FY2020 AGENCY FINANCIAL REPORT

National Aeronautics and Space Administration

WWW.NASA.GOV

COVER IMAGE CAPTION AND CREDITS

A view of the Power and Propulsion Element (PPE) and the Habitation and Logistics Outpost (HALO). The two elements of the Gateway will be launched together.

Photo Credit: NASA Johnson

Cover Image

A SpaceX Falcon 9 rocket carrying the company's Crew Dragon spacecraft is seen in this false color infrared exposure as it is launched on NASA's SpaceX Demo-2 mission to the International Space Station (ISS) with NASA astronauts Robert Behnken and Douglas Hurley onboard, Saturday, May 30, 2020, at NASA's Kennedy Space Center in Florida. The Demo-2 mission is the first launch with astronauts of the SpaceX Crew Dragon spacecraft and Falcon 9 rocket to the ISS as part of the agency's Commercial Crew Program. The test flight serves as an end-to-end demonstration of SpaceX's crew transportation system. Behnken and Hurley launched at 3:22 p.m. EDT on Saturday, May 30, from Launch Complex 39A at the Kennedy Space Center. A new era of human spaceflight is set to begin as American astronauts once again launch on an American rocket from American soil to low Earth orbit for the first time since the conclusion of the Space Shuttle Program in 2011.

Photo Credit: NASA/Bill Ingalls

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National Aeronautics and Space Administration

NASA MEETS SPACE X

NASA astronauts (from left) Victor Glover, Mike Hopkins, Doug Hurley and Robert Behnken post for a group portrait at the SpaceX Headquarters in Hawthorne, California. Behnken and Hurley will launch to the International Space Station on the Demo-2 mission – the crew flight test of SpaceX's Crew Dragon.

Photo Credit: SpaceX

SPACEX

05.30.20

A SpaceX Falcon 9 rocket carrying the company's Crew Dragon spacecraft is launched from Launch Complex 39A on NASA's SpaceX Demo-2 mission to the International Space Station with NASA astronauts Robert Behnken and Douglas Hurley onboard.

Photo Credit: NASA/Joel Kowsky

05.31.20

Views of SpaceX's Crew Dragon spacecraft with NASA astronauts Douglas Hurley and Robert Behnken onboard are seen on monitors inside firing room four as the spacecraft approaches to the International Space Station for docking.

Photo Credit: NASA/Joel Kowsky

08.02.20

The SpaceX Crew Dragon Endeavour spacecraft is lifted onto the SpaceX GO Navigator recovery ship shortly after it landed with NASA astronauts Robert Behnken and Douglas Hurley onboard in the Gulf of Mexico off the coast of Pensacola, Florida, Sunday, Aug. 2, 2020.

Photo Credit: NASA/Bill Ingalls

08.02.20

The Demo-2 test flight for NASA's Commercial Crew Program was the first to deliver astronauts to the International Space Station and return them safely to Earth onboard a commercially built and operated spacecraft. Behnken and Hurley returned after spending 64 days in space.

Photo Credit: NASA/Bill Ingalls

INTRODUCTION

Message from the Administrator

I am pleased to present the Fiscal Year (FY) 2020 Agency Financial Report (AFR) for the National Aeronautics and Space Administration (NASA). This document represents an annual view of our financial and programmatic performance relative to the Agency's Vision and Mission. A complete overview of our Mission Performance is provided, including the final year-end programmatic performance goals assessment.

To provide transparency into our business strategy, a full accounting of our financial statements in accordance with Generally Accepted Accounting Principles is presented within the financial reports. As responsible stewards of the American taxpayers, NASA is committed to delivering credible, quality data and information regarding the Agency's fiscal operations. We follow standard financial reporting practices, ensuring appropriate controls with efficient and effective management of appropriated and reimbursable Agency funds. Under the leadership of the Office of the Chief Financial Officer, for ten straight years, NASA has received an unmodified "clean" opinion on its financial statements, with no reported material weaknesses, signifying our internal controls are operating effectively to support accurate financial reporting.

Every day, NASA is pushing boundaries in aeronautics, space exploration, science, and technology. Since the Agency's establishment in 1958, we have aimed to accomplish our Vision and Mission with the utmost care. We have aligned our activities to four major themes - **DISCOVER**, **EXPLORE**, **DEVELOP**, and **ENABLE**, that, in turn, correspond to the Strategic Goals identified in our 2018 Strategic Plan. This year, unforeseen challenges posed by the coronavirus (COVID-19) pandemic were felt by all Americans, and indeed the world. NASA was faced with the challenge of adapting its operations to this new reality in a rapid and responsible manner. I am incredibly proud of the resilience, ingenuity, and energy that the people of NASA have shown to not only implement social distancing, working remotely, and ensuring safe operations, but also to achieve history at the same time. Without hesitation, NASA stepped forward to pioneer and develop solutions to issues related to COVID-19. The Agency developed a new high-pressure ventilator in the early days of the pandemic response, which was approved by the Food and Drug Administration, to treat patients facing the most severe complications of COVID-19. As the Nation continues to move forward and seeks to understand and discover ways to predict and prevent future pandemics, NASA is funding new projects exploring connections between the environment and COVID-19. Advanced satellite imaging is a powerful tool NASA's Earth Science Division is exploring to better understand the regional-to-global impacts of the pandemic.

The incredible drive, determination, and safety measures implemented by NASA's civil servants and private partners in response to COVID-19 allowed for the historic launch of American astronauts from American soil to occur as planned this spring. On May 27th, astronauts Robert Behnken and Douglas Hurley were launched into space aboard SpaceX's Crew Dragon spacecraft on the company's Falcon 9 rocket. The historic SpaceX launch to the International Space Station is just the first step which opens the way for even greater achievements in space exploration to occur in the future. It is NASA's top priority to land the first woman and next man on the Moon by 2024. During 2020, NASA announced plans to send the Volatiles Investigating Polar Exploration Rover to the South Pole of the Moon to explore the lunar surface. We have also completed the first element of the Artemis III Orion Crew module that will be used to carry Artemis astronauts to the Moon in 2024. NASA is determined to create a sustainable presence on the Moon to drive advances in science and technology and enable greater exploration of our Solar System than ever before.

As we reflect on the challenges and successes of the past fiscal year and look forward to 2021, NASA remains optimistic and energized about what is to come. It is with honor and gratitude that I recognize the efforts of the women and men who sustain NASA's success as we all continue to drive America's leadership in space and aeronautics.

NASA's Major Themes and Strategic Goals

I. Discover

Expand human knowledge through new scientific discoveries.

II. Explore

Extend human presence deeper into space and to the Moon for sustainable long-term exploration and utilization.

III. Develop

Address national challenges and catalyze economic growth.

IV. Enable

Optimize capabilities and operations.

2020 VISION: WOMEN OF NASA

Forerunners of Change, Leaders of Innovation.

Women have been at the center of NASA's story for decades, from pioneering hidden figures like Mary Winston Jackson who paved the future for countless future generations of female scientists, engineers and aerospace leaders, to the astronauts of today like Christina Koch and Jessica Meir, who recently participated in a historic All-Woman spacewalk. As we look to our future, Women at NASA will continue to lead the Agency to greater success and achievement. NASA is committed to landing the first Woman on the Moon by 2024, even as we continue to work to encourage more girls and women to enter Science, Technology, Engineering, and Mathematical (STEM) fields and follow in the footsteps of these inspiring figures.

Faces of Technology

Women at NASA are making history every day. Meet a few of these women who are making contributions to the technologies that make exploration possible. To meet more of these amazing women, visit: **www.nasa.gov/women** or join the conversation #WomensHistoryMonth.

Photo Credit: NASA

NASA Names Headquarters After 'Hidden Figure' Mary W. Jackson

Mary Winston Jackson (1921–2005) successfully overcame the barriers of segregation and gender bias to become a professional aerospace engineer and leader in ensuring equal opportunities for future generations.

Photo Credit: NASA

NASA Astronaut Jeanette Epps Joins First Operational Boeing Crew Mission to Space Station

The spaceflight will be the first for Epps, who earned a bachelor's degree in physics in 1992 from LeMoyne College in her hometown of Syracuse, New York.

Photo Credit: NASA

NASA Astronauts Christina Koch and Jessica Meir Work on Their U.S. Spacesuits

NASA astronauts Christina Koch (left) and Jessica Meir work on their U.S. spacesuits ahead of a spacewalk they conducted to install new lithium-ion batteries that store and distribute power collected from solar arrays on the station's Port-6 truss structure.

Photo Credit: NASA

NASA's Perseverance Rover Will Carry First Spacesuit Materials to Mars

Advanced spacesuit designer Amy Ross of NASA's Johnson Space Center stands with the Z-2, a prototype spacesuit.

Photo Credit: NASA

SECTION 1

Management's Discussion and Analysis

A United Launch Alliance Atlas V rocket with NASA's Mars 2020 Perseverance rover onboard is seen illuminated by spotlights on the launch pad at Space Launch Complex 41, Tuesday, July 28, 2020, at Cape Canaveral Air Force Station in Florida. The Perseverance rover is part of NASA's Mars Exploration Program, a long-term effort of robotic exploration of the Red Planet.

Photo Credit: NASA/Bill Ingalls & Joel Kowsky

WELCOME TO NASA

NASA produces an Annual Performance Report (APR) and Agency Financial Report (AFR). The APR is provided as part of NASA's annual Volume of Integrated Performance (VIPer). The VIPer is a consolidated document reporting prior year performance with an updated performance plan for the current fiscal year, and a proposed performance plan for the requested budget fiscal year. The VIPer is published in conjunction with the President's Budget Request, due in February 2021.

This AFR provides an overview of NASA's major programmatic and financial results for Fiscal Year (FY) 2020. It integrates NASA's financial and program performance to demonstrate stewardship and accountability, highlighting FY 2020 achievements and challenges.

NASA demonstrates stewardship of its resources and accountability for results through compliance with the Chief Financial Officers Act of 1990 (CFO Act) and the Government Performance and Results Act Modernization Act of 2010[1] (GPRAMA). Financial aspects of the Agency's business operations are accounted for according to U.S. Generally Accepted Accounting Principles (GAAP). GAAP, for Federal entities, are the standards prescribed by the Federal Accounting Standards Advisory Board (FASAB).

NASA presents both performance and financial results of operations by strategic goals as identified in the 2018 Strategic Plan[2]. Highlights of key program activities contributing to each strategic goal are provided in the Mission Performance section (starting on page 13). A high-level summary of the linkage between program results and the cost of operations is provided in the Statement of Net Cost (SNC), found in the Financial section (starting on page 49). The SNC presents comparative net cost of operations during FY 2020 and FY 2019 by strategic goal and for the Agency as a whole. In addition, the Financial Highlights, in the Financial Performance section (starting on page 29), explains any significant changes in NASA's financial condition from FY 2019 to FY 2020.

Financial systems that meet requirements of the Federal Financial Management Improvement Act (FFMIA) are vital to NASA's financial management program. The AFR describes NASA's compliance with the FFMIA, as well as the built-in checks and balances required by the Office of Management and Budget's (OMB) Circular No. A-123, *Management's Responsibility for Enterprise Risk Management and Internal Control*, which places responsibility for internal controls over financial reporting on Agency management for the purpose of safeguarding assets and improving efficiency and effectiveness of operations.

Four passengers participate in a simulation of an air taxi ride in NASA's Vertical Motion Simulator at the Ames Research Center in California. This research is helping to open a new era in air travel called Urban Air Mobility, an air transportation system that would include using everything from small drones to air taxis above populated areas.

Photo Credit: NASA

The AFR presents the Agency's audited FY 2020 and FY 2019 financial statements and disclosures, the related independent auditors' audit opinion, and other information. The FY 2020 AFR can be found on NASA's website at https://www.nasa.gov/content/fy-2020-budget-request

[1] Government Performance and Results Act Modernization Act of 2010 (GPRAMA) https://obamawhitehouse.archives.gov/omb/performance/gprm-act

[2] 2018 Strategic Plan https://www.nasa.gov/sites/default/files/atoms/files/nasa_2018_strategic_plan.pdf

ACHIEVING OUR VISION AND MISSION

VISION To discover and expand knowledge for the benefit of humanity.

MISSION Lead an innovative and sustainable program of exploration with commercial and international partners to enable human expansion across the solar system and bring new knowledge and opportunities back to Earth. Support growth of the Nation's economy in space and aeronautics, increase understanding of the universe and our place in it, work with industry to improve America's aerospace technologies, and advance American leadership.

NASA inspires the world by exploring new frontiers, expanding knowledge through new scientific discoveries, and developing new technologies that support economic growth. Our work benefits Americans and all humanity. Since NASA's inception in 1958 to the present day, our spacecraft have visited every planet in the solar system and begun the journey into interstellar space. We have landed astronauts on the Moon, and we are working towards landing the first woman and next man on the Moon and to expand human exploration into deep space. We have solved some of the core mysteries of our home planet and the wider universe.

As we begin a new decade, NASA will continue this legacy of achievement and greatly expand the benefits we provide to humankind. Our achievements of tomorrow are being built on a solid foundation of performance management and fiscal operations. We use credible, quality data to drive Agency decision-making and planning. Through the rigorous application of controls and standards, we ensure that our programs and projects have the resources they need to continue this forward momentum.

This commitment is at the core of the *NASA 2018 Strategic Plan* and drives our Mission and Vision. The Strategic Plan outlines NASA's plans for the future, provides a clear and unified direction for all of its activities, and the foundation on which we can build and measure the success of our programs and projects.

NASA maintains its continuity of purpose over time by serving the American public and supporting a number of National priorities, characterized by six major elements:

- Fostering New Discoveries and Expanding Human Knowledge
- Global Engagement and Diplomacy
- Interactions with the Nation's Security and Industrial Base Posture
- Economic Development and Growth
- Addressing National Challenges
- Leadership and Inspiration

Take a virtual tour of the Moon in all-new 4K resolution, thanks to data provided by NASA's Lunar Reconnaissance Orbiter spacecraft. As the visualization moves around the near side, far side, north and south poles, we highlight interesting features, sites, and information gathered on the lunar terrain.

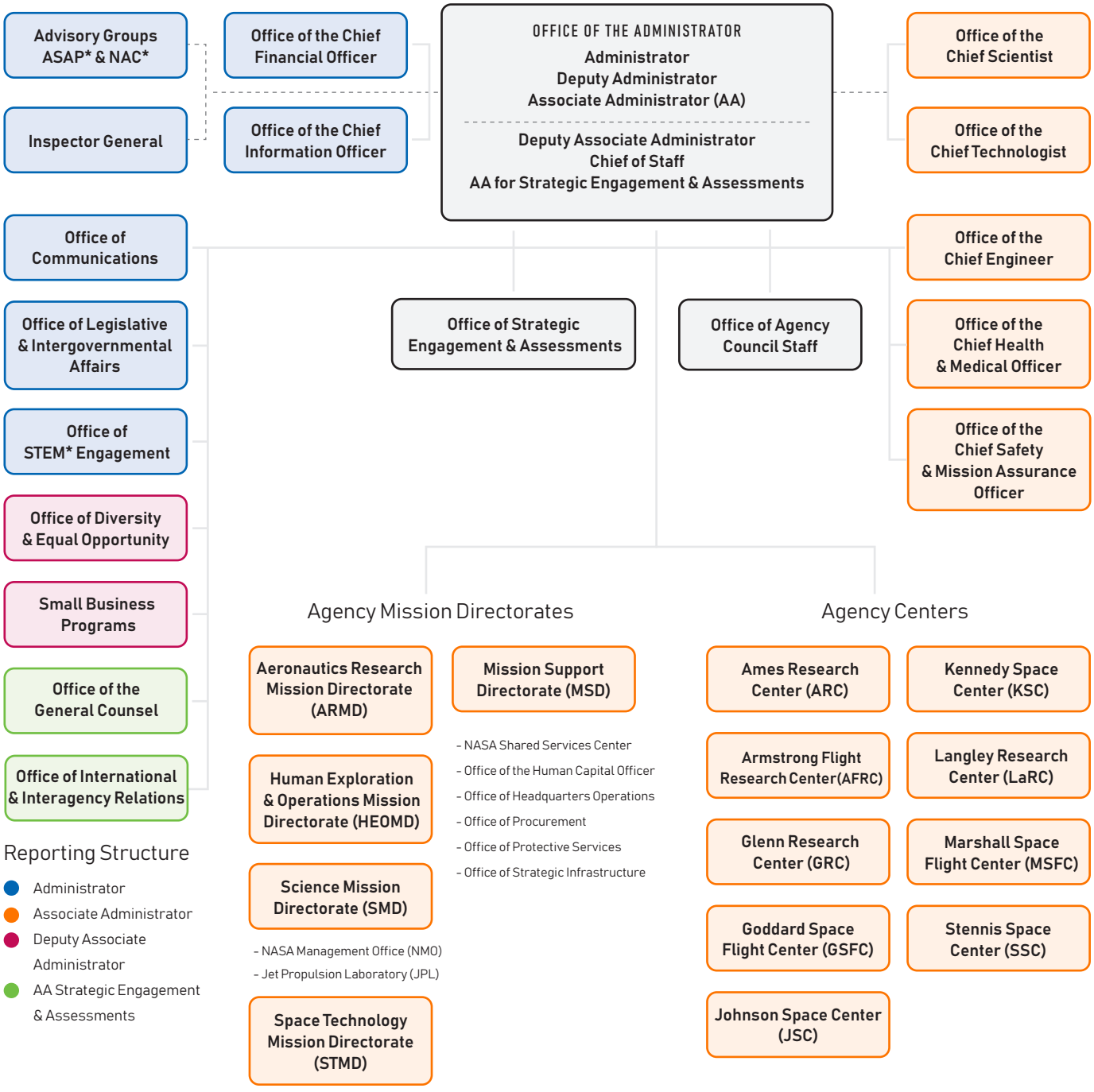
Music Provided By Killer Tracks: "Never Looking Back" - Frederick Wiedmann. "Flying over Turmoil" - Benjamin Krause & Scott Goodman.

This video is public domain and along with other supporting visualizations can be downloaded from the Scientific Visualization Studio at: http://svs.gsfc.nasa.gov/4619

Photo Credit: NASA's Goddard Space Flight Center/David Ladd & Ernie Wright

ORGANIZATIONAL STRUCTURE

NASA's organizational structure comprises a top level leadership structure overseeing a matrix relationship between Mission Directorates, Mission Support offices, and Centers. This structure ensures the Agency can have both a holistic and narrowly-focused approach to business management, safety oversight, and achievement of mission and operational goals, as described in the NASA Organization, NASA Policy Directive 1000.3E. The Administrator and senior officials lead the Agency by providing top-level strategies and direction. Mission directorate and mission support offices at Headquarters (HQ) manage decisions on programmatic investments and guide the operations of the Centers. NASA's Centers and facilities manage and execute the mission work — engineering, operations, science, and technology development — and supporting activities.

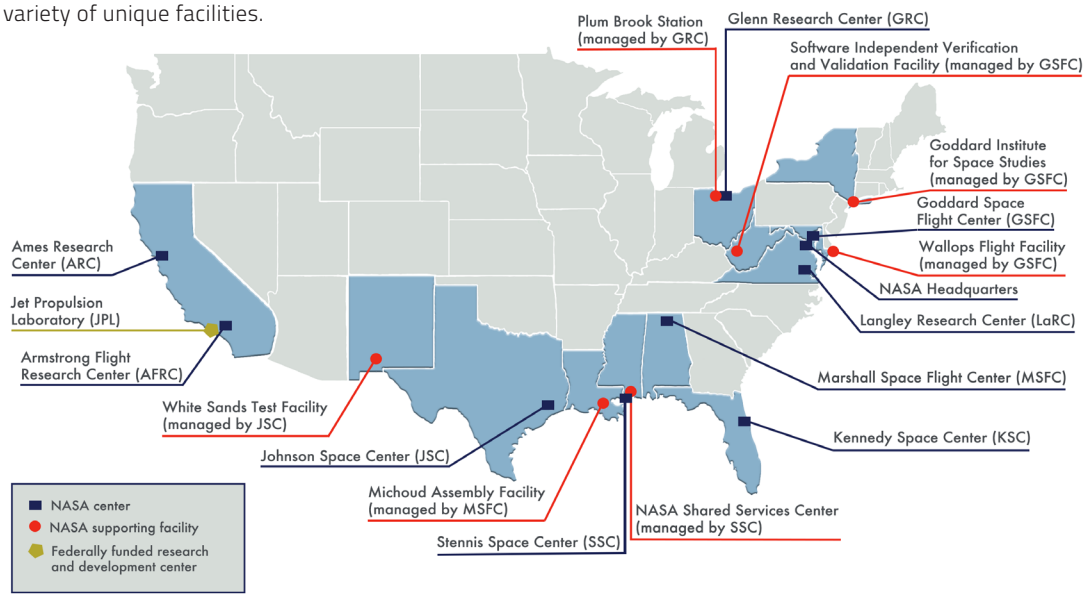


*Acronyms

ASAP - Aerospace Safety Advisory Panel | NAC - NASA Advisory Council | STEM - Science, Technology, Engineering & Mathematics

CENTERS AND FACILITIES

NASA's Headquarters, located in Washington, DC, provides the overall guidance and direction to the agency under the leadership of the Administrator. A skilled and diverse group of technical and business professionals conduct day-to-day activities throughout our ten field Centers and a variety of unique facilities.



LOCATIONS IN THE SPOTLIGHT

Michoud Assembly Facility

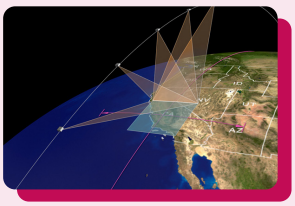
Teams at NASA's Michoud Assembly Facility in New Orleans are building the core stage of NASA's Space Launch System (SLS) rocket for Artemis II, the first crewed mission to the Moon in NASA's Artemis program. The SLS rocket's 212-foot-tall core stage provides more than 2 million pounds of thrust to help send astronauts aboard NASA's Orion spacecraft around the Moon. Because each of the five structures that make up the core stage are so large, the elements are built separately then connected together to form one stage. This video shows completed work Michoud teams have made since January 2020.

