counterfeit prevention at both DOD and NASA, including inconsistent definitions of counterfeit parts and poorly targeted quality control practices, as well as potential barriers to improvements to these practices. Additionally, this section would state the sense of Congress that counterfeit electronic parts in the NASA supply chain represent a danger to government astronauts, crew, and other personnel and a risk to the agency overall.

This section would require NASA to revise the NASA Supplement to the Federal Acquisition Regulation to address the detection and avoidance of counterfeit electronic parts and to meet the specific requirements outlined in this section not later than 270 days after the date of enactment this Act.

Section 625. Education and outreach.

This section would state the sense of Congress that: U.S. competitiveness in the 21st century requires engaging the science, technology, engineering, and mathematics (STEM) talent in all States; NASA is uniquely positioned to educate and inspire students and the broader public on STEM subjects and careers; NASA has been effective in delivering educational content because of the strong engagement of NASA scientists and engineers in its education and outreach activities; and NASA’s education and outreach programs reflect its successful commitment to growing and diversifying the national science and engineering workforce.

This section also would authorize NASA to continue engagement with the public and education opportunities for students through all of its mission directorates to the maximum extent practicable. Finally, this section would require NASA, no later than 60 days

after the date of enactment of this Act, to submit a report to the appropriate committees of Congress on its near-term outreach plans for advancing space law education.

Section 626. Leveraging commercial satellite servicing capabilities across mission directorates.

This section would state that Congress finds that: NASA will benefit from refueling and relocating aging satellites to extend their operational lifetimes; this capability is important for lowering the costs of ongoing scientific, national security, and commercial satellite operations; and the technologies involved in satellite servicing are all critical capabilities to support a human exploration mission to Mars. Further, this section would express the sense of Congress that: satellite servicing is a vital capability that will bolster the capacity and affordability of NASA's ongoing scientific and human exploration operations, and enhance the ability of domestic companies to compete in the global marketplace; and the future of NASA satellites and spacecraft across mission directorates should be constructed in a manner that allows for servicing in order to maximize operational longevity and affordability.

This section also would require NASA to identify orbital assets in both the Science Mission Directorate and the Human Exploration and Operations Mission Directorate that could benefit from satellite servicing-related technologies. Additionally, this section would require NASA to work across all of its mission directorates to evaluate opportunities for the private sector to perform such services or advance technical capabilities by leveraging the technologies and techniques developed by both NASA programs and other industry programs.

Section 627. Flight opportunities.

This section would direct NASA, as the Administrator of NASA considers appropriate, to expand the development of technology payloads for scientific research and investigating new or improved capabilities. Additionally, this section would require NASA to make funds available for flight testing, payload development, and hardware related to the development of new technology payloads and investigating improved capabilities. Finally, this section would reaffirm the policy found in the 2010 Act that NASA should provide flight opportunities for payloads to microgravity environments and suborbital altitudes.

Section 628. Sense of Congress on small class launch missions.

This section would express the sense of Congress that Venture Class Launch Services contracts awarded under the Launch Services Program will expand opportunities for future dedicated launches of CubeSats and other small satellites. Additionally, this section would state the sense of Congress that small orbital science missions and the principal investigator-led small orbital science missions offer valuable opportunities to advance science at low cost, train the next generation of scientists and engineers, and enable participants to acquire skills in systems engineering and systems integration. It also would express the sense of Congress that these factors are critical to maintaining United States leadership in

space and for enhancing United States innovation and competitiveness abroad.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, 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 material is printed in italic, existing law in which no change is proposed is shown in roman):

TITLE 51. NATIONAL AND COMMERCIAL SPACE PROGRAMS

SUBTITLE II. GENERAL PROGRAM AND POLICY PROVISIONS

CHAPTER 201. NATIONAL AERONAUTICS AND SPACE PROGRAM

SUBCHAPTER III. GENERAL ADMINISTRATIVE PROVISIONS

§20148. Indemnification; NASA launch services and reentry services

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

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

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

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

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

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

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

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

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

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

(2) *MAXIMUM PROBABLE LOSSES.*—

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

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

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

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

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

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

(4) *COVERAGE.*—An insurance policy or demonstration of financial responsibility under this subsection shall protect the following, to the extent of their potential liability for involvement in launch services or reentry services:

(A) The Government.