Johnson Space Center

When the first woman and next man land on the Moon in 2024, they will explore the permanently shadowed and extremely cold regions of the Moon's South Pole. Astronauts on Artemis missions will have to contain samples and carry them in multiple spacecrafts during transport back to Earth. To aid in the effort, the NASA Lunar Deep Freeze Challenge, led by the NASA Tournament Lab, is seeking input on how to return cold samples collected in these regions where temperatures are less than -238°F (-150°C), while preserving them in their original, frozen state back to Earth for further analysis. For more information on the Lunar Deep Freeze Challenge visit https://www.nasa.gov/lunar-deep-freeze-challenge.

Jet Propulsion Laboratory

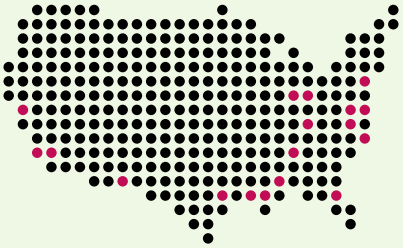
Currently in development, Multi-Angle Imager for Aerosols (MAIA) will make radiometric and polarimetric measurements needed to characterize the sizes, compositions and quantities of particulate matter in air pollution. As part of the MAIA investigation, researchers will combine MAIA measurements with population health records to better understand the connections between aerosol pollutants and health problems such as adverse birth outcomes, cardiovascular and respiratory diseases, and premature deaths.

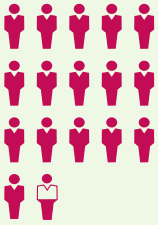


NASA BY THE NUMBERS

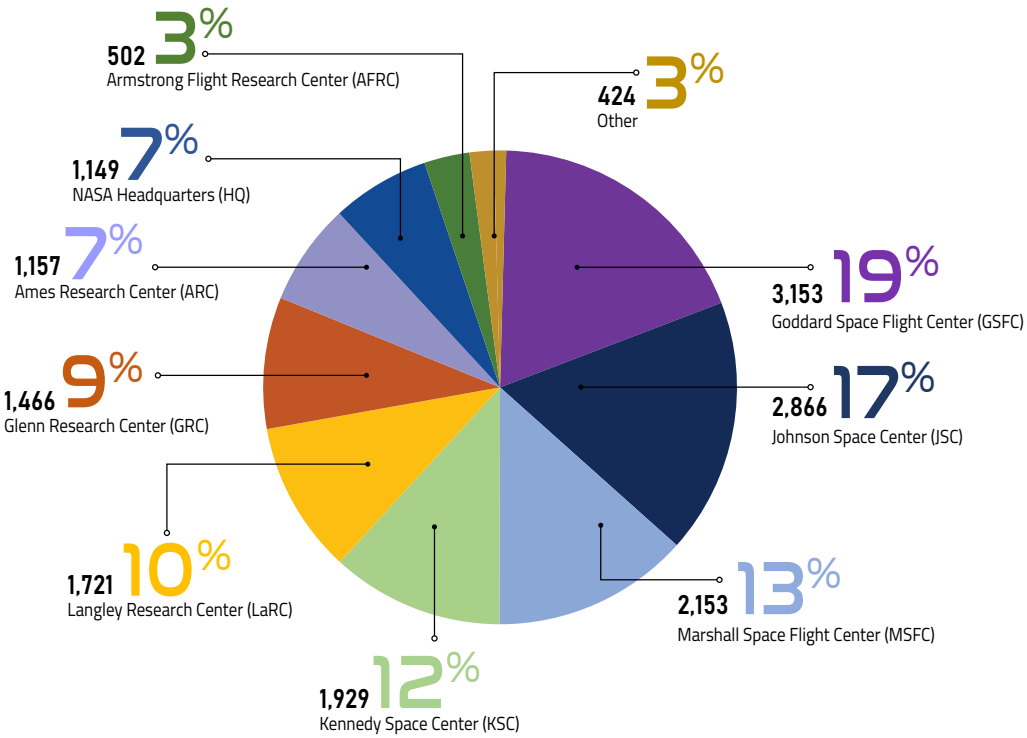
NASA'S CIVIL SERVICE WORKFORCE*

16,520

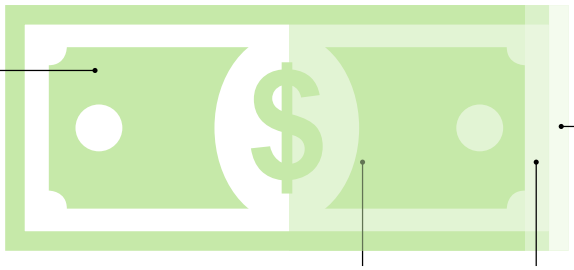




= 1,000 Employees



$22.7 BILLION budget in FY 2020



$11.7 BILLION
Research, Engineering, and Development

$0.8 BILLION
Facilities and Equipment

$8.9 BILLION
Operations

$1.3 BILLION
Grants

* Full-Time Permanent Employees

More information about NASA's workforce is available at https://wicn.nssc.nasa.gov/

MANAGEMENT'S DISCUSSION AND ANALYSIS

Mission Performance

The first solid rocket booster test for Space Launch System (SLS) missions beyond Artemis III seen here during a two-minute hot fire test, Wednesday, September 2, 2020, at the T-97 Northrop Grumman test facility in Promontory, Utah. The flight support booster is structurally identical to each of the five-segment solid rocket boosters on the SLS rocket and produce more than 75 percent of the rocket's thrust capability.

The flight support booster test builds on prior tests and will allow NASA and Northrop Grumman, the SLS booster lead contractor, to evaluate the motor's performance using potential new materials and processes for future booster performance.

Photo Credit: NASA/Northrop Grumman/Scott Mohrman

STRATEGIC PERFORMANCE FRAMEWORK

The Government Performance and Results Act Modernization Act (GPRAMA) of 2010 requires a strategic performance framework that is structured to improve focus on agency priorities with measurable outcomes that support data-driven decision making. The *NASA 2018 Strategic Plan* created a framework that consists of NASA's top priorities and strategies for making progress toward these priorities. At the top of the framework are strategic goals, which describe NASA's Mission areas. Strategic objectives present strategies for achieving the strategic goals. Multi-year performance goals (PG) measure progress towards achieving the strategic objectives (see illustration below).

Annual Evaluation Plan
1 year – report in Performance Plan

Describes the agency's plan for evaluation and evidence-building activities to answer Priority Questions from the Learning Agenda.

NASA's Performance Framework Breakdown

4	13	48
Strategic Goals	Strategic Objectives	Performance Goals

Agency priority goals are comprised of a subset of PGs, selected by NASA leadership, that highlight high-priority activities that we will focus on within a two-year timeframe. For FY 2020-2021, four of NASA's PGs are also agency priority goals.

Cross-agency priority goals drive cross-agency collaboration to implement three key modernization and reform areas highlighted in the President's Management Agenda. NASA contributes to 13 of the 14 cross-agency priority goals. While the cross-agency priority goals do not directly align to specific PGs, they contribute data for the assessment of several PGs. www.performance.gov/about/CAP_about.html

NASA revised its structure for PGs starting with FY 2020. Previously, NASA reported PGs and Annual Performance Indicators (API) as separately measured units. The new reporting structure incorporates the annual performance indicator into the PG as annual data-driven targets. This change to the reporting increases data transparency and clarifies the outcomes we plan to achieve.

STRATEGIC GOALS AND OBJECTIVES

As detailed in the *NASA 2018 Strategic Plan*, NASA's historic and enduring purpose is aligned to four major strategic themes—**DISCOVER**, **EXPLORE**, **DEVELOP**, and **ENABLE**—that characterize our four strategic goals. These four strategic goals, supported by 13 strategic objectives, outline the Agency's Mission and Vision for the future and are deliberately chosen to support a new era of space exploration; and continue America's preeminence in space, exploration, science, technology, and aeronautics.

I. DISCOVER

Expand human knowledge through new scientific discoveries.

1.1 Understand the Sun, Earth, Solar System and Universe.
1.2 Understand Responses of Physical and Biological Systems to Spaceflight.

II. EXPLORE

Extend human presence deeper into space and to the Moon for sustainable long-term exploration and utilization.

2.1 Lay the Foundation for America to Maintain a Constant Human Presence in Low Earth Orbit Enabled by a Commercial Market.
2.2 Conduct Exploration in Deep Space, Including to the Surface of the Moon.

III. DEVELOP

Address national challenges and catalyze economic growth.

3.1 Develop and Transfer Revolutionary Technologies to Enable Exploration Capabilities for NASA and the Nation.
3.2 Transform Aviation Through Revolutionary Technology Research, Development, and Transfer.
3.3 Inspire and Engage the Public in Aeronautics, Space, and Science.

IV. ENABLE

Optimize capabilities and operations.

4.1 Engage in Partnership Strategies.
4.2 Enable Space Access and Services.
4.3 Assure Safety and Mission Success.
4.4 Manage Human Capital.
4.5 Ensure Enterprise Protection.
4.6 Sustain Infrastructure Capabilities and Operations.

AGENCY PRIORITY GOALS

Agency priority goals are a sub-set of PGs that highlight top-priority achievements that NASA's leadership wants to accomplish within a 2-year timeframe. Each agency priority goal has a goal statement and quarterly milestones. Progress towards achieving NASA's FY 2020-2021 agency priority goals, listed below, are reported on https://www.performance.gov/NASA/.

Artemis 2024 Lunar Landing

Goal leader: Thomas Whitmeyer, Acting Deputy Associate Administrator, Exploration Systems Development, Human Exploration and Operations Mission Directorate

Advance America's goal to land the first woman and the next man on the Moon by 2024 and pursue a sustainable program of exploration by demonstrating capabilities that advance lunar exploration. By September 30, 2021, NASA will launch Artemis I and make significant progress for Artemis II, as well as have multiple companies under contract to develop systems to land humans on the Moon.

Commercial Low Earth Orbit Economy

Goal leader: Phil McAlister, Division Director, Commercial Spaceflight Development, Human Exploration and Operations Mission Directorate

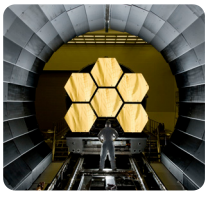
Enable a robust commercial low Earth orbit economy in which transportation, habitation, and on-orbit services are available for purchase by NASA and other customers. By September 30, 2021, NASA will support the development of commercial services, including through releasing new business opportunities, supporting demonstration flights, beginning certification activities, and demonstrating commercial capabilities.

Enable Sustainable Surface Capabilities for the Moon in Preparation for Mars

Co-Goal leader: Walt Engelund, Deputy Associate Administrator for Programs, Space Technology Mission Directorate

Co-Goal leader: Steve Clarke, Deputy Associate Administrator for Exploration, Science Mission Directorate

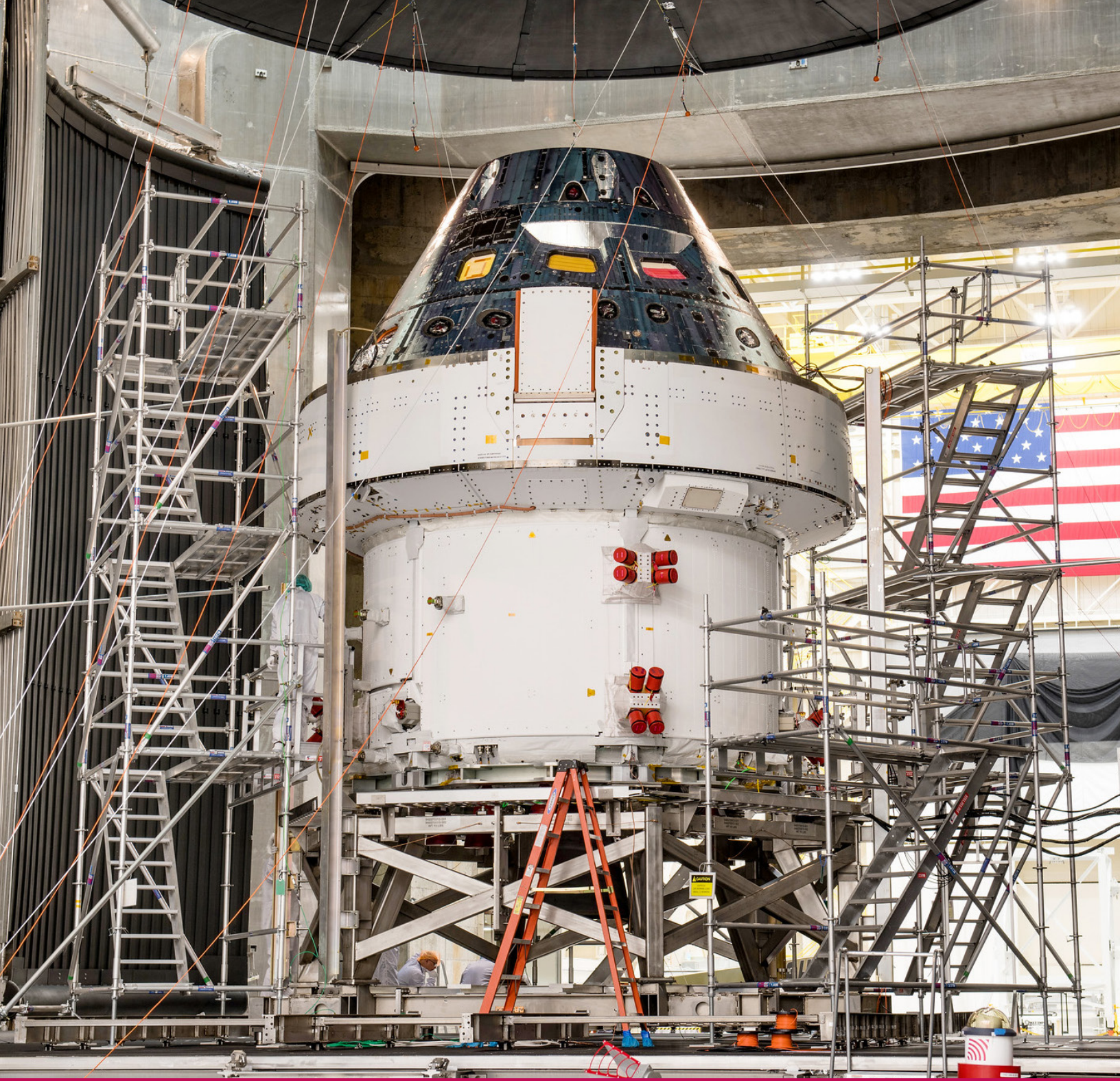
Commence lunar surface science investigations, technology, and exploration demonstrations to enable a sustainable lunar surface exploration strategy. By September 30, 2021, deliver NASA science and technology payloads to the awarded Commercial Lunar Payload Services (CLPS) provider(s) for delivery to the surface of the Moon.



James Webb Space Telescope

Goal leader: Greg Robinson, Program Director, Science Mission Directorate

Revolutionize humankind's understanding of the cosmos and humanity's place in it. The James Webb Space Telescope (Webb) will study every phase in the history of our universe, ranging from the first luminous glows after the Big Bang, to the formation of other stellar systems capable of supporting life on planets like Earth, to the evolution of our own solar system. By September 30, 2021, NASA will launch the Webb, complete on-orbit checkout, and initiate observatory.



MANAGEMENT'S DISCUSSION AND ANALYSIS

Strategic Goals and Highlights

NASA's Orion spacecraft, a critical part of the agency's Artemis I Mission, is nearing the end of a three-month testing campaign at the agency's Plum Brook Station in Sandusky, Ohio. During testing, the craft was subjected to the extreme temperatures and electromagnetic environment it will experience in its upcoming test mission to the Moon.

Photo Credit: NASA

PERFORMANCE ASSESSMENT CRITERIA

As of FY 2020, NASA has incorporated annual targets into each multi-year PG and eliminated API as a separate measurement. A measurement statement describes how the PG will be measured, so that targets are consistent from year to year. We use color-coded scoring to reflect progress towards achieving the target and final results.

During the third and fourth quarters of FY 2020, program officials assessed progress towards achieving our 48 Performance Goals in the Annual Performance Plan. They determined whether targets and milestones were met and assigned the appropriate color ratings. The AFR provides a summary of the preliminary color ratings for FY 2020. The final color ratings, as well as the final progress made based on the targets and explanations of performance, will be provided in the *FY 2022 Volume of Integrated Performance* (VIPer), which will be published in early February 2021.

GREEN

Complete or On Target to Complete

NASA has completed or is on target as planned to complete the PG.

YELLOW

Slightly Below Target

NASA completed or expects to complete this performance measure, but is slightly below the target and/or moderately behind schedule.

RED

Significantly Below Target

NASA did not or does not expect to complete this performance measure within the estimated time frame. The program is substantially below the target and/or significantly behind schedule.

WHITE

Not Assessed

Data not available to assess this PG for FY 2020.

GREY

Currently Unrated

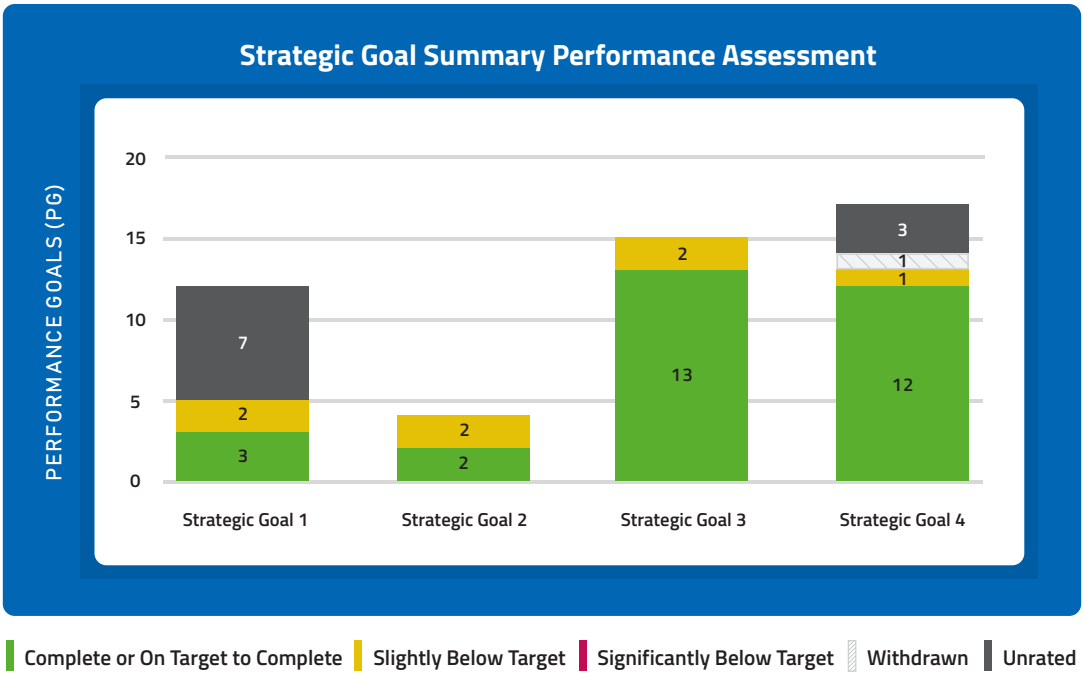
A final rating will be provided in the FY 2022 VIPer.

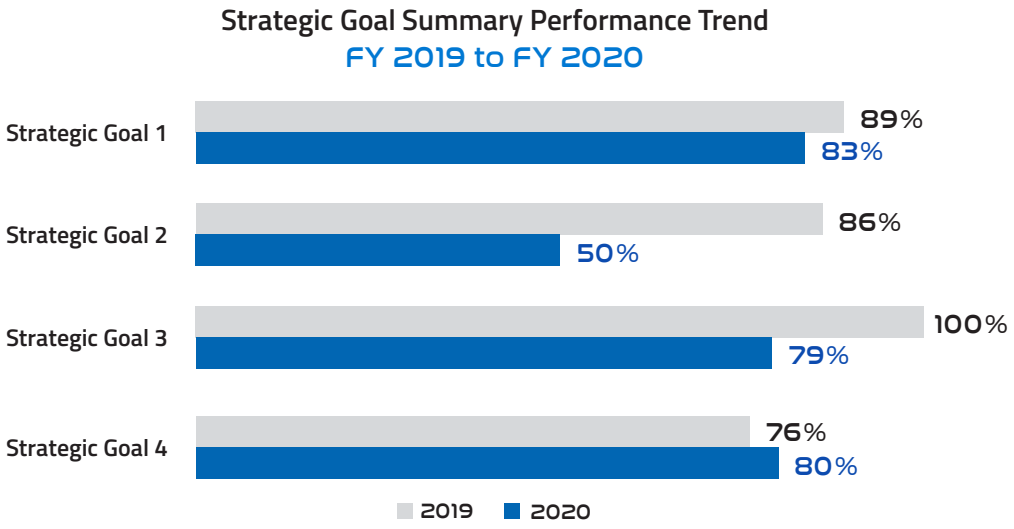
FY 2020 PERFORMANCE ASSESSMENT

The FY 2020 performance assessment provides the preliminary performance ratings for NASA's 48 PGs identified in the FY 2020 Annual Performance Plan. The following graphs show the FY 2020 performance assessment preliminary summary of PG ratings, grouped by strategic goals and supporting strategic objectives described in the strategic performance framework on page 14.

This fiscal year, PGs under all four of the strategic goals faced performance challenges resulting from the impacts of the coronavirus pandemic. NASA has identified work that can be done remotely, mission-essential work that must be performed on-site, and on-site work that will be paused. Every office and mission directorate was impacted in some way by the pandemic, as both NASA and our partners adjusted operations to follow health safety guidelines provided by the Centers for Disease Control and Prevention and local and state health officials. Despite the issues stemming from COVID-19, NASA has successfully implemented mitigation strategies for many of the PGs, and NASA still achieved many of our FY 2020 targets.

In the charts below, the preliminary PG color ratings, except those for agency priority goals, are for the fourth quarter of FY 2020. The agency priority goal color ratings are for the third quarter due to their separate review and approval schedule. All final color ratings as well as actual progress against the FY 2020 targets and explanations of performance, will be published in NASA's FY 2022 VIPer in February 2021.





STRATEGIC GOAL I. DISCOVER

EXPAND HUMAN KNOWLEDGE THROUGH NEW SCIENTIFIC DISCOVERIES

Overview

For over 60 years, NASA's discoveries have been inspiring the world, rewriting textbooks, and transforming knowledge of humanity, the planet, the solar system, and the universe. Together, scientific discovery and human exploration improve and safeguard life on Earth.

Scientific research is also opening the pathway for exploration and robotic-human partnerships. NASA's Webb is poised to be the premier observatory of the next decade — unlocking the mysteries of the universe for humankind. The ISS is an orbital outpost for humanity. It is a blueprint for global cooperation and scientific advancement, a catalyst for growing new commercial marketplaces in space, and a test bed for demonstrating new technologies. It extends where humankind lives and is the springboard for NASA's next great leaps in human space exploration, including future missions to the Moon, Mars, and beyond.

Finally, NASA acts as a champion of free and open access to scientific data. The Agency's work incorporates and builds upon the work of others in a spirit of global engagement and diplomacy.

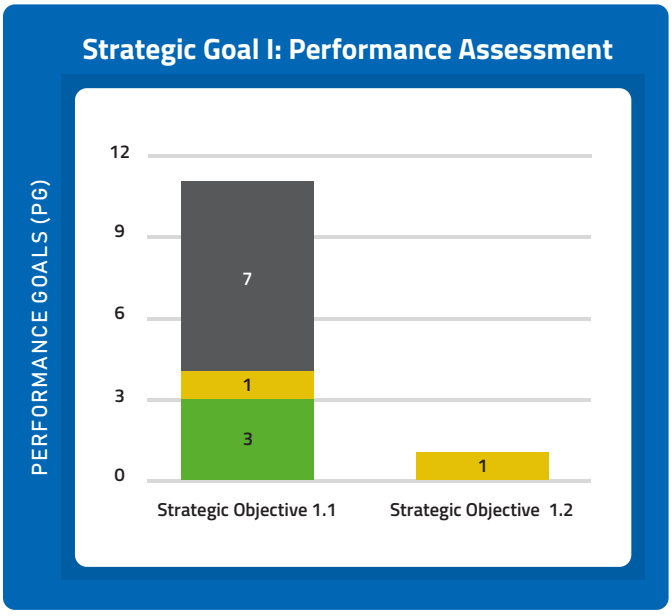
Preparations are underway to lift the United Launch Alliance Atlas V booster for NASA's Mars Perseverance rover and move it into the Vertical Integration Facility at Launch Complex 41 at Cape Canaveral Air Force Station (CCAFS) in Florida on May 28, 2020. The Mars Perseverance rover is scheduled to launch in mid-July atop the Atlas V 541 rocket from Pad 41 at CCAFS. The rover is part of NASA's Mars Exploration Program, a long-term effort of robotic exploration of the Red Planet. The rover will search for habitable conditions in the ancient past and signs of past microbial life on Mars. The Launch Services Program at Kennedy is responsible for launch management.

Photo Credit: NASA/Kim Shiflett

HIGHLIGHTS

Exploring Mars demonstrates the United States' political and economic leadership as a nation, improves the quality of life on Earth, helps us learn about our home planet, and expands U.S. leadership in the peaceful, international exploration of space. NASA identified the Mars 2020 Perseverance Rover as mission critical, and the team completed final assembly, testing, and launch integration while adhering to coronavirus safety precautions. NASA launched the mission on July 30, 2020, and it will land in Jezero Crater on February 18, 2021, to begin its search for signs of ancient life and demonstrate key technologies that will help us prepare for future robotic and human exploration of Mars.

NASA achieved all of its fiscal year targets for its operational science missions, including observing distant stars and galaxies, exploring the planets in the solar system, and studying our Sun and home planet. NASA data, capabilities, and support also helps institutions and individuals make informed decisions about the environment, food, water, health, and safety. During FY 2020, NASA-provided data-aided response and recovery activities for hurricanes Isaias, Laura, and Sally, mapped fires in the western United States, and supported response and recovery for many natural disasters around the world.



1.1 Understand the Sun, Earth, Solar System and Universe.

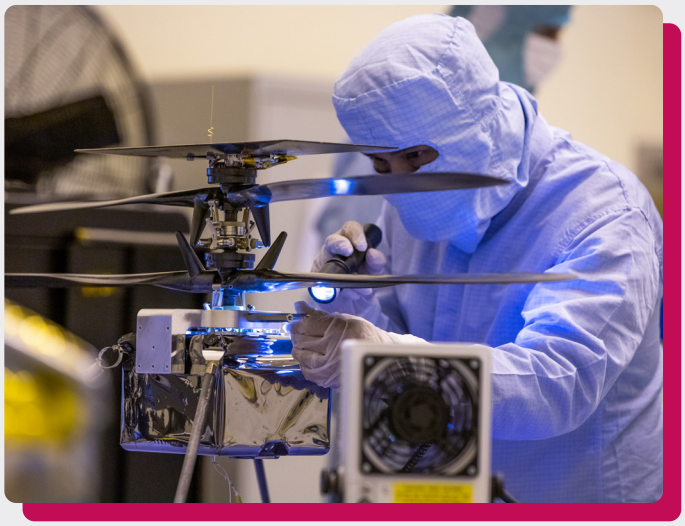
1.2 Understand Responses of Physical and Biological Systems to Spaceflight.

CHALLENGES

In March 2020, on-site work on the Webb, which will be the largest, most powerful and complex space telescope ever built, was paused due to the coronavirus pandemic. Several key observatory tests, including a second test deployment of the telescope deployable tower assembly, were delayed. In late June, the work schedule returned to two full shifts and the team was able to complete key milestones. After an assessment of the impacts to the schedule, NASA announced a new launch readiness date of October 31, 2021 with no requirement for additional funds. NASA anticipates achieving the Webb agency priority goal milestones for FY 2020, but due to the changed launch date, will not achieve the overarching goal next fiscal year.

Functional testing of NASA's Mars Helicopter and its cruise stage occurred in the airlock inside Kennedy Space Center's Payload Hazardous Servicing Facility on March 10, 2020. The helicopter was tested on a stand while the cruise stage was tested on the rotation fixture. The helicopter will be attached to the Mars Perseverance rover during its mission, which is part of NASA's Mars Exploration Program. Perseverance will land on the Red Planet on Feb. 18, 2021. Liftoff aboard a United Launch Alliance Atlas V 541 rocket is targeted for mid-July from Cape Canaveral Air Force Station. NASA's Launch Services Program based at Kennedy is managing the launch.

Photo Credit: NASA/Cory Huston



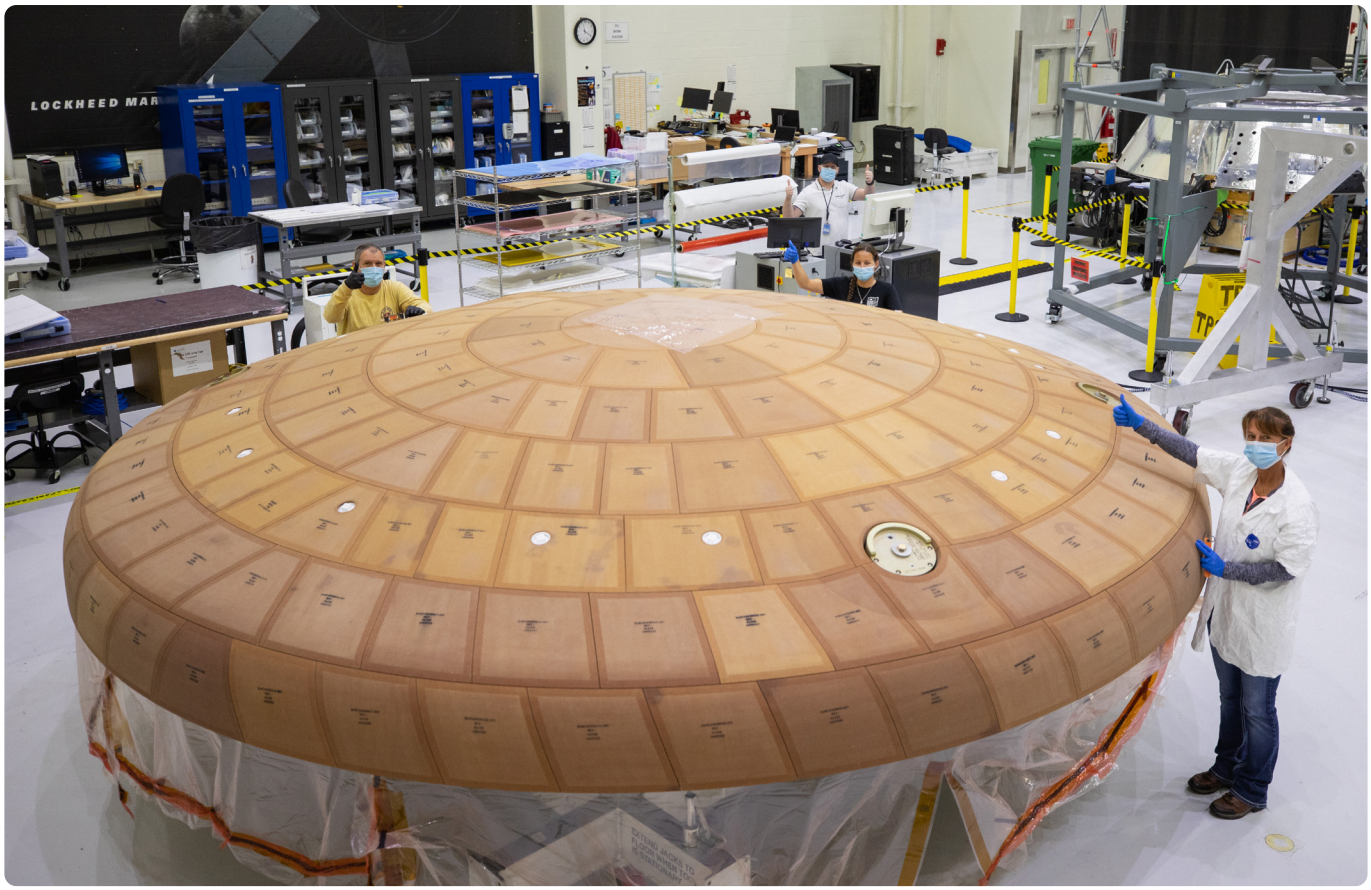
STRATEGIC GOAL II. DISCOVER

EXTEND HUMAN PRESENCE DEEPER INTO SPACE AND TO THE MOON FOR SUSTAINABLE LONG-TERM EXPLORATION AND UTILIZATION

Overview

America is a Nation of explorers. In everything we do - science, technology, commerce, the arts, sports - we strive to reach higher, farther, deeper, or faster than ever before in order to create a better future for generations to come.

NASA is also laying the foundation for America to sustain a constant commercial, human presence in low Earth orbit. From there, we will turn our attention back toward our celestial neighbors. At the same time, to support a broader strategy to explore and utilize the Moon and its surface, NASA is establishing a Lunar Gateway in lunar orbit space, to include a power and propulsion element by 2022. The United States will seek international partnership on a shared exploration agenda and spearhead the next phase of human exploration. NASA will promote permanent human presence in space in a way that enables the 21st century space economy to thrive.



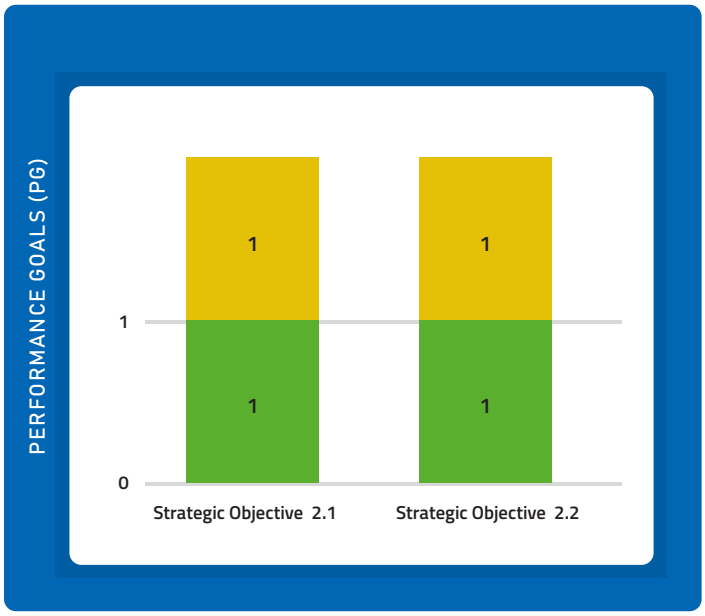
Preparations are underway to lift the United Launch Alliance Atlas V booster for NASA's Mars Perseverance rover and move it into the Vertical Integration Facility at Launch Complex 41 at Cape Canaveral Air Force Station (CCAFS) in Florida on May 28, 2020. The Mars Perseverance rover is scheduled to launch in mid-July atop the Atlas V 541 rocket from Pad 41 at CCAFS. The rover is part of NASA's Mars Exploration Program, a long-term effort of robotic exploration of the Red Planet. The rover will search for habitable conditions in the ancient past and signs of past microbial life on Mars. The Launch Services Program at Kennedy is responsible for launch management.

Photo Credit: NASA/Kim Shiflett

HIGHLIGHTS

NASA has made significant progress in developing the lunar transportation and deep space systems necessary to deliver the first woman and next man to the surface of Moon by 2024. To achieve this goal, NASA is building the SLS and the Orion spacecraft. In March 2020, NASA selected the first U.S. commercial provider, SpaceX, to deliver cargo, experiments, and other supplies to lunar orbit. In April, we awarded initial contracts to Blue Origin, Dynetics, and SpaceX to design and build the human landing systems. SLS, Orion, and the human landing system are NASA's backbone for future Artemis missions and deep space exploration.

NASA unveiled the next-generation spacesuit currently in development for the Artemis missions in October 2019. The suit is designed with interchangeable parts that can be configured for use in microgravity environments, like the ISS or the Gateway, or on planetary surfaces. These suits offer many improvements over those used for the Apollo missions, including better mobility; embedded, voice-activated microphones; and a rear-entry hatch that allows the explorer to climb into the suit from the back.



2.1 Lay the Foundation for America to Maintain a Constant Human Presence in Low Earth Orbit Enabled by a Commercial Market.

2.2 Conduct Exploration in Deep Space, Including to the Surface of the Moon.

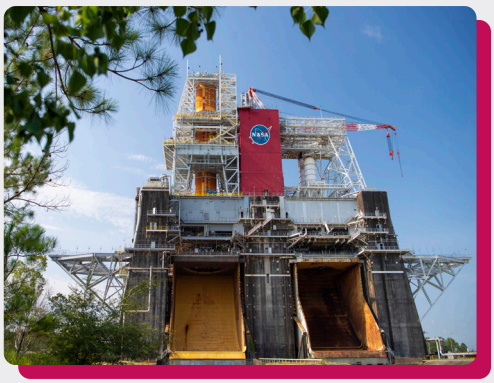
CHALLENGES

NASA did not complete the Green Run test series for the SLS rocket core stage, a major milestone in preparation for the Artemis I Mission, due to the impacts of coronavirus and an unprecedented hurricane season. The first five of eight Green Run test cases were complete by the end of FY 2020, but the remaining tests, including the hot fire test, will not be complete until early FY 2021. The Green Run is a demanding series of tests and includes nearly 30 first-time events or activities, including first loading of the propellant tanks, first flow through the propellant feed systems, first firing of all four engines, and first exposure of the core stage to the vibrations and temperatures of launch. Because of this delay, we anticipate that the Artemis agency priority goal will be below target for the fiscal year.

NASA is developing lunar surface science investigation, technology, and exploration demonstrations to enable sustainable lunar surface exploration. As part of this effort, NASA has developed small, low cost, expendable rovers called the Autonomous Pop-Up Flat-Folding Explorers (A-PUFFER). The team completed the first set of mobility field tests during the second quarter of FY 2020. Additional mobility tests were delayed until winter 2020 due to coronavirus safety restrictions. NASA anticipates that the agency priority goal for Lunar Surface Capabilities will be below target for the fiscal year.

The Space Launch System (SLS) rocket is completing the Green Run test for the rocket's core stage, shown installed on the top left side of the B-2 Test Stand at NASA's Stennis Space Center near Bay St. Louis, Mississippi. For Green Run, the team is completing a series of eight tests culminating with Test 8, a full-up hot fire test that lasts eight minutes. Flames from the test will exit out of the yellow flame bucket shown here on the north side of the test stand. The B-2 test stand has dual positions and the right side of the stand is used for other testing.

Photo Credit: NASA/Cory Huston



STRATEGIC GOAL III. DEVELOP

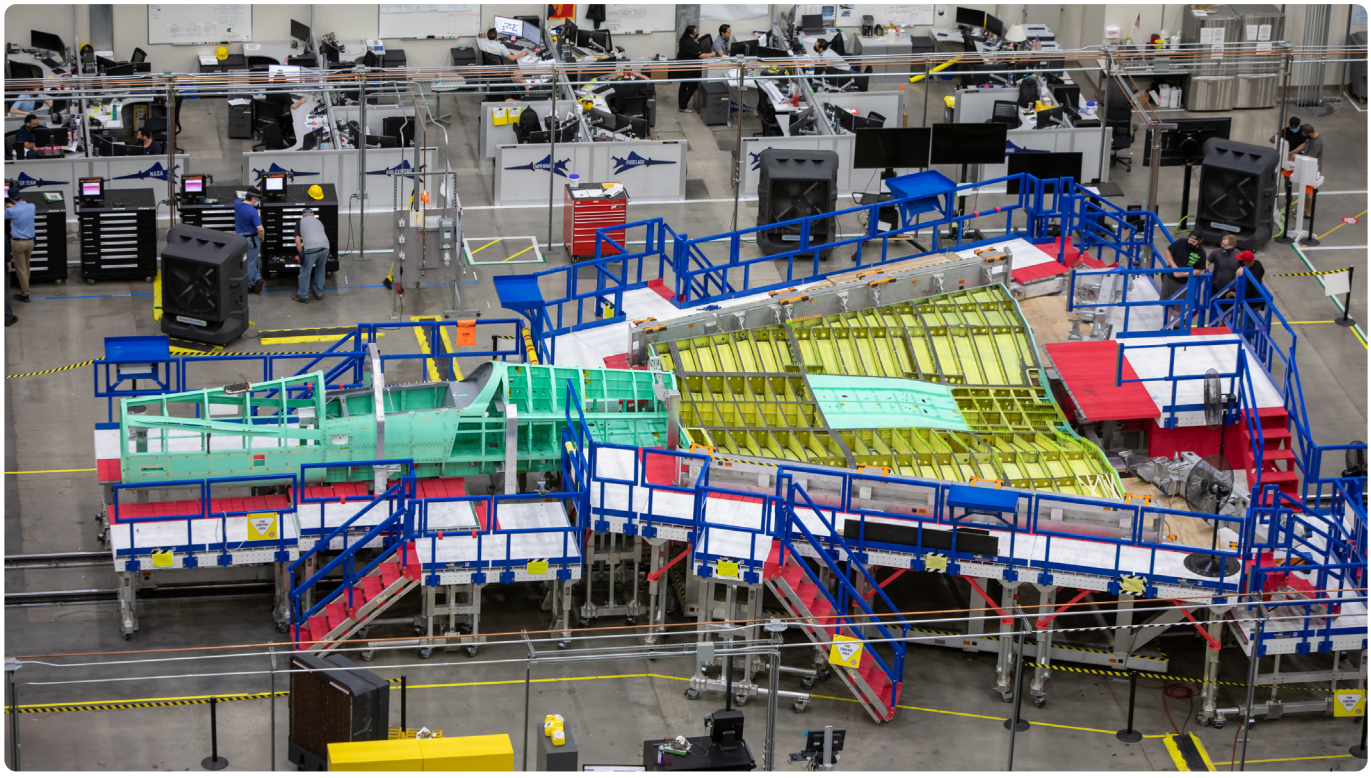
ADDRESS NATIONAL CHALLENGES AND CATALYZE ECONOMIC GROWTH

Overview

Originally tied to keeping the Nation secure and advancing U.S. leadership in aeronautics, communications satellites, and Earth remote sensing, NASA's mandate is broader today.

NASA drives economic development and growth; the National Aeronautics and Space Act of 1958 calls out this important theme, and the Agency generally invests more than 80 percent of its funds in U.S. industry and academia to carry out its missions of scientific discovery and exploration. In doing so, NASA engages and inspires young people to become scientists, technologists, engineers, and mathemeticians. This ensures that the Nation's vast intellectual and industrial base - shared by many other government agencies, including the departments of Defense, Commerce, Transportation, and Interior - has a continuous supply of bright minds and skilled hands.

Today, NASA's technology is found aboard every U.S. aircraft and inside every traffic control facility in the country. This infusion can be attributed to one of the most productive public-private partnerships (P3) in U.S. history, as NASA continues to team with industry, academia, and other Government agencies.



The wing and cockpit sections of NASA's X-59 Quiet SuperSonic Technology (QueSST) are coming together at Lockheed Martin's Skunk Works® factory in Palmdale, California. When complete, Lockheed Martin and NASA will put the X-59 through a series of ground and test flights to ensure not only its air worthiness, but also its ability to create a sonic boom that can barely be heard – if at all – by people on the ground while it flies supersonic at a cruise altitude overhead. The X-59 will then be flown over select communities in the United States – still to be chosen – so residents can help provide information to NASA about their reaction to the sound of the sonic "thump." This scientifically gathered data will be presented to regulators with the hope they will change rules that currently prohibit commercial supersonic air travel over land.