(B) Personnel of the Government.

(C) Related entities of the Government.

(D) Related entities of the provider.

(E) Government astronauts.

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

(e) *CROSS-WAIVERS.*—

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

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

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

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

(h) *PAYMENTS.*—

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

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

(3) *ADDITIONAL APPROPRIATIONS.*—If the Administrator requests additional appropriations to make payments under this subsection, then the request for those appropriations shall be made in accordance with the procedures established under section 50915.

(i) *RULES OF CONSTRUCTION.*—

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

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

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

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

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

(j) *RELATIONSHIP TO OTHER LAWS.*—The Administrator may not provide indemnification under this section for an activity that requires a license or permit under chapter 509.

(k) *DEFINITIONS.*—In this section:

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

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

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

(4) *RELATED ENTITY.*—The term “related entity” means a contractor or subcontractor.

(5) *REENTRY SERVICES.*—The term “reentry services” has the meaning given the term in section 50902.

(6) *THIRD PARTY.*—The term “third party” means a person except—

(A) the United States Government;

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

(C) a provider;

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

(E) a government astronaut.

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

(a) *IN GENERAL.*—Notwithstanding any other provision of law, the Administrator may provide for the medical monitoring, diagnosis,

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

(b) *EXCLUSIONS.*—The Administrator may not—

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

(2) require a former United States government astronaut or payload specialist to participate in the monitoring authorized under subsection (a).

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

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

CHAPTER 203. RESPONSIBILITIES AND VISION

§ 20302. Vision for space exploration

(a) *IN GENERAL.*—The Administrator shall establish a program to develop a sustained human presence *in cis-lunar space* or on the Moon, including a robust precursor program, to promote exploration, science, commerce, and United States preeminence in space, and as a stepping-stone to future exploration of Mars and other destinations. The Administrator is further authorized to develop and conduct appropriate international collaborations in pursuit of these goals.

[(b) *MILESTONES.*—The Administrator shall manage human space flight programs to strive to achieve the following milestones (in conformity with section 70502 of this title):

[(1) Returning Americans to the Moon no later than 2020.

[(2) Launching the Crew Exploration Vehicle as close to 2010 as possible.

[(3) Increasing knowledge of the impacts of long duration stays in space on the human body using the most appropriate facilities available, including the International Space Station.

[(4) Enabling humans to land on and return from Mars and other destinations on a timetable that is technically and fiscally possible.]

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

SUBTITLE V. PROGRAMS TARGETING COMMERCIAL OPPORTUNITIES

CHAPTER 501. SPACE COMMERCE

SUBCHAPTER II. PROMOTION OF COMMERCIAL SPACE OPPORTUNITIES

§ 50111. Commercialization of Space Station

* * * * *

(c) ISS TRANSITION PLAN.—

(1) IN GENERAL.—The Administrator, in coordination with the ISS management entity, ISS partners, the scientific user community, and the commercial space sector shall develop a plan to transition in a step-wise approach from the current regime that relies heavily on NASA sponsorship to a regime where NASA is one of many customers of a low-Earth orbit commercial human space flight enterprise.

(2) REPORTS.—Not later than December 1, 2017, and triennially thereafter until 2023, the Administrator shall submit to the appropriate committees of Congress a report that includes—

(A) an identification of low-Earth orbit capabilities necessary to meet the Administration’s deep space human space flight exploration objectives and mission requirements beyond the period of operation and utilization of the ISS described in section 503 of the National Aeronautics and Space Administration Authorization Act of 2010 (42 U.S.C. 18353), if any;

(B) steps NASA is taking and will take, including demonstrations that could be conducted on the ISS, to stimulate and facilitate commercial demand and supply of products and services in low-Earth orbit;

(C) an assessment of current and projected commercial activities in low-Earth orbit, including on the ISS, and their potential for meeting the capabilities identified in subparagraph (A);

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

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

(i) a general discussion of international partner capabilities and prospects for extending the partnership, to include the potential for participation by additional countries, for the purposes of the human development and exploration of deep space;

(ii) a review of essential systems, equipment upgrades, or potential maintenance that would be necessary to extend ISS operations and utilization;

(iii) an evaluation of the cost and schedule requirements associated with the development and delivery of

essential systems, equipment upgrades, or potential maintenance identified under clause (ii);

(iv) an identification of possible international, academic, or industry partner contributions, cost-share, and program transitions to provide the upgrades identified under clause (ii);

(v) impacts on the goals and objectives of the ISS National Laboratory and the management entity responsible for operation of the ISS National Laboratory;

(vi) impacts on services provided by the Commercial Resupply Services and Commercial Crew Program to the ISS;

(vii) impacts on the use of the ISS as a testbed to transition functions of the ISS to the commercial space sector and enhance economic development of low-Earth orbit, including the evolution of self-sustaining commercial activities;

(viii) an assessment on the technical limiting factor of the ISS lifetime, including a list of critical components and their expected lifetime and availability;

(ix) an evaluation of the potential for expanding the use of ISS facilities to accommodate the needs of researchers and other users, including changes to policies, regulations, and laws that would stimulate greater private and public involvement on the ISS; and

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

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

(i) those functions, roles, and responsibilities the Federal Government should retain during the lifecycle of the ISS;

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

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

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

(G) progress on meeting human exploration research objectives on ISS and prospects for accomplishing future exploration and other research objectives on future commercially supplied low-Earth orbit platforms or migration of those objectives to cis-lunar space.

(3) DEMONSTRATIONS.—Demonstrations identified under paragraph (2) may—

(A) test the capabilities described in paragraph (2)(A); and

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

CHAPTER 505. COMMERCIAL SPACE COMPETITIVENESS

§ 50507. Commercial launch cooperation

(a) AUTHORITY FOR AGREEMENTS RELATING TO SPACE TRANSPORTATION INFRASTRUCTURE.—The Administrator—

(1) may enter into an agreement with a covered entity to provide the covered entity with support and services related to the space transportation infrastructure of the Administration—

(A) to maximize the use of the space transportation infrastructure of the Administration by the private sector in the United States;

(B) to maximize the effectiveness and efficiency of the space transportation infrastructure of the Administration;

(C) to reduce the cost of services provided by the Administration related to space transportation infrastructure at launch support facilities and space recovery support facilities; and

(D) to encourage commercial space activities by enabling investment by covered entities in the space transportation infrastructure of the Administration; and

(2) at the request of the covered entity, may include that support and services in the contracted space launch and reentry range support requirements of the Administration if—

(A) the Administrator determines that including that support and services in the requirements—

(i) is in the best interest of the Federal Government;

(ii) does not interfere with the requirements of the Administration;

(iii) does not compete with the commercial space activities of other covered entities; and

(iv) does not result in the Administration retaining ownership of assets which are no longer needed to meet a programmatic mission of the Administration; and

(B) any commercial requirement included in the agreement has full non-Federal funding before the execution of the agreement.

(b) CONTRIBUTIONS.—

(1) IN GENERAL.—The Administrator may enter into an agreement with a covered entity on a cooperative and voluntary basis to accept funds, services, and equipment to carry out the purposes in subsection (a)(1).

(2) USE OF CONTRIBUTIONS.—Any funds, services, or equipment accepted by the Administrator under this subsection—

(A) may be used only for the objectives specified in this section in accordance with terms of use set forth in the agreement entered into under this subsection; and

(B) shall be managed by the Administrator in accordance with procedures prescribed under subsection (d).

(3) *REQUIREMENTS WITH RESPECT TO AGREEMENTS.*—An agreement entered into with a covered entity under this subsection shall—

(A) address the terms of use, ownership, and disposition of the funds, services, or equipment contributed under the agreement;

(B) include a provision that the covered entity will not recover the costs of its contribution through any other agreement with the United States; and

(C) include a provision that the contribution of a covered entity will not preclude access to or use by another covered entity.