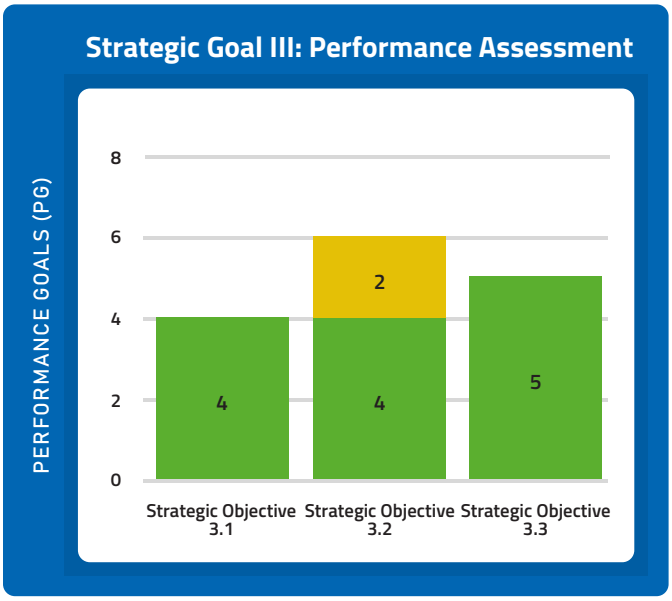
Photo Credit: NASA

HIGHLIGHTS

NASA supported its partner, Swift Engineering, to complete a two-hour flight test of the Swift High-Altitude Long-Endurance (HALE) unmanned aircraft system (UAS). The applications of the technology – for science, agriculture, and disaster response – could have a real impact on our everyday lives. This partnership is an example of how NASA's Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) phased funding and collaborative approach stimulates innovation and ingenuity among small businesses. Swift received Phase I and II funding in 2016 and 2017 to develop its idea toward a prototype, which resulted in a successful flight demonstration in July 2020.

In summer 2020, NASA conducted UAS flight tests of drone aircraft to investigate the feasibility of a concept called Time-Based Conformance Monitoring (TBCM). Air traffic controllers or UAS traffic management services monitor whether aircraft are adhering to their assigned flight trajectories. TBCM will extend that concept by continuously evaluating the times required for aircraft to maintain those trajectories. For the tests this summer, five specifically designed flight profiles were successfully flown over 26 flights to gather data for the TBCM concept evaluation. This work helped NASA achieve the UAS PG goal, which was focused on integrating UAS operations into low-altitude airspace.

NASA provides opportunities for students to contribute to our aeronautics, space, and science missions and work through numerous grant, fellowship, and Science, Technology, Engineering, and Mathematics (STEM) education programs. As a direct result of NASA STEM engagement investments, 550 peer-reviewed papers and 6 books were published, 282 invited paper presentations were delivered, and 1,177 technical papers were published or presented. Additionally, nine patents were awarded to higher education institutions as a direct result of their NASA STEM Engagement grants or cooperative agreements. The PG uses data reported on the academic calendar; the data above is from the 2018-2019 academic calendar.



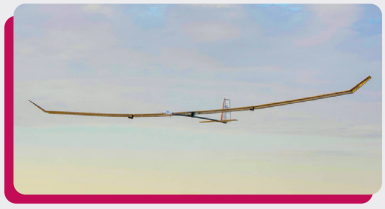
3.1 Develop and Transfer Revolutionary Technologies to Enable Exploration Capabilities for NASA and the Nation.

3.2 Transform Aviation Through Revolutionary Technology Research Development, and Transfer.

3.3 Inspire and Engage the Public in Aeronautics, Space and Science.

CHALLENGES

Working with the Federal Aviation Administration (FAA) and industry, NASA has developed an integrated arrival, departure, and surface (IADS) concept to improve the efficiency of surface operations at the Nation's busiest airports. An operational field evaluation of the IADS Metroplex Coordinator, a tool designed to provide benefits when aircraft demand exceeds the capacity of an airport, was scheduled for April through August 2020. Software development was completed on schedule, the system was deployed, training was conducted, and NASA's airline and FAA partners were committed to participating in the evaluation. However, the coronavirus pandemic dramatically reduced air traffic volume to a level where the number of scheduled flights rarely exceeded capacity during the evaluation period. As a result, the team was unable to collect enough data to satisfy the requirements for the evaluation during FY 2020.



Swift HALE is an unmanned aircraft system developed by small business Swift Engineering, in partnership with NASA, to demonstrate how successful high-altitude, long-endurance flight can expand science research in a cost-efficient and timely manner. It is seen here during its first flight test on July 7, 2020.

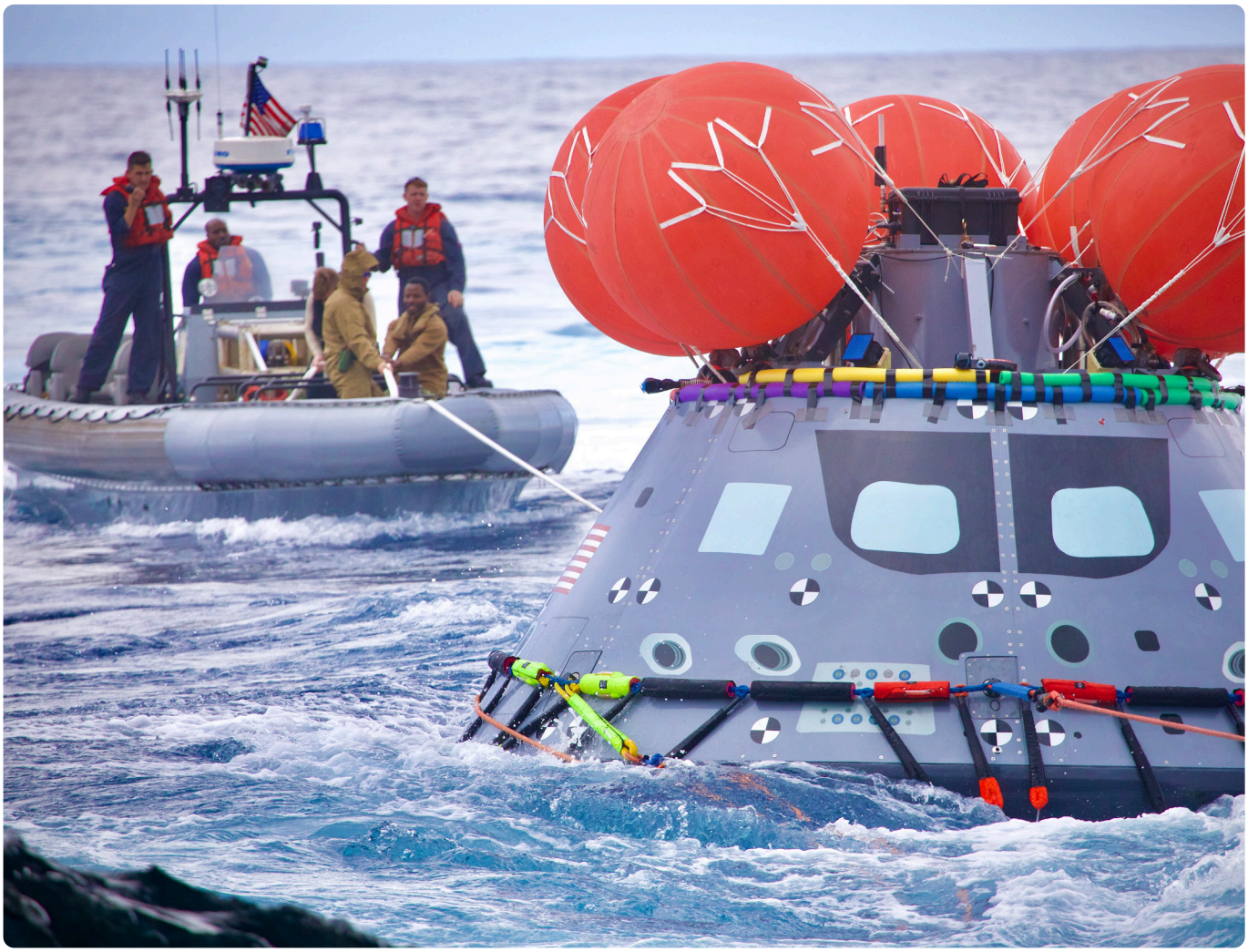
Photo Credit: Swift Engineering

STRATEGIC GOAL IV. ENABLE

OPTIMIZE CAPABILITIES AND OPERATIONS

Overview

The Agency understands that a skilled, valued, and diverse workforce is central to creating and maintaining the capabilities to explore the solar system and beyond and for our understanding of our home planet. NASA will continue to maintain and ensure the availability and safety of critical capabilities and facilitates necessary for advancing our space, air, and Earth-based activities. This hybrid goal includes both strategic objectives and management focused objectives. Recognizing the growth of technologies and innovations increasing outside the Agency, NASA is instituting a robust partnership and acquisition strategy focused on leveraging and collaborating with the private sector and academia in order to benefit from their innovations. NASA's role in global engagement extends directly from the Space Act in areas such as data-sharing agreements and joint science and technology flight projects. More than two-thirds of NASA's science missions have foreign partners.



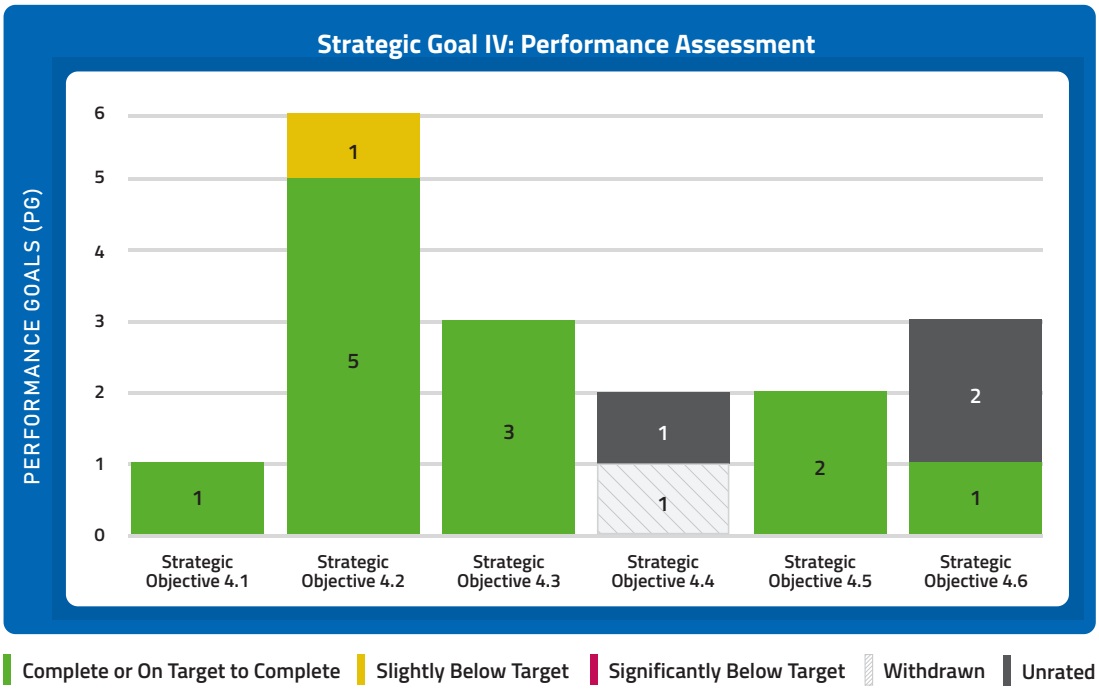
NASA's Landing and Recovery team, composed of members from the Department of Defense, NASA and contractor Jacobs, practiced securing a test version of Orion into the well deck of a ship. During the test, the team practiced to ensure recovery procedure timelines are validated as NASA plans to send Artemis I around the Moon and splashdown in the Pacific Ocean.

Photo Credit: NASA

HIGHLIGHTS

In May 2020, for the first time in history, NASA astronauts launched from American soil in a commercially built and operated American crew spacecraft on its way to the ISS on NASA's SpaceX Demo-2 mission. The SpaceX Crew Dragon Endeavor spacecraft successfully delivered astronauts Doug Hurley and Bob Behnken to the ISS 19 hours later. In August, the spacecraft carrying the two astronauts safely splashed down into the Gulf of Mexico.

For the eighth consecutive year, NASA was named the Best Place to Work in Government by the Partnership for Public Service in December 2019. The ranking was based on responses from employees at 490 Federal agencies to the 2019 Federal Employee Viewpoint Survey (FEVS), which measures Federal employees' perceptions of their work experiences. The FEVS results provide insight into areas where improvements have been made, as well as areas where improvements are still needed. For more information, regarding FEVS see https://www.opm.gov/fevs/.



4.1 Engage in Partnership Strategies.
4.2 Enable Space Access and Services.
4.3 Assure Safety and Mission Success.
4.4 Manage Human Capital.
4.5 Ensure Enterprise Protection.
4.6 Sustain Infrastructure Capabilities and Operations.

CHALLENGES

NASA's PG target for FY 2020 called for both commercial partners conducting their crewed demonstration flight during the fiscal year. While SpaceX successfully completed their crewed flight to the ISS, Boeing did not complete a crewed demonstration of their CST-100 Starliner spacecraft. During an uncrewed orbital test flight conducted in December 2019, the spacecraft experienced some anomalies, including intermittent space-to-ground communication issues. A joint NASA-Boeing independent review team recommended corrective and preventive actions to address in preparation for a second uncrewed orbital flight test, which will occur in the first half of FY 2021. Boeing plans to conduct a crewed orbital flight test in summer 2021.

NASA astronauts Robert Behnken, left, and Douglas Hurley are seen inside the SpaceX Crew Dragon Endeavour spacecraft onboard the SpaceX GO Navigator recovery ship shortly after having landed in the Gulf of Mexico off the coast of Pensacola, Florida, Sunday, Aug. 2, 2020. Behnken and Hurley returned after spending 64 days in space.

Photo Credit: NASA/Bill Ingalls

NASA TECHNOLOGY TRANSFER PROGRAM

For over 50 years the NASA Technology Transfer Program has partnered with private industry companies to modify and transfer NASA-originated technology for the development of commercial products and services that can benefit the public on Earth. These products and services are commonly referred to as Spinoff Technologies. Since 1976, NASA has released an annual premier publication titled Spinoff that profiles new NASA technologies that have been transformed for commercial use in the public sector. Below are some technology transfer highlights from FY 2020.

Astronaut Artificial Intelligence Monitors Patients at Home

When astronauts go on spacewalks, their spacesuits contain numerous sensors that monitor body temperature, heart rate, how much they sweat, and more. That data is automatically sent to groundbased crew at NASA who use that information to guide support efforts – maybe to remind an astronaut to drink some water to avoid dehydration or take a short break to lower heart rate. The same remote health monitoring is now used here on Earth in a system called Ejenta. The system employs off-the-shelf health and fitness monitoring devices and a custom smartphone monitoring app to collect important health metrics. It then saves, analyzes, reports on, and distributes information to the patient and the entire medical team. That ongoing flow of information replaces an office visit with a phone call or video visit to discuss recent vital signs. Multiple studies conducted with healthcare provider Kaiser Permanente, an Ejenta customer, provide evidence for the system's potential benefits for treating serious health conditions such as heart failure and high-risk pregnancies. Doctors were able to catch problems early before it reached a crisis that required a hospital stay.

Cleaning up the Ecosystem

Monitoring carbon dioxide in our atmosphere is a critical priority for NASA's Earth-observation satellites. Looking down from orbit, these satellites detect large-scale changes in the atmosphere, but the same instruments can help plug smaller leaks too. The Langley Research Center developed an active remote sensor, called ASCENDS, capable of taking carbon dioxide readings in darkness and during the day. J. Stewart Hager, a subcontractor at Langley, was part of team that was brainstorming alternative uses for the instrument. Soon after, Hager left his contractor job and founded Hager Environmental and Atmospheric Technologies (HEAT) Inc., devising a monitor for carbon dioxide and other exhaust emissions based on the Langley ASCENDS tool. The Emissions Detection and Reporting (EDAR) system can be mounted on traffic signals and uses lasers to sniff out the hydrocarbons emitted by vehicles passing underneath. EDAR systems are now deployed in three states and recently saw road use in Europe.

NASA Invention Helps Keep Hearts Beating

In the early 1990s, Robert Bryant, a researcher at NASA's Langley Research Center, was studying advanced composites and adhesives that could be used to build a supersonic passenger jet. The material he discovered, LaRC-SI (short for Langley Research Center-Soluble Imide), has helped to keep hundreds of thousands of hearts beating properly all over the world. In 2004, Minneapolis-based Medtronic got a license from Langley to use LaRC-SI in its products and eventually brought Bryant on as a consultant, as well. He and the company spent years developing a process to use the material as a coating and electric insulator for key components in Medtronic's pacemakers. The technology began clinical trials in 2007 and received Food and Drug Administration approval in 2009. Medtronic's left ventricular leads, now in several models, have been implanted in hundreds of thousands of people.

Did You Know?

The Soyuz rocket is rolled out by train to the launch pad at Site 31, Sunday, Oct. 11, 2020, at the Baikonur Cosmodrome in Kazakhstan. Expedition 64 Russian cosmonauts Sergey Ryzhikov and Sergey Kud-Sverchkov of Roscosmos, and NASA astronaut Kate Rubins are scheduled to launch aboard their Soyuz MS-17 spacecraft on Oct. 14 to start a six-month mission onboard the International Space Station.

Photo Credit: NASA/GCTC/Andrey Shelepin

MANAGEMENT'S DISCUSSION AND ANALYSIS

Financial Performance

Retired U.S. Air Force Honorary Brigadier General Charles McGee speaks with NASA astronaut Alvin Drew during a Black History Month program titled "Trailblazers, The Story of a Tuskegee Airman," Wednesday, Feb. 5, 2020, at NASA Headquarters in Washington, DC. McGee, a pilot with the Tuskegee Airmen during World War II, was a career officer in the Air Force also serving during the Korean and Vietnam Wars. Over his 30 years of service he flew 409 combat missions. Of the 355 Tuskegee pilots who flew in combat, McGee is one of only nine surviving.

Photo Credit: NASA/Joel Kowsky

FINANCIAL HIGHLIGHTS

OVERVIEW OF FINANCIAL POSITION

NASA's Balance Sheet provides a comparable snapshot of the Agency's financial position as of September 30, 2020 and September 30, 2019. It displays amounts in three primary categories.

ASSETS

the current and future economic benefits owned or available for use by NASA. +

LIABILITIES

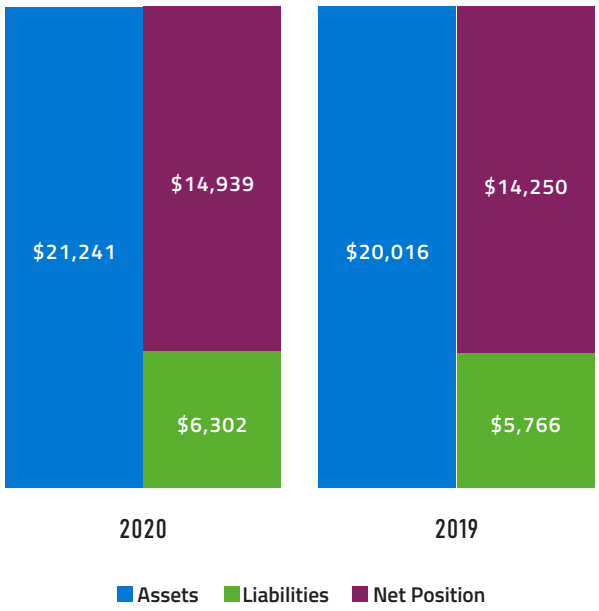
the debts owed by NASA but not yet paid. –

NET POSITION

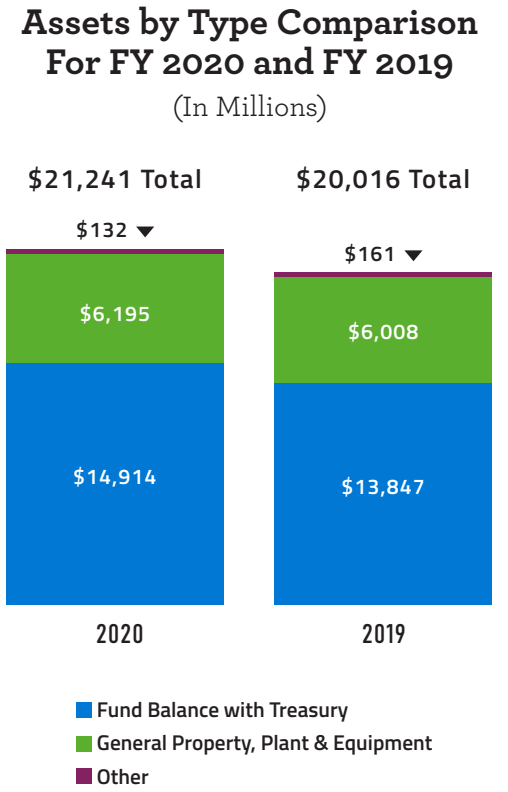
the activity between revenue and other financing sources, and costs incurred since inception.

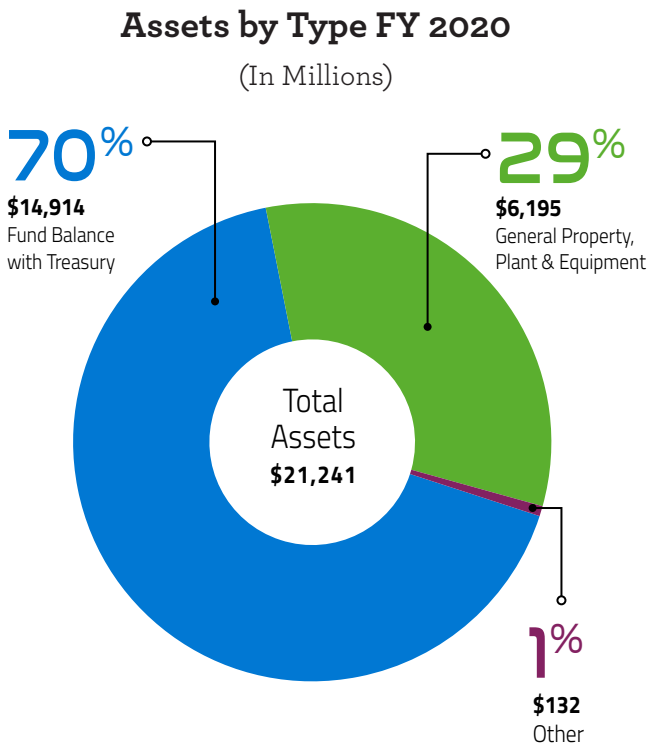
Balance Sheet Components FY 2020 and FY 2019

(In Millions)



Total Assets were the largest of the three categories (Total Liabilities plus Total Net Position will always equal Total Assets). NASA's total asset balance, as of September 30, 2020, was $21.2 billion, six percent higher than FY 2019.





The Agency's Fund Balance with Treasury (FBWT) and its General Property, Plant and Equipment (G-PP&E) were the two primary components of the total asset balance.

FBWT, which represents NASA's cash balance with the U.S. Department of the Treasury, was the largest asset at $15 billion, 70 percent of total assets. This cash balance included Congressional appropriated funds available for NASA's mission operations (for example, employee labor or purchased goods or services from contractors) that have not yet been paid.

NASA's G-PP&E had a net book value of $6 billion as of September 30, 2020, 29 percent of total assets. The balance increased slightly compared to FY 2019, primarily due to an increase in G-PP&E for NASA operation, which was offset by ongoing depreciation of existing assets.

The Other category represents the amount of Investments, Accounts Receivable, and Other Assets as of September 30, 2020. The decrease of $29 million, or 18 percent, is primarily due to an additional billing and collection in September 2020 of outstanding costs on Reimbursable funds.

Total Liabilities, as of September 30, 2020, were $6.3 billion, nine percent higher than FY 2019. Environmental and Disposal Liabilities, Accounts Payable, and Other Accrued Liabilities represent the majority of NASA's liabilities.

Environmental and Disposal Liabilities of $2 billion represent the estimated cost to clean up both known and projected environmental hazards. The increase of $204 million, or 10 percent, is primarily due to the availability of new or updated information on the extent of contamination and refinements to the environmental clean-up estimation methodology.

Accounts Payable, which represents amounts owed to other entities, was $1.4 billion, an increase of $75 million, or six percent, compared to FY 2019.

Other Accrued Liabilities with public entities were $1.9 billion, an increase of $211 million, or 13 percent, compared to FY 2019.

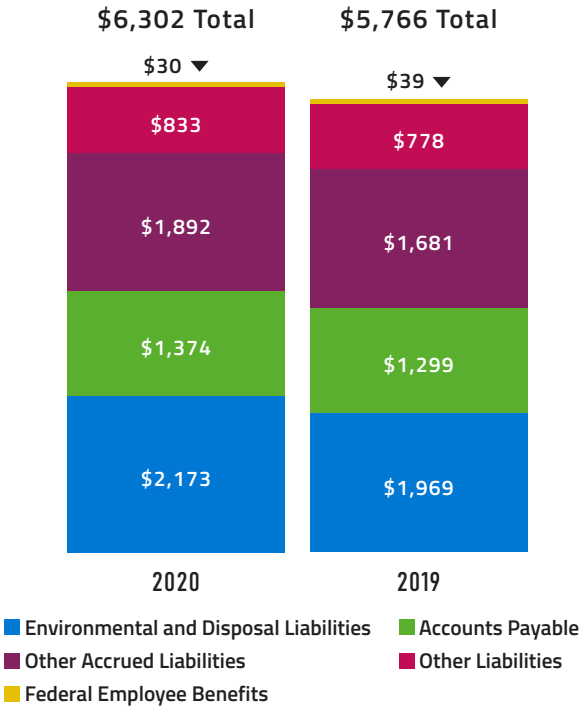
Other Liabilities, which represents various amounts including Advances from Others, Unfunded Annual Leave, and Accrued Funded Payroll, were $833 million, an increase of $55 million, or seven percent, compared to FY 2019. The increase is primarily due to employees accumulated leave that is not being used due to the COVID-19 crisis.

Federal Employee Benefits are amounts the Department of Labor estimates on behalf of NASA for future workers' compensation liabilities for current employees.

Total Net Position comprised of Unexpended Appropriations and Cumulative Results of Operations ("net worth"), increased by $689 million, five percent higher than FY 2019. Unexpended Appropriations, at $11.2 billion, increased by seven percent from FY 2019. Cumulative Results of Operations, at $3.7 billion, remained virtually unchanged from FY 2019. The change to Net Position is due to the increase in budget authority received without a correlating increase in disbursements.

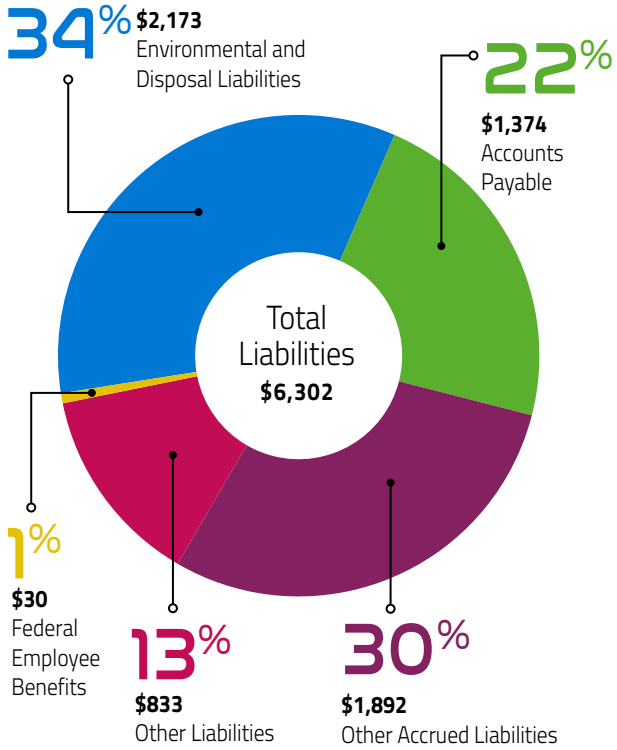
Liabilities by Type Comparison For FY 2020 and FY 2019

(In Millions)



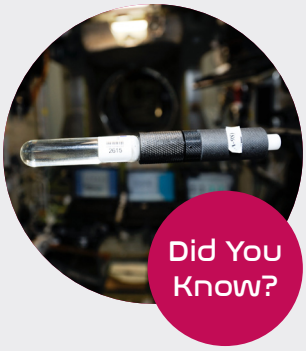
Liabilities by Type FY 2020

(In Millions)



Neutrons make up a significant part of the radiation exposure in low Earth orbit, but have not been well characterized. Radi-N2, a Canadian Space Agency investigation, uses bubble detectors to better characterize the neutron environment on the space station, helping to define the risk it poses to crew members. It continues a previous investigation, Radi-N1, and repeats measurements in the same or equivalent locations aboard the space station. Measuring the average dose in different segments of the space station supports development of a radiation protection plan for future missions. During the week of Aug. 17, 2020, crew members retrieved detectors for collection of dose measurements.

Photo Credit: NASA



SOURCES OF FUNDING

The Statement of Budgetary Resources (SBR) provides information on the budgetary funding available to NASA. NASA's resources consist primarily of funds received from two sources:

Appropriations from Congress for the current fiscal year and unobligated balances from prior fiscal years.

Revenue from agreements with other governmental organizations or private entities.

In FY 2020, the total funds available for use by the Agency were $27.7 billion — an increase of $1.4 billion, or five percent, compared to FY 2019.

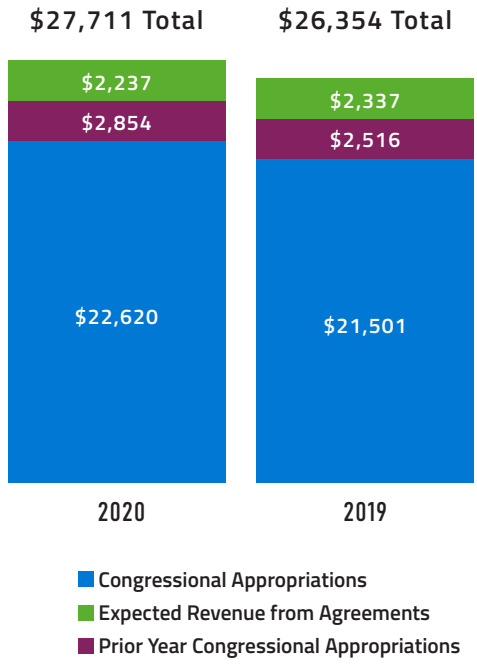
The $22.6 billion in appropriations from Congress for FY 2020 accounted for 82 percent of the total funds available for use by the Agency. Congress designates the funding available to the Agency for a specific NASA mission. Appropriations that remained available from prior years totaled $3 billion, 10 percent of NASA's available resources in FY 2020.

NASA's FY 2020 funding also included $2.2 billion of spending authority from offsetting collections, primarily comprised of revenue earned and collected from agreements, eight percent of NASA's available resources in FY 2020. Revenue is earned under NASA's authority to provide goods, services, or use of facilities to other entities on a reimbursable basis.

In FY 2020, NASA obligated $25.3 billion of the $27.7 billion available for Agency programmatic and institutional objectives. An obligation binds the Government to make an expenditure (or outlay) of funds, and reflects a reservation of budget authority that will be used to pay for a contract, labor, or other items. The remaining $2.4 billion may be obligated until the funds' periods of availability expire.

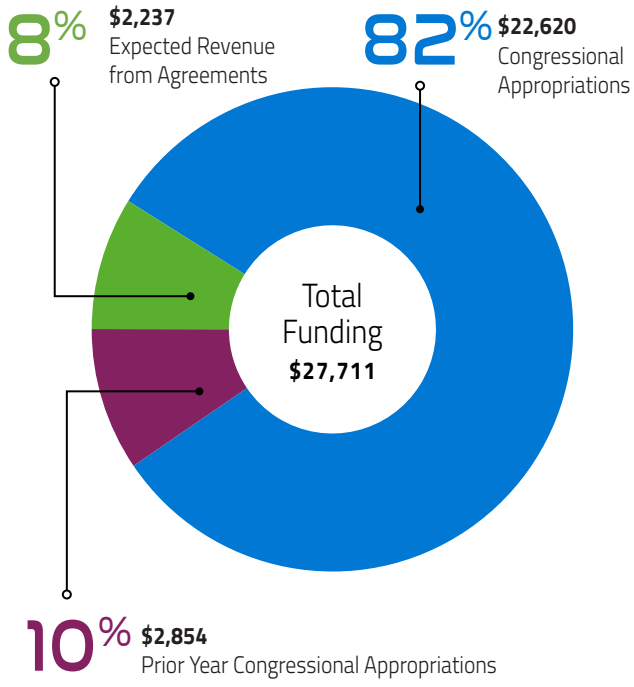
Sources of Funding Comparison

FY 2020 and FY 2019
(In Millions)



Sources of Funding FY 2020

(In Millions)

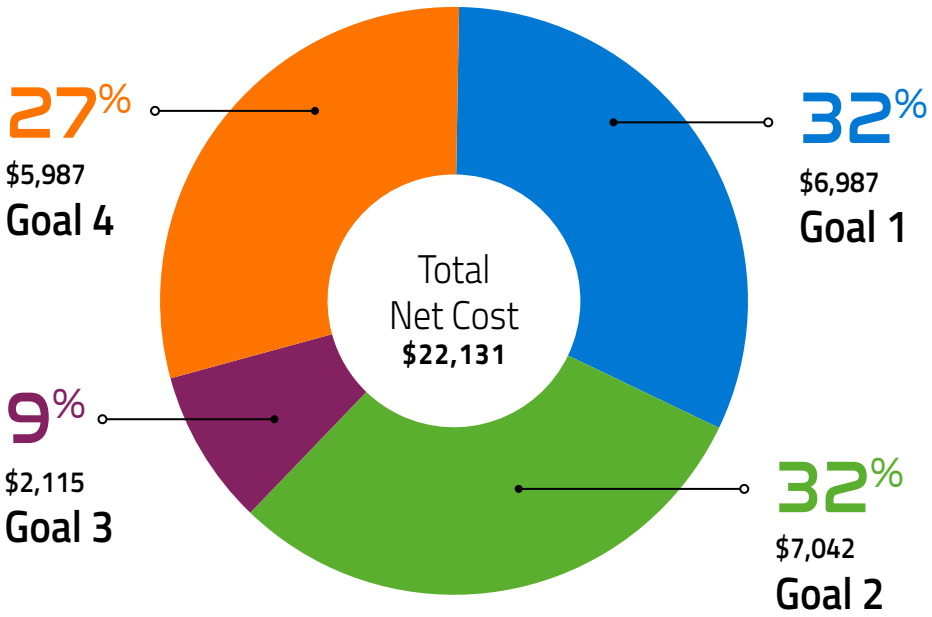


RESULTS OF OPERATIONS

Net Cost of Operations

The Statement of Net Cost presents NASA's net cost of operations by strategic goal. NASA's strategic goals are described in the Mission Performance section of the Agency Financial Report (page 13). The Net Cost of Operations represents gross cost incurred less revenue earned for work performed for other government organizations or private entities. As of September 30, 2020, NASA's gross costs were $24 billion, an increase of $1.3 billion from FY 2019. Earned Revenue from other governmental organizations or private entities was $1.8 billion a $40 million decrease from FY 2019, leaving NASA with a FY 2020 net cost of $22.1 billion, an increase of $1.3 billion from FY 2019.

Net Cost of Operations by Strategic Goal for FY 2020
(In Millions)



- **Strategic Goal 1: Expand human knowledge through new scientific discoveries.**
- **Strategic Goal 2: Extend human presence deeper into space and to the Moon for sustainable long-term exploration and utilization.**
- **Strategic Goal 3: Address national challenges and catalyze economic growth.**
- **Strategic Goal 4: Optimize capabilities and operations.**

OSIRIS-REx will travel to a near-Earth asteroid called Bennu and bring a small sample back to Earth for study. The mission launched Sept. 8, 2016, from Cape Canaveral Air Force Station. As planned, the spacecraft will reach Bennu in 2018 and return a sample to Earth in 2023. To view the OSIRIS-REx mission's Touch-And-Go (TAG) sample collection event that took place October 20, 2020, please click here https://www.nasa.gov/feature/goddard/2020/osiris-rex-tags-surface-of-asteroid-bennu/

Photo Credit: NASA

Gross Cost of Operations

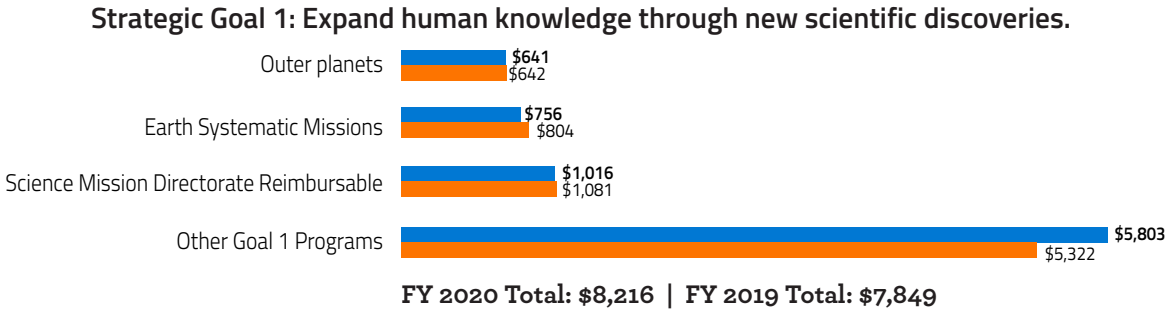
NASA's day-to-day operations are performed at NASA and contractor facilities around the globe and in space. Gross costs of operations is presented in the following table, detailing select NASA programs that support each strategic goal. Gross costs of operations include expenses incurred for NASA's research and development (R&D) investments that are expected to maintain or increase national economic productive capacity or yield other future benefits.

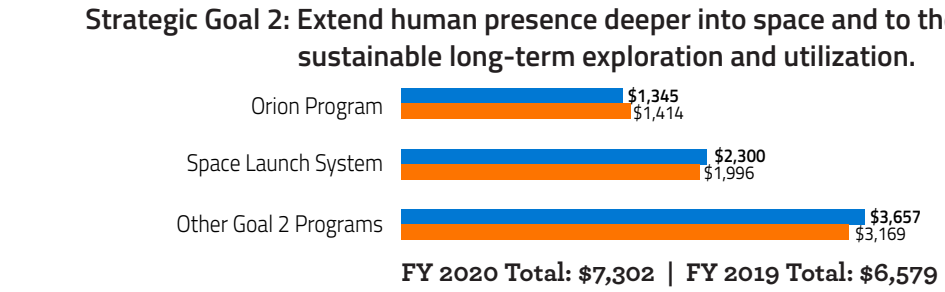
Gross costs of operations include expenses incurred for NASA's research and development program investments that are expected to maintain or increase national economic productive capacity or yield other future benefits. Top programs by strategic goal in relation to gross costs have remained consistent year to year.

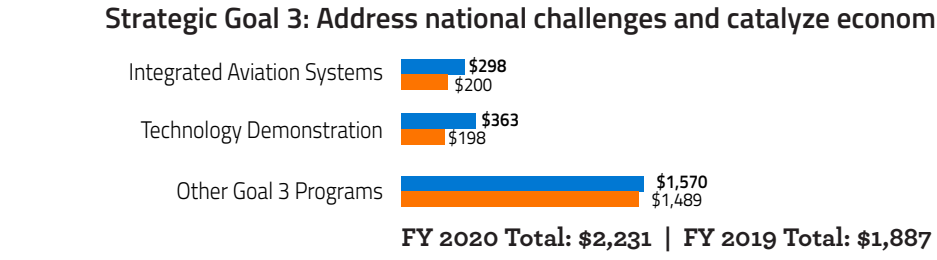
Comparative Gross Cost of Operations by Strategic Goal FY 2020 and FY 2019

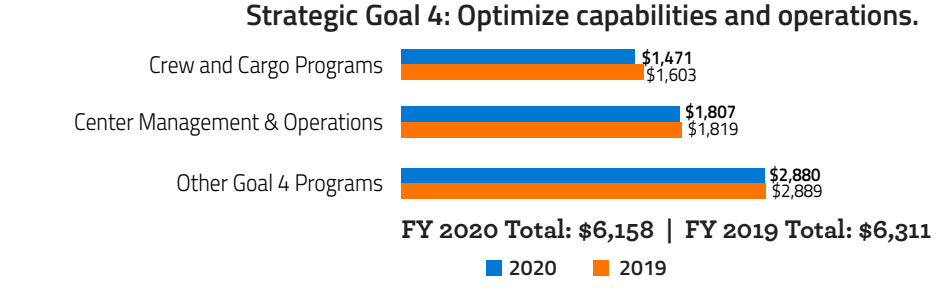
(In Millions)

FY 2020 Total: $23,907 | FY 2019 Total: $22,626









MAJOR R&D PROJECTS BY STRATEGIC GOAL

STRATEGIC GOAL 1

James Webb Space Telescope

The Webb is an internal collaboration between NASA, the European Space Agency, and the Canadian Space Agency. It's large infrared telescope with a 6.5-meter primary mirror will allow scientists to study every phase in the history of the universe, ranging back to the first glows after the Big Bang to the formation of solar systems capable of supporting life on planets like Earth, to the evolution of our own solar system.

Environmental testing, where the telescope undergoes rigorous testing under conditions similar to those in space, began during FY 2020. For several months, work was slowed to observe COVID-19 safety protocols, resulting in schedule delays. Work returned to a near-normal schedule by July 2020. The Webb team completed deployments of the mirror wings and the tower assembly, which tested the ability of the assemblies to deploy once Webb is launched. The team also filled the Mid-Infrared Instrument (MIRI) cryocooler, which will keep MIRI's detectors at the optimal temperature.

STRATEGIC GOAL 2

Space Launch System

The SLS program's launch vehicles work is moving toward the first SLS flight on the Artemis I mission. SLS leverages hardware designed for previous programs, including using adapted and refurbished Space Shuttle main engines, five-segment Shuttle-derived solid rocket boosters, and an interim cryogenic propulsion stage (ICPS) from a derivative of the Delta cryogenic second stage. The program benefits from NASA's half-century of experience and knowledge of liquid oxygen and hydrogen heavy-lift vehicles, large solid rocket motors, and advances in technology and manufacturing practices.

During FY 2020, NASA began work on the Green Run test to test critical systems of the SLS Core Stage. In June, 10 rocket booster segments were sent by train from Promontory, Utah, to Kennedy Space Center, Florida. In July, the launch vehicle stage adapter, which connects the SLS core stage and the interim cryogenic propulsion stage, was shipped from the Marshall Space Flight Center to Kennedy by barge. The SLS core stage will be delivered to Kennedy by barge after completion of the Green Run hot fire test.

STRATEGIC GOAL 3

Small Business Innovation Research

The SBIR program was established under the Small Business Innovation Development Act of 1982 (P.L. 97-219) with the purpose of strengthening the role of innovative small business concerns in Federally-funded R&D. SBIR provides the high technology, small business sector with opportunities to develop NASA-funded space technologies that have the potential to address national needs in the aerospace industry and other sectors. The NASA SBIR program funds innovative technologies that fulfill NASA needs as described in the annual NASA Solicitations and that have significant potential for successful commercialization. Annual solicitations align subtopics to exploration focus areas to draw on small business support of NASA's Exploration Campaign objectives.

STRATEGIC GOAL 4

Commercial Crew Program

Through NASA's Commercial Crew Program (CCP), the U.S. private sector is working to develop and operate safe, reliable, and affordable crew transportation to space, including to the ISS. Partnering with the commercial space industry for access to ISS and other low Earth orbit destinations bolsters American leadership, reduces our current reliance on foreign providers for this service, and helps stimulate the American aerospace industry.

The first commercial crew mission, NASA's SpaceX Demo-2 test flight, launched on May 30 from Kennedy Space Center. SpaceX's Crew Dragon, carrying Robert Behnken and Douglas Hurley, arrived at the International Space Station on May 31. Their mission ended successfully on August 2 when the Crew Dragon splashed down in the Gulf of Mexico. SpaceX's next crew launch is planned for October 2020. Boeing plans to conduct an uncrewed orbital test flight of their CST-100 Starliner spacecraft in the first half of FY2021.

STRATEGIC GOALS AND OUTCOMES

STRATEGIC GOAL 1

Expand Human Knowledge through New Scientific Discoveries

- Conduct scientific studies of the Earth and Sun from space, return data and samples from other bodies in the solar system, peer out into the vast reaches of the universe, and play a catalyzing role in lunar robotic exploration by supporting innovative approaches to advancing science.
- Conduct a robust program of space-based research to advance technologies that enable space exploration, and to pioneer uses of the space environment to benefit life on Earth.