(c) *ANNUAL REPORT.*—Not later than January 31 of each year, the Administrator shall submit to the appropriate committees of Congress a report on the process used to establish agreements under subsections (a) and (b), including noticing announcements of opportunities and criteria for selecting a covered entity, and the funds, services, and equipment accepted and used by the Administrator under this section during the preceding fiscal year.

(d) *PROCEDURES.*—The Administrator shall prescribe procedures to carry out this section consistent with sections 50504 and 50913.

(e) *DEFINITIONS.*—In this section:

(1) *COVERED ENTITY.*—In this section, the term “covered entity” means—

(A) a non-Federal entity that—

(i) is organized under the laws of the United States or of any jurisdiction within the United States; and

(ii) is engaged in commercial space activities; or

(B) an entity that controls, is controlled by, or is under common control with, a non-Federal entity described in subparagraph (A).

(2) *LAUNCH SUPPORT FACILITIES.*—The term “launch support facilities” has the meaning given the term in section 50501.

(3) *SPACE RECOVERY SUPPORT FACILITIES.*—The term “space recovery support facilities” has the meaning given the term in section 50501.

(4) *SPACE TRANSPORTATION INFRASTRUCTURE.*—The term “space transportation infrastructure” has the meaning given that term in section 50501.

SUBTITLE VII. ACCESS TO SPACE

CHAPTER 705. EXPLORATION INITIATIVES

§ 70502. Exploration plan and programs

The Administrator shall—

(1) construct an architecture and implementation plan for the Administration’s human exploration program that is not critically dependent on the achievement of milestones by fixed dates;

[(2) implement an exploration technology development program to enable lunar human and robotic operations consistent with section 20302(b) of this title, including surface power to use on the Moon and other locations;]

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

(3) conduct an in-situ resource utilization technology program to develop the capability to use space resources to increase independence from Earth, and sustain exploration beyond low-Earth orbit; and

(4) pursue aggressively automated rendezvous and docking capabilities that can support the International Space Station and other mission requirements.

[§ 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 exploration and utilization activities of the United States, the Administrator shall take all necessary steps, including engaging international, academic, and industry partners to ensure that activities in the Administration’s human 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.

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

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 2010

[Public Law 111-267; 124 Stat. 2805]

SEC. 202. GOALS AND OBJECTIVES.

[42 U.S.C. 18312]

[(a) LONG TERM GOAL.—The long term goal of 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, in a manner involving international partners.]

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

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

(2) *the peaceful settlement of a location in space or on another celestial body and a thriving space economy in the 21st century.*

(b) *KEY OBJECTIVES.*—*The key objectives of the United States for human expansion into space shall be—*

(1) to sustain the capability for long-duration presence in low-Earth orbit, initially through continuation of the ISS and full utilization of the United States segment of the ISS as a National Laboratory, and through assisting and enabling an expanded commercial presence in, and access to, low-Earth orbit, as elements of a low-Earth orbit infrastructure;

(2) to determine if humans can live in an extended manner in space with decreasing reliance on Earth, starting with utilization of low-Earth orbit infrastructure, to identify potential roles that space resources such as energy and materials may play, to meet national and global needs and challenges, such as potential cataclysmic threats, and to explore the viability of and lay the foundation for sustainable economic activities in space;

(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 achieve human exploration of Mars, including the establishment of a capability to extend human presence, including potential human habitation, on the surface of Mars.*

SEC. 401. COMMERCIAL CARGO DEVELOPMENT PROGRAM.

[42 U.S.C. 18341]

The Administrator shall continue to support the existing [Commercial Orbital Transportation Services] *Commercial Resupply Services* program, aimed at enabling the commercial space industry in support of NASA to develop reliable means of launching cargo and supplies to the ISS throughout the duration of the facility's operation. The Administrator may apply funds towards the reduction of risk to the timely start of these services, specifically—

(1) efforts to conduct a flight test;

(2) accelerate development; and

(3) develop the ground infrastructure needed for commercial cargo capability.