STRATEGIC GOAL 2

Extend Human Presence Deeper Into Space and to the Moon for Sustainable Long-term Exploration and Utilizations

- Enable space-based low Earth orbit economy by transitioning the ISS operations and maintenance to commercial and international partners, while continuing to leverage ISS for research, technology development, and to extend human presence in space.
- Extend human presence into cislunar space and the lunar surface, with capabilities that allow for sustained operations in deep space and the lunar surface.

STRATEGIC GOAL 3

Address National Challenges and Catalyze Economic Growth

- Advance revolutionary technologies for NASA and the Nation, involving commercial space products, specifically for utilization of near-Earth space; efficient transportation through space; access to planetary surfaces; enabling human space exploration; next generation science missions; and growth and utilization of the U.S. industrial and academic base.
- Maintain and advance U.S. global leadership in aviation through application of new concepts and technologies pioneered by NASA and developed in partnership with U.S. industry that lead to transformative improvements in mobility, efficiency, and safety.
- Inspire, engage, educate, and employ the next generation of explorers through NASA-unique STEM learning opportunities.

STRATEGIC GOAL 4

Optimize Capabilities and Operation

- Support cooperative, reimbursable, and funded initiatives through domestic and international partnerships.
- Support the communication, launch service, rocket propulsion testing, and strategic capabilities needs of NASA's programs.
- Assure effective management of NASA programs and operations to complete the mission safely and successfully.
- Cultivate a diverse and innovative workforce with the right balance of skills and experience to provide an inclusive work environment in which employees that possess varying perspectives, education levels, life experiences, and backgrounds can work together and remain fully engaged in our mission.
- Increase the resiliency of NASA's enterprise systems by assessing risks and implementing comprehensive, economical, and actionable solutions.
- Enable NASA's mission by providing the facilities, tools, and services required to efficiently manage, operate, and sustain the infrastructure necessary to meet mission objectives.

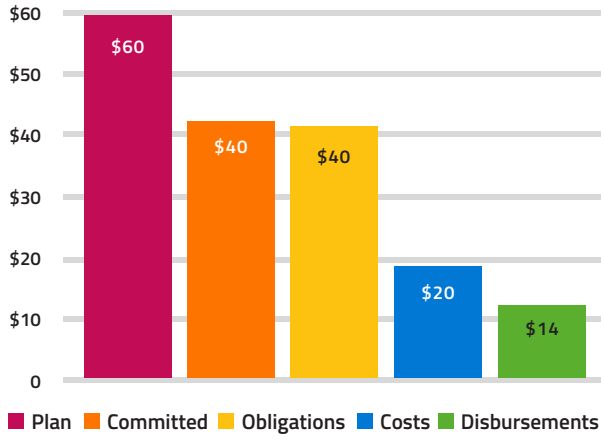
FINANCIAL AND PERFORMANCE IMPACT OF COVID-19

In conjunction with the Harris County (Texas) Public Health Department, materials engineers and space medicine professionals at NASA's Johnson Space Center (JSC) in Houston have developed and tested a sterilization protocol to combat a national shortage of N95 masks for health care workers on the frontlines as they fight against COVID-19. The team includes Daniel Kim, chemist, Joseph Settles, soft-goods laboratory technician, and Richard Watson, occupational health, all of NASA JSC; Jerry Miller, chief technologist for Harris County Public Health; and Jeremy Jacobs and Leslie Schaschl, materials engineers, Michael Kocurek, materials laboratory technician, and Sean Carter, strategic partnerships.

Photo Credit: NASA

The Coronavirus Aid, Relief, and Economic Security Act or, CARES Act, was passed by Congress and signed by President Donald Trump on March 27, 2020. This bill allotted $2.2 trillion to provide fast and direct economic aid to the American people negatively impacted by the COVID-19 pandemic. Of those funds, $60 million was provided to NASA within its Safety, Security, and Mission Services appropriation to prevent, prepare for, and respond to the coronavirus domestically or internationally. These funds will primarily be used for contractor impact claims, information technology services, cleaning supplies, and personal protective equipment. These funds include the costs of increased cleaning efforts at each NASA facility to protect the health and safety of our workforce and ensuring the well-being of every employee. As we begin FY 2021, we have approximately $20 million available for additive costs.

As of September 30, 2020 (in Millions)



NASA is helping the medical community address the shortage of ventilators needed to treat COVID-19 patients with a ventilator prototype. Within 37 days, engineers and others at the agency's Jet Propulsion Laboratory in Southern California created a high-pressure ventilator prototype tailored to the needs of patients with COVID-19 and sent it to the Icahn School of Medicine at Mount Sinai in New York for testing.

Photo Credit: NASA/JPL-Caltech

LIMITATIONS OF THE FINANCIAL STATEMENTS

The principal financial statements are prepared to report the financial position, financial condition, and results of operations, pursuant to the requirements of 31 U.S.C. § 3515(b). The statements are prepared from records of Federal entities in accordance with Federal Generally Accepted Accounting Principles (GAAP) and the formats prescribed by OMB. Reports used to monitor and control budgetary resources are prepared from the same records. Users of the statements are advised that the statements are for a component of the U.S. Government.

This 2018 composite of the Crab Nebula was made with data from the Chandra X-Ray Observatory (blue and white), Hubble Space Telescope (purple), and Spitzer Space Telescope (pink). The star that exploded to create the Crab Nebula was first seen from Earth in 1054 A.D. Since its launch in 1999, Chandra has frequently observed the nebula and x-ray observations have helped astronomers better understand this spectacular object. The Crab Nebula was one of the first objects that Chandra examined with its sharp X-ray vision, and it has been a frequent target of the telescope ever since.

There are many reasons that the Crab Nebula is such a well-studied object: it is one of a handful of cases where there is strong historical evidence for when the star exploded. Having this definitive timeline helps astronomers understand the details of the explosion and its aftermath.

In the case of the Crab, observers in several countries reported the appearance of a "new star" in 1054 A.D. in the direction of the constellation Taurus. Much has been learned about the Crab in the centuries since then. Today, astronomers know that the Crab Nebula is powered by a quickly spinning, highly magnetized neutron star called a pulsar, which was formed when a massive star ran out of its nuclear fuel and collapsed. The combination of rapid rotation and a strong magnetic field in the Crab generates an intense electromagnetic field that creates jets of matter and anti-matter moving away from both the north and south poles of the pulsar, and an intense wind flowing out in the equatorial direction.

Photo Credit: X-ray: NASA/CXC/SAO; Optical: NASA/STScI; Infrared: NASA-JPL-Caltech

MANAGEMENT'S DISCUSSION AND ANALYSIS

Systems, Controls, and Legal Compliance

The Moon, or supermoon, is seen as it rises behind the U.S. Capitol, Monday, March 9, 2020, in Washington, DC. A supermoon occurs when the Moon's orbit is closest (perigee) to Earth.

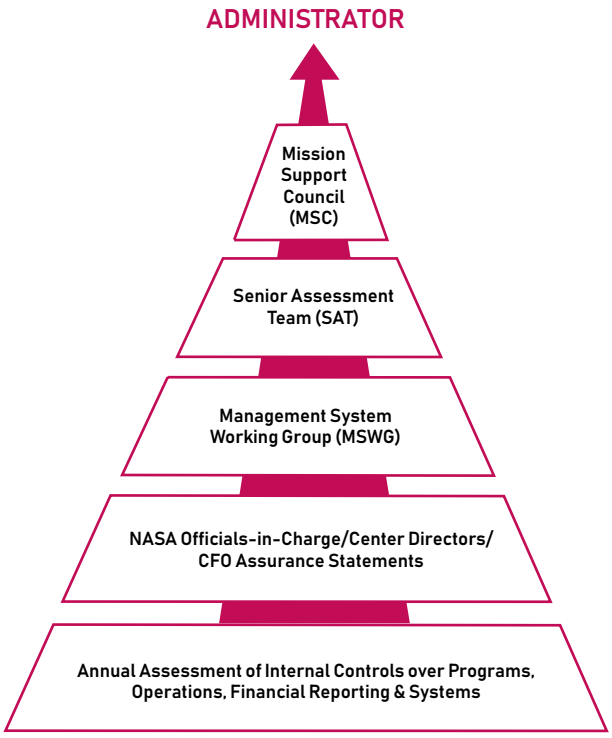
Photo Credit: NASA/Joel Kowsky

INTERNAL CONTROL FRAMEWORK

NASA Federal Managers' Financial Integrity Act Annual Statement of Assurance Process

The Federal Managers' Financial Integrity Act (FMFIA)[a] requires agency heads to evaluate and report on the internal control and financial systems to ensure the integrity of Federal programs and operations. This evaluation aims to provide reasonable assurance that internal controls are operating effectively to ensure efficient operations, reliable financial reporting, and compliance with applicable laws and regulations.

An effective system of internal control is at the core of NASA fulfilling its mission and achieving its goals while safeguarding governmental resources. NASA management is responsible for implementing internal control activities that support the organization in meeting established objectives. NASA complies with OMB Circular A-123, *Management's Responsibility for Enterprise Risk Management and Internal Control*, which provides Government-wide requirements for internal control and accountability, based on the FMFIA. OMB Circular A-123[b] also requires agencies to establish internal controls over operations, reporting and compliance.



NASA FMFIA ANNUAL STATEMENT OF ASSURANCE PROCESS

Figure 1

NASA evaluates internal control across the Agency at various levels of the organization to ensure significant risks are identified, and related internal controls that address those risks are evaluated. NASA assesses the effectiveness of the internal controls over operations, management systems, and reporting with consideration of reviews and other relevant sources of information. NASA's executive leadership provides annual certifications reporting on the effectiveness of internal controls that are implemented to meet intended objectives. In addition, the NASA Office of the Chief Financial Officer (OCFO) deploys an extensive annual assessment methodology and internal control testing techniques that evaluate internal controls over financial reporting. NASA considers Enterprise Risk Management (ERM) Program activities, reviews the Agency Risk Profile and considers fraud risk in its execution of the Administrators' Statement of Assurance Process (SOA) in evaluating and providing assurance on internal controls.

The FMFIA assurance statement is primarily based on self-certifications submitted by NASA Officials-in-Charge that ultimately support the Administrator's SOA. These certifications are based upon organizational self-assessments guided by the Government Accountability Office's (GAO) Standards for Internal Control in the Federal Government (known as the Green Book[c]). The self-assessments are informed by various sources of information such as internal reviews of controls, as well as recommendations for improvements from external audits, investigations, and reviews conducted by the Office of Inspector General (OIG) and the GAO. The Mission Support Council (MSC), the organization responsible for oversight of NASA's Internal Control Program, advises the Administrator on the Statement of Assurance. The Senior Assessment Team (SAT), which is an arm of the MSC, helps guide the internal control evaluation and reporting process that recommends the type of assurance that results from their execution of the SOA Program.

The Management System Working Group (MSWG) performs the first level evaluation of annual results and serves as the primary advisory body for NASA internal control activities. The MSWG analyzes the annual assessment results and reports issues that may significantly impact the effective design and operation of internal controls to the SAT. Figure 1 depicts the Agency's Annual Statement of Assurance process and organizational components.

[a] The Federal Managers' Financial Integrity Act (FMFIA) - https://obamawhitehouse.archives.gov/omb/financial_fmfia1982
[b] OMB Circular No. A-123, *Management's Responsibility for Enterprise Risk Management and Internal Control*
https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2016/m-16-17.pdf
[c] Green Book - https://www.gao.gov/assets/670/665712.pdf

In March 2020, the COVID-19 pandemic affected NASA's standard operating model both internally and externally within NASA across the United States of America and globally across the world. Agency leadership set the tone and vision for a smooth transition during this challenging and difficult time to meet its mission, with employee safety being paramount. NASA's internal control environment established over decades of continuous improvement was the foundation for an effective system of internal control during this turbulent time. NASA's "Tone at the Top" was spotlighted as an efficient and effective approach to meet the standards and requirements per FMFIA, A-123, GAO, and NASA directives. NASA leadership reiterates that the health and safety of the NASA community is a top priority and critical to the success of the mission as evidenced by its core values of Safety, Integrity, Inclusion, Teamwork and Excellence. In response to the pandemic, NASA developed COVID-19 guidance that was derived from the guidelines from the White House, Centers for Disease Control and Prevention, the American College of Occupational and Environmental Medicine, Occupational Health and Safety Administration and the American Academy of Audiology.

As part of its FY 2020 internal control assessment, NASA has taken an integrated and methodical approach by leveraging and enhancing current processes in response to the COVID-19 pandemic including the impact of remote work, reduction in travel and changes in the ability to conduct in-person oversight. In an effort to proactively identify and address control risks, NASA employed a multi-faceted approach to assessing internal controls, which included interviews, questionnaires, and documentation reviews all done remotely.

NASA leadership continuously evaluates agency operations based on lessons learned from the pandemic and makes changes, as appropriate, to better protect the health and safety of the workforce and missions while meeting mission objectives.

Internal control processes at NASA are robust and continue to operate in an effective and efficient manner, these controls helped facilitate a smooth transition to virtual work, and consequently, NASA management found that there was not a significant adverse impact on the internal control environment for FY 2020 due to COVID-19 pandemic. The Agency remains committed to assessing the internal control structure and operation and will continue to do so for FY 2021.

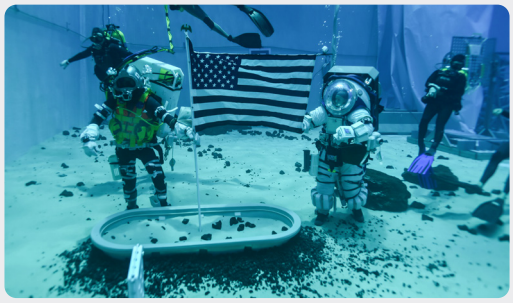
Acronyms

ARMWG	Agency Risk Management Working Group	OCHMO	Office of the Chief Health & Medical Officer
CIO	Chief Information Officer	OPM	Office of Personnel Management
CMP	Continuous Monitoring Program	OSMA	Office of Safety & Mission Assurance
COF	Construction of Facilities	PMC	Program Management Council
EC	Executive Council	RMB	Reimbursable
ERMWG	Enterprise Risk Management Working Group	SAT	Senior Assessment Team
GISS	Goddard Institute for Space Studies	SMC	Senior Management Council
LarC - SI	Langley Research Center - Soluble Imide	SOA	Statement of Assurance
MSC	Mission Support Council	STEM	Science, Technology, Engineering, and Mathematics
MSWG	Management System Working Group	STSci	Space Telescope Science Institute
OCE	Office of the Chief Engineer		

Did You Know?

Teams are evaluating how to train for lunar surface operations during Artemis missions, in the Neutral Buoyancy Lab at Johnson Space Center in Houston.

Photo Credit: NASA



ENTERPRISE RISK MANAGEMENT

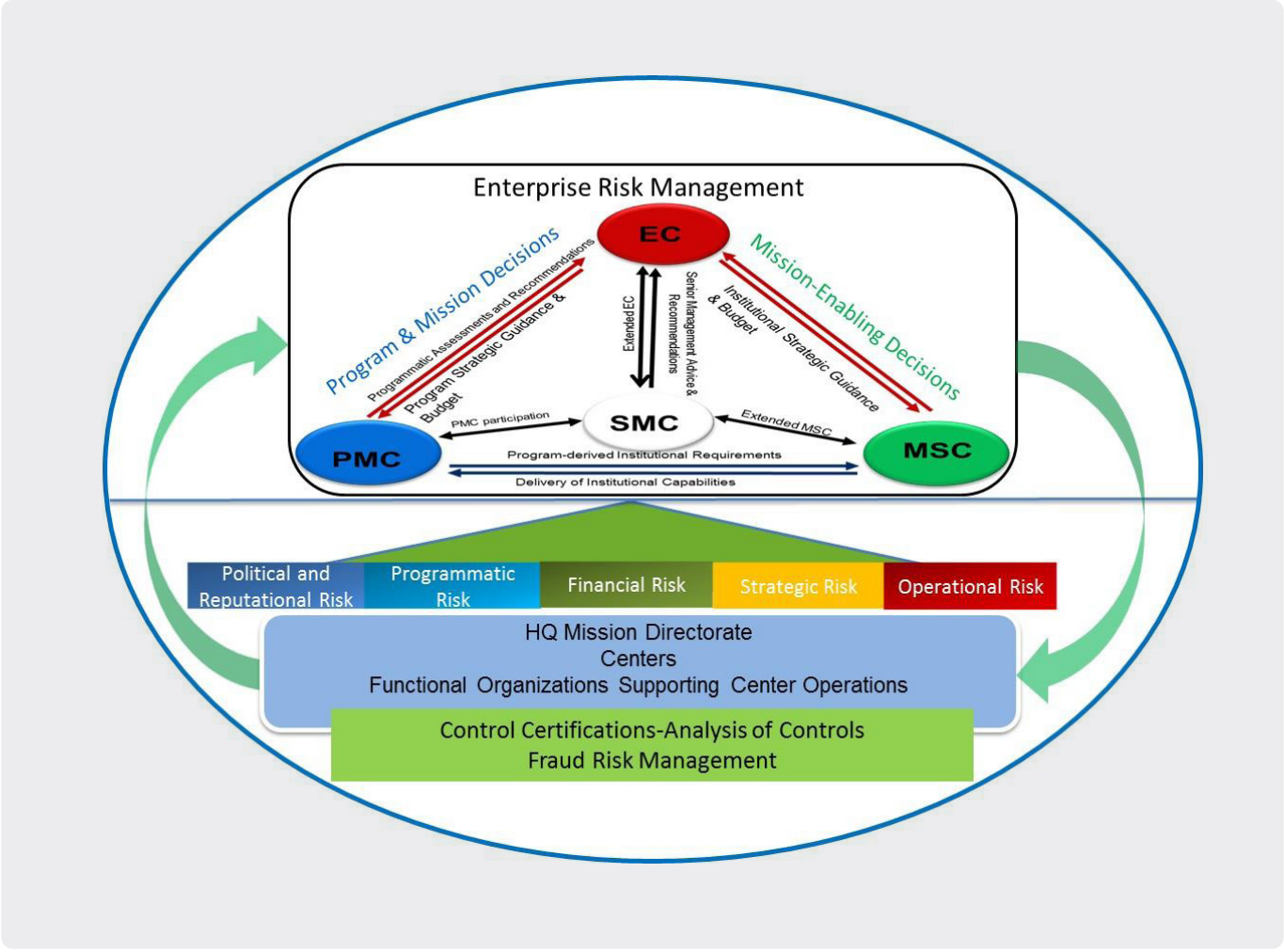
OMB Circular No. A-123, *Management's Responsibility for Enterprise Risk Management and Internal Control*, requires federal agencies to implement ERM to ensure federal managers are effectively managing risks that could affect the achievement of agency strategic objectives.

Risk management continues to be embedded in NASA's culture, and the principles and practices are inherent in everyday operations. NASA's Office of the Chief Financial Officer, Quality Assurance Division (QAD) leads the Agency's ERM effort. The NASA Unified Comprehensive Operational Risk Network (UNICORN), is the framework for the communication and exchange of risk information between NASA's functional organizations and the Agency leadership (see Figure 2). The UNICORN's foundation is the Agency's risk management activities and decisional councils.

UNIFIED COMPREHENSIVE OPERATIONAL RISK NETWORK

NASA'S UNICORN

Figure 2

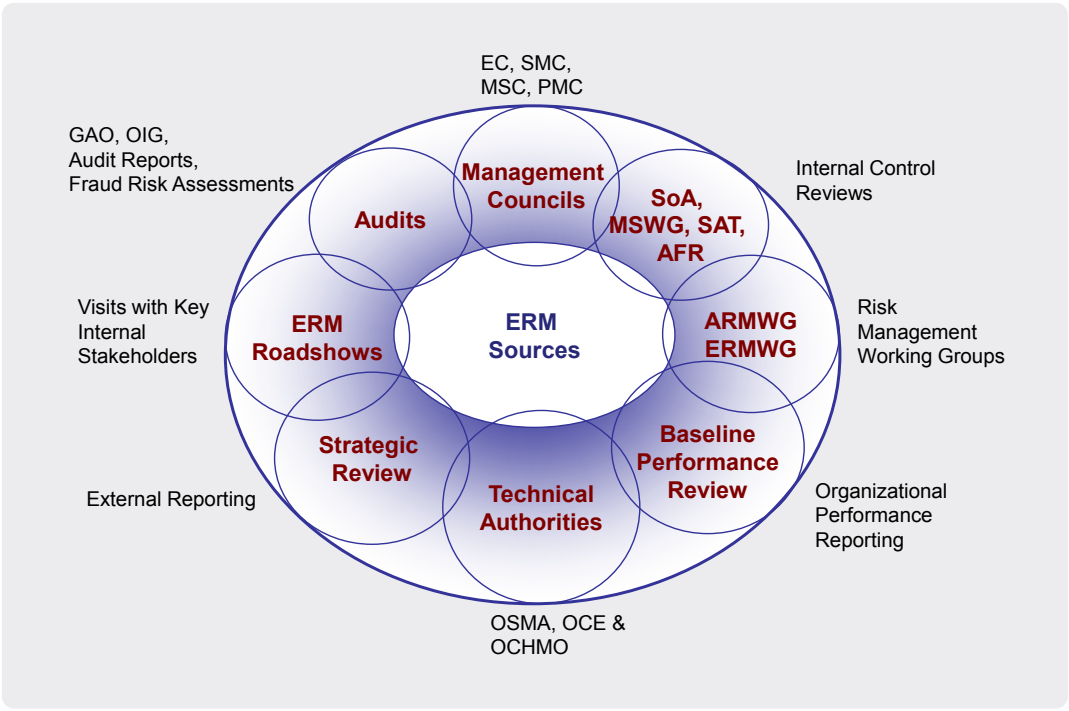


In FY 2020, NASA continued to mature the development of its ERM Program. The NASA Enterprise Risk Management Working Group (ERMWG) continues to identify enterprise-level risks and opportunities and collaborate with organizations to address identified enterprise risks. The ERMWG, which is comprised of representatives from several stakeholder organizations, proposes enterprise-level risks for consideration and integration into the Agency Risk Profile. The status of ERM activities is reported by the Chair of the ERMWG to NASA's Associate Administrator on a quarterly basis through Baseline Performance Reviews. On an annual basis, the ERMWG Chair presents the Agency Risk Profile to the Agency Program Management Council (APMC), chaired by the Associate Administrator for approval.

As illustrated in Figure 3, NASA leverages a variety of sources to identify potential enterprise risks and relies upon the Agency governance structure of decisional councils, as well as other bodies such as the Agency Risk Management Working Group (ARMWG) and MSWG to facilitate the integration of risks across the Agency for appropriate consideration as enterprise risks. The ARMWG is distinct from the ERMWG in that it covers the spectrum of risk management activities at the institutional, program, and project level versus the ERMWG which focuses on integrating risks at the enterprise level.

ERM SOURCES

Figure 3



FY 2020 was a unique year, as the global COVID-19 pandemic significantly impacted normal operations internally and externally across the Agency, across the United States and globally as well. As a result of the pandemic, NASA faced new challenges in carrying out essential functions necessary to achieve its core mission. Long standing risk management processes and activities were already inherently woven throughout NASA's culture, so beneficially, the Agency was well-positioned to respond to unknown threats or national emergencies that may disrupt operations for an extended period. NASA leadership has developed Agency-wide guidance that considers guidelines provided by the White House, OPM, and OMB. As the pandemic remains, uncertainty exists as to when normal operations will fully resume. The ERMWG took these new challenges into consideration when identifying and prioritizing enterprise risks. The ERMWG conducted an analysis of the impact of the pandemic response on the risks that were being reported on the Agency Risk Profile. The ERMWG also began conducting analyses of risks and opportunities arising from operations being performed in a modified environment as a result of unexpected events which did not necessitate activation of the NASA Continuity of Operations Plan (COOP). The QAD worked closely with senior leaders to understand the impact of the COVID-19 response on their ability to meet organizational objectives and to identify additional emerging risks and opportunities.

NASA will continue to strengthen its risk management and reporting process through comprehensive collaboration with the various risk bodies and stakeholders throughout the Agency, to more effectively identify key risks and opportunities particularly as they have arisen as a result of the COVID-19 response, develop effective risk responses, and implement timely mitigation actions.

MANAGEMENT ASSURANCES

Administrator's Statement of Assurance - November 16, 2020

National Aeronautics and Space Administration (NASA) management is responsible for establishing and maintaining an effective system of internal control that meets the objectives of the Federal Managers' Financial Integrity Act (FMFIA) and Federal Financial Management Improvement Act (FFMIA) in accordance with the Government Accountability Office (GAO)'s *Standards for Internal Control in the Federal Government* and NASA policy. NASA's Certification of Reasonable Assurance is based upon management's knowledge gained from daily operations; monitoring activities; self-assessments; and other internal controls over the effectiveness and efficiency of operations and compliance with applicable laws and regulations in accordance with Office of Management and Budget (OMB) Circular A-123, *Management's Responsibility for Enterprise Risk Management and Internal Control* and NASA requirements. In accordance with GAO and OMB requirements to integrate Enterprise Risk Management (ERM) and internal control in Federal agencies, NASA's ERM Program conducts enterprise risk activities, fraud risk activities, evaluates internal control, and provides an overall assurance on the internal control environment. As a result, managers and employees throughout the Agency are actively engaged in identifying or updating key control objectives, assessing risks, implementing controls or executing other mitigating strategies, conducting reviews, and taking corrective actions as necessary.

In addition, NASA complies with FMFIA requirements and OMB guidance to evaluate and assure the reliability of its internal controls over its financial management systems as well as Digital Accountability and Transparency Act of 2014 (DATA Act) submissions.

NASA conducted its Fiscal Year (FY) 2020 annual assessment of the effectiveness of management's internal controls to support reliable financial reporting, effective and efficient programmatic operations, and compliance with applicable laws and regulations in accordance with FMFIA and OMB's Circular A-123. Based on the results of this evaluation, NASA provides reasonable assurance that its system of internal control over the effectiveness and efficiency of operations and compliance with laws and regulations as of September 30, 2020, was operating effectively and no material weaknesses were found in the design or implementation of internal controls.

NASA also conducted its evaluation of financial management systems for compliance with FFMIA in accordance with Appendix D of OMB Circular A-123, Federal Accounting Standards, and the United States Government Standard General Ledger at the transactional level. NASA financial management systems substantially comply with FFMIA as of September 30, 2020.

In conclusion, NASA makes an unmodified statement of assurance that its internal controls for FY 2020 were operating effectively. NASA remains committed to ensuring a sound system of internal control exists over operations, reporting, and financial management systems.

Sincerely,

James F. Bridenstine
Administrator

FINANCIAL SYSTEMS STRATEGIES

NASA's financial management system strategy is to establish an overarching roadmap that aligns with the Agency's mission for innovation and strategic goals to optimize capabilities and operations which promote the technologies of tomorrow. Current financial management systems initiatives seek to enable integrated solutions which utilize modern business processes, meet evolving stakeholder needs and comply with internal and external federal policies, standards and OMB requirements.

The Systems, Applications & Products ERP Central Component (SAP ECC) is the dedicated enterprise resource planning (ERP) solution serving as NASA's integrated financial accounting system of record since 2003. The eBudget Suite of applications designed to develop, manage and maintain the NASA Federal Budget by phases, has supported budget formulation and Congressional justifications since 2007. These financial management tools are supported by commercial off-the-shelf (COTS) software, NASA developed applications, and interfaces with systems managed by other Federal agencies.

In collaboration with Agency Information Technology (IT) Governance structure, a financial application management board was established to prioritize significant IT investments, establish functional roadmaps, and continually review inventory of applications for modernization opportunities across the financial management portfolio evaluating whether enterprise solutions meet current business needs.

This approach is in adherence with the FY 2018 President's Management Agenda: *Modernizing Government for the 21st Century* which lays out a long-term vision for modernizing the Federal Government in key areas that will improve the ability of agencies to deliver mission outcomes, provide excellent service, and effectively steward taxpayer dollars on behalf of the American people. A key component of the Administration's Information Technology Framework effort includes addressing aging IT infrastructure and modernizing citizen facing services.

NASA utilized the Treasury Invoice Processing Platform to meet OMB's directive M-15-19, *Improving Government Efficiency and Saving Taxpayer Dollars Through Electronic Invoicing*. Treasury's platform is a web-based system that provides one integrated, secure system to simplify the management of vendor invoices, and significantly reduced manual invoice data entry.

NASA is currently working to implement G-Invoicing, Treasury's long-term solution for Federal Program Agencies (FPAs) to manage intragovernmental (IGT) Buy/Sell transactions by the mandated implementation deadline.

Did You Know?

In collaboration with NASA's Goddard Space Flight Center, NASA's Johnson Space Center in Houston, Texas hosted the second NASA Commercialization Training Camp on Feb. 12-14 in partnership with the NFL Players Association. Through presentations, tours, panels and one-on-one conversations, the training camp introduced current and former professional football players to NASA technology, explaining how athletes could infuse NASA innovations into an existing business or new startup idea.

Photo Credit: NASA/Johnson Space Center/ Josh Valcarcel

MANAGEMENT'S DISCUSSION AND ANALYSIS

Forward Looking

The spiral galaxy NGC 2008 sits center stage, its ghostly spiral arms spreading out toward us, in this image captured by the NASA/ESA Hubble Space Telescope.

This galaxy is located about 425 million light-years from Earth in the constellation of Pictor (the Painter's Easel). Discovered in 1834 by astronomer John Herschel, NGC 2008 is categorized as a type Sc galaxy in the Hubble sequence, a system used to describe and classify the various morphologies of galaxies. The "S" indicates that NGC 2008 is a spiral, while the "c" means it has a relatively small central bulge and more open spiral arms. Spiral galaxies with larger central bulges tend to have more tightly wrapped arms, and are classified as Sa galaxies, while those in between are classified as type Sb.

Spiral galaxies are ubiquitous across the cosmos, comprising over 70% of all observed galaxies — including our own, the Milky Way. However, their ubiquity does not detract from their beauty. These grand, spiraling collections of billions of stars are among the most wondrous sights that have been captured by telescopes such as Hubble and are firmly embedded in astronomical iconography.

Photo Credit: ESA/Hubble & NASA, A. Bellini

FORWARD LOOKING

In September 2020, NASA published an Artemis Plan, with an update of Phase 1 plans to land the first woman and the next man on the surface of the Moon in 2024. We have reached the final critical milestones in preparation for the uncrewed Artemis I mission, which is on track for launch in 2021, and making progress towards the Artemis II mission, which is on track for a crewed flight in 2023. Artemis III will return humans to the surface of the Moon in 2024.

NASA estimates that the resources required to accomplish Artemis Phase 1 through FY 2025 will cost just under $30 billion, consistent with the President's FY 2021 budget request. The funding requirements, described in the Artemis Plan, support development of SLS, Orion, Exploration Ground Systems, Human Landing Systems, surface suits, logistics to support missions on the lunar surface, exploration technologies, and supporting sciences. The continuing resolution funds agencies at the FY 2020 budget level and does not include $3.2 billion for the Human Landing System. NASA has requested extra funding for a Human Landing System, keeping the Agency on track to achieve our ambitious goals.

The next year will be exciting for space exploration. In addition to the Artemis I launch, the OSIRIS-REx spacecraft will explore asteroid Bennu's boulder-strewn surface, collecting samples of the asteroid's rocks and dust to be returned to Earth for study. Mars 2020 Perseverance rover will touch down on the Martian surface in February 2021 and begin its exploration of Jezero Crater. The Lucy mission, which is scheduled to launch in October 2021, will be the first spacecraft to study the Trojan asteroids, where it will study what scientists believe are the remnants of the primordial material that formed the outer planets. October 2021 will also see the launch of the infrared James Webb Space Telescope, which will hunt for the unobserved formation of the first galaxies and look inside dust clouds where stars and planetary systems are forming. Here at home, Landsat 9 will join Landsat 8 to provide high-quality, global, land-imaging measurements.

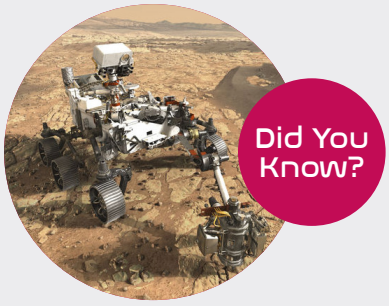
NASA expects to complete assembly of the Low Boom Flight Demonstrator aircraft, also known as the X-59, in summer 2021. Then the team will begin major ground testing, leading to a target date for first flight in summer 2022. The X-59 is designed to fly faster than the speed of sound without producing a loud, disruptive sonic boom, which is typically heard on the ground below aircraft flying at such speeds. Instead, the X-59 produces a quiet sonic thump, if anything at all. NASA plans as early as 2024 to fly the X-59 over select communities to gather information on how the public will react to the level of noise the aircraft is designed to produce.

The 2020 High Risk Corrective Action Plan, released in August 2020, provides an update on NASA's efforts to address challenges in the Agency's acquisition practices and mission cost and schedule growth identified in GAO's biennial High Risk Report. Since the 2018 plan, we completed six corrective action initiatives. Two initiatives remain open (implementing Earned Value Management and implementing programmatic training curriculum) and one was closed and rewritten (increase cost and schedule transparency for Deep Space Exploration Systems). Initiatives like these will help strengthen our program and project management efforts and improve transparency for our stakeholders.

In February 2022, NASA will publish the 2022-2026 Strategic Plan. The plan will outline our priorities and long-term strategies for robotic and human space exploration, aeronautics, science research, technology development, and enabling a commercial market in low Earth orbit. The plan also will realign our framework of strategic goals, strategic objectives, and performance goals to reflect our ongoing mission and mission support efforts. The 2022-2026 Strategic Plan will require NASA to align evaluation efforts, done according to the Foundations for Evidence-Based Policymaking Act of 2018, with our strategic objectives to inform decision-making. To support this, we will develop a Learning Agenda, which establishes the activities we will undertake to answer short- and long-term strategic and operational questions most pressing to achieving our Mission, and a Capacity Assessment of how our evaluation, research, and analysis efforts support various Agency functions, including strategic management.

The Mars 2020 Perseverance Rover will search for signs of ancient microbial life, which will advance NASA's quest to explore the past habitability of Mars. The rover has a drill to collect core samples of Martian rock and soil, then store them in sealed tubes for pickup by a future mission that would ferry them back to Earth for detailed analysis. Perseverance will also test technologies to help pave the way for future human exploration of Mars.

You can track the Rover's countdown to landing on Mars here https://www.mars.nasa.gov/mars2020/

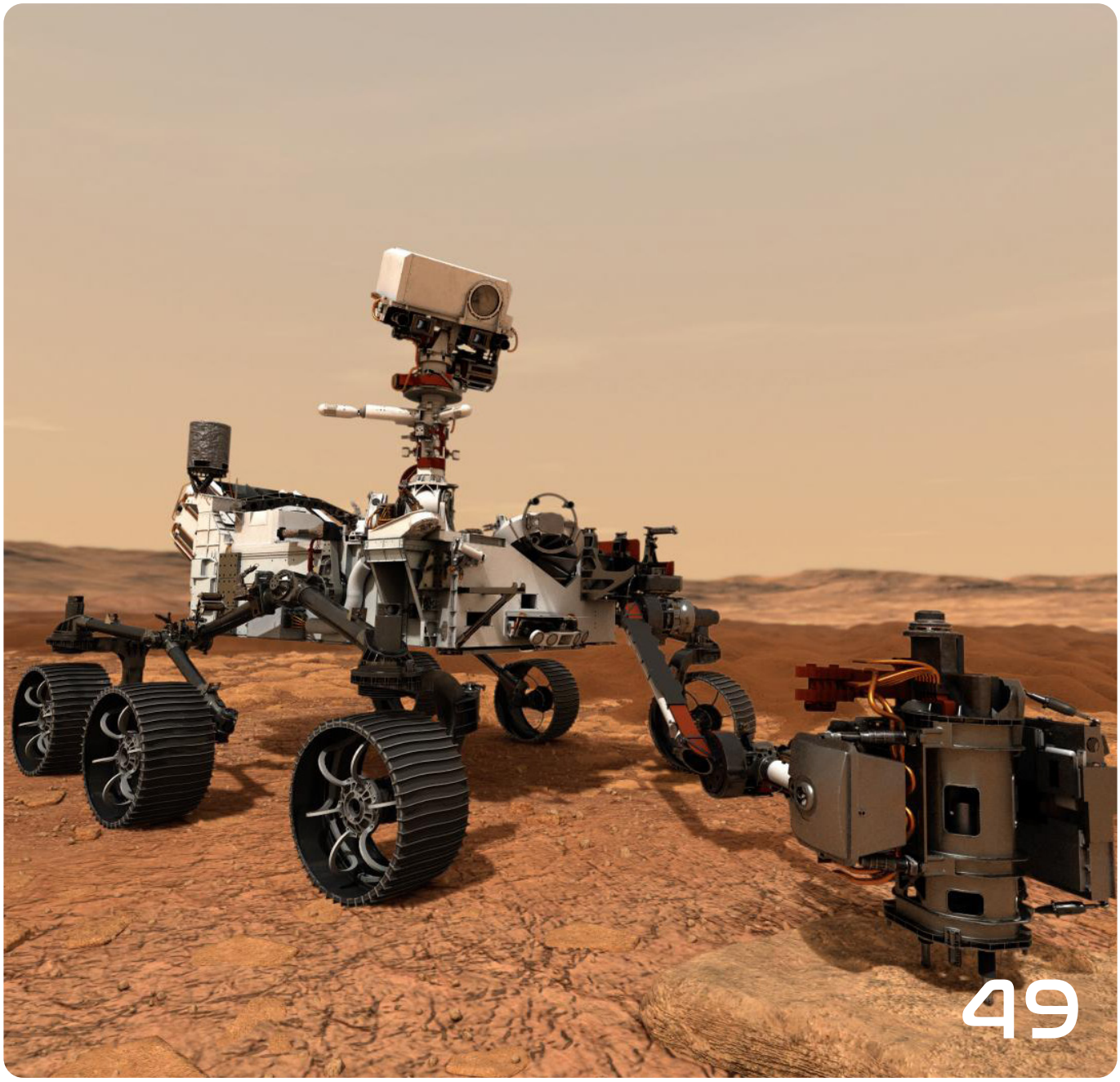


SECTION 2

Financial Section

In this illustration, NASA's Mars 2020 rover uses its drill to core a rock sample on Mars. Scheduled to launch in July 2020, the Mars 2020 rover represents the first leg of humanity's first round trip to another planet. The rover will collect and store rock and soil samples on the planet's surface that future missions will retrieve and return to Earth. NASA and the European Space Agency are solidifying concepts for a Mars sample return mission.

Photo Credit: NASA/JPL-Caltech



INTRODUCTION TO THE PRINCIPAL FINANCIAL STATEMENTS

The principal financial statements are prepared to report the financial position and results of operations of the National Aeronautics and Space Administration, pursuant to the requirements of 31 U.S.C.3515 (b).

Consolidated Balance Sheets

provide information on assets, liabilities, and net position as of the end of the reporting periods. Net position is the difference between assets and liabilities. It is a summary measure of the Agency's financial condition at the end of the reporting periods.

Consolidated Statements of Net Cost

report net cost of operations during the reporting periods by strategic goal and at the entity level. It is a measure of gross costs of operations less earned revenue, and represents the cost to taxpayers for achieving each strategic goal and Agency Mission at the entity level.

Consolidated Statements of Changes in Net Position

report the beginning balance of net position, current financing sources and use of resources, unexpended resources for the reporting periods, and ending net position for the current periods.

Combined Statements of Budgetary Resources

report information on the sources and status of budgetary resources for the reporting periods. Information in this statement is reported on the budgetary basis of accounting, which supports compliance with budgetary controls and controlling legislation.

FINANCIAL SECTION

Financial Statements, Notes, and Supplemental Information

This long-exposure photograph during an orbital night period from the International Space Station reveals a wispy, but colorful atmospheric glow crowning Earth's horizon back-dropped by the dazzling Milky Way.

Photo Credit: NASA

National Aeronautics and Space Administration
Consolidated Balance Sheets
As of September 30, 2020 and 2019

(In Millions)

	2020	2019
Assets:		
Intragovernmental:		
Fund Balance with Treasury (Note 2)	$ 14,914	$ 13,847
Investments (Note 3)	16	16
Accounts Receivable, Net (Note 4)	110	139
Total Intragovernmental	15,040	14,002
Accounts Receivable, Net (Note 4)	-	1
General Property, Plant and Equipment, Net (Note 5)	6,195	6,008
Other Assets (Note 7)	6	5
Total Assets	**$ 21,241**	**$ 20,016**
Stewardship PP&E (Note 6)		
Liabilities (Note 8):		
Intragovernmental:		
Accounts Payable	$ 83	$ 48
Other Liabilities (Note 10)	210	205
Total Intragovernmental	293	253
Accounts Payable	1,291	1,251
Federal Employee and Veteran Benefits (Note 8)	30	39
Environmental and Disposal Liabilities (Note 9)	2,173	1,969
Other Accrued Liabilities (Note 10)	1,892	1,681
Other Liabilities (Note 10)	623	573
Total Liabilities	**$ 6,302**	**$ 5,766**
Commitments and Contingencies (Note 11)		
Net Position:		
Unexpended Appropriations	$ 11,230	$10,542
Cumulative Results of Operations	3,709	3,708
Total Net Position	**14,939**	**14,250**
Total Liabilities and Net Position	**$ 21,241**	**$ 20,016**

The accompanying notes are an integral part of these financial statements.

National Aeronautics and Space Administration
Consolidated Statements of Net Cost
For the Fiscal Years Ended September 30, 2020 and 2019

(In Millions)

	2020	2019
Strategic Goal 1 – Expand human knowledge through new scientific discoveries:		
Gross Costs	$ 8,216	$ 7,849
Less: Earned Revenue	1,229	1,238
Net Cost	6,987	6,611
Strategic Goal 2 – Extend human presence deeper into space and to the Moon for sustainable long-term exploration and utilization:		
Gross Costs	$ 7,302	$ 6,579
Less: Earned Revenue	260	314
Net Cost	7,042	6,265
Strategic Goal 3 – Address national challenges and catalyze economic growth:		
Gross Costs	$ 2,231	$ 1,887
Less: Earned Revenue	116	103
Net Cost	2,115	1,784
Strategic Goal 4 - Optimize capabilities and operations:		
Gross Costs	$ 6,158	$ 6,311
Less: Earned Revenue	171	161
Net Cost	5,987	6,150
Net Cost of Operations		
Total Gross Costs	$ 23,907	$ 22,626
Less: Total Earned Revenue	1,776	1,816
Net Cost	**$ 22,131**	**$20,810**

The accompanying notes are an integral part of these financial statements.

National Aeronautics and Space Administration
Consolidated Statements of Changes in Net Position
For the Fiscal Years Ended September 30, 2020 and 2019

(In Millions)

	2020	2019
Unexpended Appropriations:		
Beginning Balance	$ 10,542	$ 9,285
Budgetary Financing Sources:		
Appropriations received	22,689	21,501
Other Adjustments	(90)	(24)
Appropriations used	(21,911)	(20,219)
Total Budgetary Financing Sources	688	1,257
Total Unexpended Appropriations	**$ 11,230**	**$ 10,542**
Cumulative Results of Operations:		
Beginning Balance	$ 3,708	$ 4,114
Budgetary Financing Sources:		
Appropriations used	21,911	20,219
Non-Exchange Revenue	22	4
Other Financing Sources:		
Donations and forfeitures of property	71	2
Imputed financing	149	183
Other	(21)	(4)
Total financing sources	22,132	20,404
Net cost of operations	(22,131)	(20,810)
Net change	1	(406)
Cumulative Results of Operations	**$ 3,709**	**$ 3,708**
Net Position	**$ 14,939**	**$ 14,250**

The accompanying notes are an integral part of these financial statements.