[SEC. 803. OVERALL SCIENCE PORTFOLIO-SENSE OF CONGRESS.

[Public Law 111-267; 124 Stat. 2832]

[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.

Congress restates its sense that—

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

(2) *the Administrator should set science priorities by following the guidance provided by the scientific community through the National Academy of Sciences' decadal surveys.*

SEC. 1207. INFORMATION SECURITY.

[42 U.S.C. 18445]

(a) **AGENCY-WIDE INFORMATION SECURITY PLAN.**—

(1) **IN GENERAL.**—*Not later than 1 year after the date of enactment of the National Aeronautics and Space Administration Transition Authorization Act of 2016, the Administrator shall implement the information security plan developed under paragraph (2) and take such further actions as the Administrator considers necessary to improve the information security system in accordance with this section.*

(2) **INFORMATION SECURITY PLAN.**—*Subject to paragraphs (3), (4), and (5), the chief information officer of NASA, shall develop an agency-wide information security plan to enhance information security for NASA information and information infrastructure.*

(3) **REQUIREMENTS.**—*In developing the plan under paragraph (2), the chief information officer shall ensure that the plan—*

(A) *is consistent with policies, standards, guidelines, and directives on information security under subchapter II of chapter 35 of title 44, United States Code;*

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

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

(4) **APPROVAL.**—*The chief information officer shall submit the plan to the Administrator for approval prior to its implementation.*

(5) **CONTENTS.**—*The plan shall include—*

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

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

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

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

(E) coordination among organizational entities, including between each center, facility, mission directorate, and mission support office, and among agency entities responsible for different aspects of information security;

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

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

[(a)](b) MONITORING RISK.—

(1) **UPDATE ON SYSTEM IMPLEMENTATION.**—Not later than 120 days after the date of enactment of this Act, and on a biennial basis thereafter, the chief information officer of NASA, in coordination with other national security agencies, shall provide to the appropriate committees of Congress—

(A) an update on efforts to implement a system to provide dynamic, comprehensive, real-time information regarding risk of unauthorized remote, proximity, and insider use or access, for all information infrastructure under the responsibility of the chief information officer, and mission-related networks, including contractor networks;

(B) an assessment of whether the system has demonstrably and quantifiably reduced network risk compared to alternative methods of measuring security[; and];

(C) an assessment of the progress that each center and facility has made toward implementing the system[.]; and

(D) an update on the agency's efforts to apply additional information security protections to secure high-impact and moderate-impact information systems and mission-critical systems and activities, including those systems that control spacecraft and maintain critical data sources.

(2) **EXISTING ASSESSMENTS.**—The assessments required of the Inspector General under section [3545] 3555 of title 44, United States Code, shall evaluate the effectiveness of the system described in this subsection.

[(b)](c) INFORMATION SECURITY AWARENESS AND EDUCATION.—

(1) **IN GENERAL.**—In consultation with the Department of Education, other national security agencies, and other agency directorates, the chief information officer shall institute an information security awareness and education program for all operators and users of NASA information infrastructure, with the goal of reducing unauthorized remote, proximity, and insider use or access.

(2) **PROGRAM REQUIREMENTS.**—

(A) The program shall include, at a minimum, ongoing classified and unclassified threat-based briefings, and automated exercises and examinations that simulate common attack techniques.

(B) All agency employees and contractors engaged in the operation or use of agency information infrastructure shall participate in the program.

(C) Access to NASA information infrastructure shall only be granted to operators and users who regularly satisfy the requirements of the program.

(D) The chief human capital officer of NASA, in consultation with the chief information officer, shall create a system to reward operators and users of agency information infrastructure for continuous high achievement in the program.

[(c)](d) INFORMATION INFRASTRUCTURE DEFINED.—In this section, the term “information infrastructure” means the underlying framework that information systems and assets rely on to process, transmit, receive, or store information electronically, including programmable electronic devices and communications networks and any associated hardware, software, or data.