National Aeronautics and Space Administration
Combined Statements of Budgetary Resources
For the Fiscal Years Ended September 30, 2020 and 2019

(In Millions)

	2020	2019
Budgetary Resources:		
Unobligated balance from prior year budget authority, net	$ 2,854	$ 2,516
Appropriations	22,620	21,501
Spending authority from offsetting collections	2,237	2,337
Total Budgetary Resources	**$ 27,711**	**$ 26,354**
Status of Budgetary Resources:		
New obligations and upward adjustments (total)	$ 25,271	$ 23,971
Unobligated balance, end of year:		
Apportioned, unexpired accounts	2,286	2,270
Unapportioned, unexpired accounts	40	8
Unexpired unobligated balance, end of year	2,326	2,278
Expired unobligated balance, end of year	114	105
Unobligated balance, end of year (total)	2,440	2,383
Total Status of Budgetary Resources	**$ 27,711**	**$ 26,354**
Outlays, net:		
Outlays, net (total)	$ 21,545	$ 20,182
Distributed offsetting receipts (-)	(22)	(3)
Agency Outlays, net	**$ 21,523**	**$20,179**

The accompanying notes are an integral part of these financial statements.

Note 1: Summary of Significant Accounting Policies

Reporting Entity

The National Aeronautics and Space Administration is an independent agency established by Congress on October 1, 1958 by the National Aeronautics and Space Act of 1958. NASA was incorporated from its predecessor agency, the National Advisory Committee for Aeronautics, which provided technical advice to the United States (U.S.) aviation industry and performed aeronautics research. Today, NASA serves as the principal agency of the U.S. Government for initiatives in civil space and aviation.

NASA is organized into four Mission Directorates supported by one Mission Support Directorate (see Organization on page 10):

- Aeronautics Research: conducts research which enhances aircraft performance, environmental compatibility, capacity, flexibility, and safety of the future air transportation system;
- Human Exploration and Operations: develops new capabilities, supporting technologies and foundational research for affordable, sustainable human and robotic exploration;
- Science: explores the Earth, Moon, Mars, and beyond; charts the best route of discovery, and obtains the benefits of Earth and space exploration for society; and
- Space Technology: develops new technologies needed to support current and future NASA missions, other agencies, and the aerospace industry.

The Agency's administrative structure includes the Senior Management Council, Executive Council, Mission Support Council, Agency Program Management Council, Acquisition Strategy Council, and other Committees to integrate strategic, tactical, and operational decisions in support of strategic focus and direction.

Operationally, NASA is organized into nine Centers and other facilities across the country, the Headquarters Office, and the NASA Shared Services Center (NSSC).

The Agency's consolidated financial statements present the accounts of all funds that have been established and maintained to account for the resources under the control of NASA management.

Disclosure Entities

The Federal Accounting Standards Advisory Board's (FASAB) Statement of Federal Financial Accounting Standards (SFFAS) No. 47, *Reporting Entity,* is intended to guide Federal agencies in recognizing complex, diverse organizations possessing varying legal designations (e.g., government agencies, not-for-profit organizations, and corporations) that are involved in addressing public policy challenges. It provides guidance for determining what organizations should be included in a Federal agency's financial statements (consolidation entities) and footnote disclosures (disclosure entities; and related parties) for financial accountability purposes and is not intended to establish whether an organization is or should be considered a Federal agency for legal or political purposes. See Note 15, *Disclosure Entity*, for information on NASA's disclosure entity.

Basis of Accounting and Presentation

These consolidated financial statements are prepared in accordance with the Federal Accounting Standards Advisory Board (FASAB) standards in the format prescribed by the OMB Circular No. A-136, *Financial Reporting Requirements*, Revised (August 2020). FASAB's authority to set Federal Government accounting standards is recognized by the American Institute of Certified Public Accountants (AICPA). The financial statements present the financial position, net cost of operations, changes in net position, and budgetary resources of NASA, as required by the Chief Financial Officers Act of 1990, Public Law (P.L.) 101- 576, and the Government Management Reform Act P.L. 103-356.

The accounting structure of Federal agencies is designed to reflect proprietary and budgetary accounting. Proprietary accounting uses the accrual method of accounting. Under the accrual method of accounting, revenues are recognized when earned and expenses are recognized when incurred, without regard to the timing of receipt or payment of cash. Budgetary accounting does not use the accrual method of accounting; it accounts for the sources and status of funds to facilitate compliance with legal controls over the use of Federal funds.

Material intra-agency transactions and balances have been eliminated from the principal financial statements for presentation on a consolidated basis, except for the Statement of Budgetary Resources, which is presented on a combined basis in accordance with OMB Circular No. A-136.

Accounting standards require all reporting entities to disclose that accounting standards allow certain presentations and disclosures to be modified, if needed, to prevent disclosure of classified information.

In FY 2020, NASA implemented the requirements of paragraphs 2, 9, and 10 of SFFAS No. 57, *Omnibus Amendments*. The requirements set forth in paragraphs 3-8, 11 and 12 of the standard are effective in FY 2024 and early adoption is not permitted.

Continued on the next page →

Note 1: Summary of Significant Accounting Policies (continued)

Budgets and Budgetary Accounting

NASA complies with Federal budgetary accounting guidelines of OMB Circular No. A-11, *Preparation, Submission and Execution of the Budget*, Revised (July 2020). Congress funds NASA's operations through nine main appropriations: Science; Aeronautics; Exploration; Space Operations; Science, Technology, Engineering and Mathematics Engagement, Safety, Security and Mission Services; Space Technology; Office of Inspector General; and Construction and Environmental Compliance and Restoration. NASA also receives reimbursements from reimbursable service agreements that cover the cost of goods and services NASA provides to other Federal entities or non-Federal entities. The reimbursable agreement price is based on cost principles to reasonably reflect the actual cost for the goods and services provided to the customer.

Research and Development, Other Initiatives and Similar Costs

NASA makes substantial Research and Development (R&D) investments for the benefit of the U.S. The R&D programs include activities to extend our knowledge of Earth, its space environment, and the universe; and to invest in new aeronautics and advanced space transportation technologies supporting the development and application of technologies. Following guidance outlined in the FASAB Technical Release No. 7, Clarification of Standards Relating to the National Aeronautics and Space Administration's Space Exploration Equipment, NASA applies the Financial Accounting Standards Board's (FASB) Accounting Standards Codification (ASC) 730-10-25, Research and Development - Recognition, and FASB ASC 730-10-50 Research and Development - Disclosure, to its R&D projects. Consistent with the above guidance, costs to acquire PP&E that is expected to be used only for a specific R&D project are expensed in the period they are incurred.

Exchange and Non-Exchange Revenue

NASA classified revenues as either exchange or non-exchange. Exchange revenues are those transactions in which NASA provides goods and services to another party for a price, primarily through reimbursable agreements that are priced based on cost principles to reasonably reflect the actual cost for the goods and services provided to the customer. These revenues are presented on the Statement of Net Cost and serve to offset the costs of these goods and services. Non-exchange revenues result from donations to the Government and from the Government's right to demand payment, including taxes, fines, and penalties. These revenues are not considered to reduce the cost of NASA's operations and are reported on the Statement of Changes in Net Position.

Application of Significant Accounting Estimates

The preparation of financial statements requires management to make assumptions and reasonable estimates affecting the reported amounts of assets and liabilities and disclosures of contingent liabilities as of the date of the financial statements and the reported amounts of revenues and expenses for the reporting period. Accordingly, actual results may differ from those estimates.

Fund Balance with Treasury

The U.S. Department of the Treasury (Treasury) collects and disburses cash on behalf of Federal agencies during the fiscal year. The collections include funds appropriated by Congress to fund the Agency's operations and revenues earned for services provided to other Federal agencies or the public. The disbursements are for goods and services in support of NASA's operations and other liabilities. The Fund Balance with Treasury (FBWT) is an asset account that shows the available budget spending authority of Federal agencies.

Investments in U.S. Government Securities

NASA investments include the following intragovernmental non-marketable securities:

(1) The Endeavor Teacher Fellowship Trust Fund (Endeavor Trust Fund) was established from public donations in tribute to the crew of the Space Shuttle Challenger. The Endeavor Trust Fund biannual interest earned is reinvested in short-term bills. P.L. 102-195 requires the interest earned from the Endeavor Trust Fund investments be used to create the Endeavor Teacher Fellowship Program.

(2) The Science, Space and Technology Education Trust Fund (Challenger Trust Fund) was established to advance science and technology education. The Challenger Trust Fund balance is invested in short-term bills and a bond. P.L. 100-404 requires that a quarterly payment of $250,000 be sent to the Challenger Center from interest earned on the Challenger Trust Fund investments. In order to meet the requirement of providing funds to the Challenger Center, NASA invests the biannual interest earned in short-term bills with maturity that coincides with quarterly payments of $250,000 to beneficiaries. Interest received in excess of the amount needed for quarterly payment to beneficiaries may be reinvested.

Continued on the next page →

Note 1: Summary of Significant Accounting Policies (continued)

Accounts Receivable

Most of NASA's Accounts Receivable are for intragovernmental reimbursements for cost of goods and services provided to other Federal agencies; the rest are for debts to NASA by employees and non-Federal vendors. Allowances for delinquent non-Federal accounts receivable are based on factors such as: aging of accounts receivable, debtors' ability to pay, payment history, and other relevant factors. Delinquent non-Federal accounts receivable over 120 days are referred to Treasury for collection, wage garnishment or cross-servicing in accordance with the Debt Collection Improvement Act (DCIA), as amended. An allowance for uncollectible accounts is recorded for Accounts Receivable due from the public and Federal sector in order to reduce Accounts Receivable to its net realizable value in accordance with SFFAS No. 1, *Accounting for Selected Assets and Liabilities*.

Operating Materials and Supplies

The Agency follows the purchase method of accounting for operating materials and supplies under which it expenses operating materials and supplies when purchased, not when used.

General Property, Plant and Equipment

NASA reports depreciation and amortization expense using the straight-line method over an asset's estimated useful life, beginning with the month the asset is placed in service. General Property, Plant, and Equipment (G-PP&E) are capitalized assets with acquisition costs of $500,000 or more, a useful life of two years or more, and R&D assets that are determined at the time of acquisition to have alternative future use. Assets that do not meet these capitalization criteria are expensed. Capitalized costs include costs incurred by NASA to bring the property to a form and location suitable for its intended use. Certain NASA assets are held by Government contractors. Under provisions of the Federal Acquisition Regulation (FAR), the contractors are responsible for the control and accountability of the assets in their possession. These Government-owned, contractor-held assets are included within the balances reported in NASA's financial statements.

NASA has barter agreements with international entities; the assets and services received under these barter agreements are unique, with limited easement to only a few countries, as these assets are on the International Space Station (ISS). The intergovernmental agreements state that the parties will seek to minimize the exchange of funds in the cooperative program, including the use of barters to provide goods and services. NASA has received some assets from these parties in exchange for future services. The fair value is indeterminable; therefore, no value was ascribed to these transactions in accordance with FASB ASC 845-10-25, *Non-Monetary Transactions – Recognition*, and ASC 845-10-50, *Non-Monetary Transactions – Disclosure*.

SFFAS No. 10, *Accounting for Internal Use Software*, requires the capitalization of internally developed, contractor developed, and commercial off-the-shelf software. Capitalized costs for internally developed software include the full costs (direct and indirect) incurred during the software development stage only. For purchased software, capitalized costs include amounts paid to vendors for the software and other material costs incurred by NASA to implement and make the software ready for use through acceptance testing. NASA capitalizes costs for internal use software when the total projected cost is $1 million or more, and the expected useful life of the software is two years or more.

Liabilities Covered by Budgetary Resources

As a component of a sovereign entity, NASA cannot pay for liabilities unless authorized by law and covered by budgetary resources. Liabilities Covered by Budgetary Resources are those for which appropriated funds are available as of the balance sheet date. Budgetary resources include: new budget authority, unobligated balances of budgetary resources at the beginning of the year or net transfers of prior year balances during the year, spending authority from offsetting collections (credited to an appropriation or fund account), and recoveries of unexpired budget authority through downward adjustments of prior year obligations.

Liabilities and Contingencies Not Covered by Budgetary Resources

Liabilities and Contingencies Not Covered by Budgetary Resources include future environmental cleanup liability, legal claims, pensions and other retirement benefits, workers' compensation, annual leave, and payables related to cancelled appropriations. Liabilities not covered by budgetary resources require future congressional action whereas liabilities covered by budgetary resources reflect prior congressional action. Liabilities that do not require the use of budgetary resources are covered by monetary assets that are not budgetary resources to the entity.

Federal Employee Benefits

A liability is recorded for workers' compensation claims related to the Federal Employees' Compensation Act (FECA), administered by the U.S. Department of Labor. The FECA provides income and medical cost protection to covered Federal civilian employees injured on the job, employees who have incurred a work-related occupational disease, and beneficiaries of employees whose death is attributable to a job-related injury or occupational disease. The FECA program initially pays valid claims and subsequently seeks reimbursement from the Federal agencies employing the claimants. The FECA liability includes the actuarial liability for estimated future costs of death benefits, workers' compensation, medical and miscellaneous costs for approved compensation cases.

Continued on the next page →

Note 1: Summary of Significant Accounting Policies (continued)

Personnel Compensation and Benefits:

Annual, Sick and Other Leave

Annual leave is accrued as it is earned; the accrual is reduced as leave is taken. Each year, the balance in the accrued annual leave account is adjusted to reflect current pay rates. To the extent current or prior year appropriations are not available to fund annual leave earned but not taken, funding will be obtained from future financing sources. Sick leave and other types of non-vested leave are expensed as taken.

Retirement Benefits

NASA employees participate in the Civil Service Retirement System (CSRS), a defined benefit plan, or the Federal Employees Retirement System (FERS), a defined benefit and contribution plan. For CSRS employees, NASA makes contributions of 7.0 percent of gross pay. For FERS employees, NASA makes contributions to the defined benefit plan of 16.0 percent of gross pay. For employees hired January 1, 2013, and after, NASA contributes 14.2 percent of gross pay. The Agency also contributes 1.0 percent to a thrift savings plan (contribution plan) for each employee and matches employee contributions to this plan up to an additional 4.0 percent of gross pay.

Insurance Benefits

SFFAS No. 5, *Accounting for Liabilities of the Federal Government*, requires Government agencies to report the full cost of Federal Employee Health Benefits (FEHB) and the Federal Employees Group Life Insurance (FEGLI) Programs. NASA uses the applicable cost factors and data provided by the Office of Personnel Management (OPM) to value these liabilities.

Subsequent Events

Subsequent events have been evaluated per guidance in OMB Circular A-136 for fiscal year 2020. The auditors' report date is the date the financial statements are available to be issued and management determined that there are no other items to disclose related to NASA's FY 2020 financial statements.

Note 2: Fund Balance with Treasury

The status of Fund Balance with Treasury (FBWT) represents the total fund balance recorded in the general ledger for unobligated and obligated balances. Unobligated balances — available is the amount remaining in appropriated funds available for obligation. Unobligated balances — unavailable is primarily comprised of amounts remaining in appropriated funds used only for adjustments to previously recorded obligations. Obligated balance not yet disbursed is the cumulative amount of obligations incurred for which outlays have not been made. Non-Budgetary FBWT is comprised of amounts in non-appropriated funds. The increase in Non-Budgetary FBWT is primarily due to a legal settlement check received in the amount of $19 million.

(In Millions)	2020	2019
Status of Fund Balances with Treasury:		
Unobligated Balances		
Available	$ 2,286	$ 2,271
Unavailable	154	113
Obligated Balance not yet Disbursed	12,441	11,442
Non-Budgetary FBWT	33	21
Total	**$ 14,914**	**$ 13,847**

Note 3: Investments

Investments consist of non-marketable par value intragovernmental securities issued by Treasury's Bureau of the Fiscal Service. Trust fund balances are invested in Treasury securities, which are purchased at either a premium or discount, and redeemed at par value exclusively through Treasury's Federal Investment Branch. The effective interest method is used to amortize the premium on the bond, and the straight line method is used to amortize discounts on bills.

Interest receivable on investments was less than one-half million dollars, in FY 2020 and FY 2019. In addition, NASA did not have any adjustments resulting from the sale of securities prior to maturity or any change in value that was more than temporary.

2020

(In Millions)	Cost	Amortization Method	Amortized (Premium) Discount	Interest Receivable	Investments, Net	Other Adjustments	Market Value Disclosure
Intragovernmental Securities:		Straight-Line Effective interest					
Non-Marketable: Par value	$ 16	0.105 - 1.487%	$ —	$ —	$ 16	$ —	$ 16
Total	**$16**		**$ —**	**$ —**	**$ 16**	**$ —**	**$ 16**

2019

(In Millions)	Cost	Amortization Method	Amortized (Premium) Discount	Interest Receivable	Investments, Net	Other Adjustments	Market Value Disclosure
Intragovernmental Securities:		Straight-Line Effective interest					
Non-Marketable: Par value	$ 17	1.837 - 2.524%	$ (1)	$ —	$ 16	$ —	$ 16
Total	**$17**		**$ (1)**	**$ —**	**$ 16**	**$ —**	**$ 16**

Note 4: Accounts Receivable, Net

The Accounts Receivable balance represents net valid claims by NASA to cash or other assets of other entities. Intragovernmental Accounts Receivable represents reimbursements due from other Federal entities for goods and services provided by NASA on a reimbursable basis. Accounts Receivable due from the public is the total of miscellaneous debts owed to NASA from employees and/or smaller reimbursements from other non-Federal entities. A periodic evaluation of accounts receivable is performed to estimate any uncollectible amounts based on current status, financial and other relevant characteristics of debtors, and the overall relationship with the debtor. An allowance for uncollectible accounts is recorded for Accounts Receivable due from the public and Federal sector in order to reduce Accounts Receivable to its net realizable value in accordance with SFFAS No. 1, *Accounting for Selected Assets and Liabilities*. The total allowance for uncollectible accounts during FY 2020 and FY 2019 is less than one–half million dollars.

2020

(In Millions)	Accounts Receivable	Allowance for Uncollectible Accounts	Net Amount Due
Intragovernmental	$ 110	$ —	$ 110
Public	—	—	—
Total	**$ 110**	**$ —**	**$ 110**

2019

(In Millions)	Accounts Receivable	Allowance for Uncollectible Accounts	Net Amount Due
Intragovernmental	$ 139	$ —	$ 139
Public	1	—	1
Total	**$ 140**	**$ —**	**$ 140**

Note 5: General Property, Plant and Equipment, Net

There are no known restrictions to the use or convertibility of NASA G-PP&E. The composition of NASA G-PP&E as of September 30, 2020 and 2019 is presented in the table below.

2020

(In Millions)	Depreciation Method	Estimated Useful Life	Cost	Accumulated Depreciation	Book Value
General PP&E					
Structures, Facilities and Leasehold Improvements	Straight-line	15–40 years	$11,642	$ (8,539)	$ 3,103
Equipment	Straight-line	5–20 years	16,560	(15,109)	1,451
Construction In Progress - Personal Property	N/A	N/A	741	—	741
Construction In Progress - Real Property	N/A	N/A	766	—	766
Internal Use Software	Straight-line	5 years	253	(243)	10
Land	N/A	N/A	124	—	124
Internal Use Software In Development	N/A	N/A	—	—	—
Total			**$ 30,086**	**$ (23,891)**	**$ 6,195**

2019

(In Millions)	Depreciation Method	Estimated Useful Life	Cost	Accumulated Depreciation	Book Value
General PP&E					
Structures, Facilities and Leasehold Improvements	Straight-line	15–40 years	$11,493	$ (8,272)	$ 3,221
Equipment	Straight-line	5–20 years	16,477	(14,933)	1,544
Construction In Progress - Personal Property	N/A	N/A	404	—	404
Construction In Progress - Real Property	N/A	N/A	703	—	703
Internal Use Software	Straight-line	5 years	254	(248)	6
Land	N/A	N/A	124	—	124
Internal Use Software In Development	N/A	N/A	6	—	6
Total			**$ 29,461**	**$ (23,453)**	**$ 6,008**

The following table presents the changes in total PP&E book value from September 30, 2019 to September 30, 2020.

2020

(In Millions)	Net PP&E
Balance September 30, 2019	**$ 6,008**
Capitalized acquisitions	861
Disposition	(127)
Revaluations	—
Depreciation expense	(547)
Balance at September 30, 2020	**$ 6,195**

Note 6: Stewardship PP&E

Federal agencies are required to classify and report heritage assets, multi-use heritage assets, and stewardship land in accordance with SFFAS No. 29, *Heritage Assets and Stewardship Land*. Stewardship PP&E have physical characteristics similar to those of G-PP&E, but differ from G-PP&E because their value is more intrinsic and not easily determinable in dollars. The only type of stewardship PP&E owned by NASA are heritage assets.

Heritage assets are PP&E that possess one or more of the following characteristics:

- Historical or natural significance;
- Cultural, educational, or artistic (e.g., aesthetic importance);
- Significant architectural characteristics.

There is no minimum dollar threshold for designating PP&E as a heritage asset, and depreciation expense is not taken on these assets. For these reasons, heritage assets (other than multi-use heritage assets) are reported in physical units, rather than with assigned dollar values. In accordance with SFFAS No. 29, the cost of acquisition, improvement, reconstruction, or renovation of heritage assets is expensed in the period incurred.

Assets that have a heritage function and are used in NASA's day-to-day operations are considered multi-use heritage assets. NASA's multi-use heritage assets consist of items such as launch pads, research labs, and wind tunnels still in operational use. Such assets that meet the capitalization criteria are accounted for as G-PP&E and depreciated over their estimated useful life in the same manner as other G-PP&E. Multi-use heritage assets are presented at the individual item level. As of September 30, 2020 and 2019, the total number of NASA's multi-use heritage assets was 520 and 482, respectively.

When a G-PP&E has no use in operations, but is designated as a heritage asset, its cost and accumulated depreciation are reclassified and removed from the G-PP&E asset accounts. Such assets remain on the record as heritage assets, except where there is legal authority for transfer or sale at which time they are removed from the heritage asset record. Heritage assets are withdrawn when they are disposed or reclassified as multi-use heritage assets. Heritage assets are generally in fair condition suitable for display.

SFFAS No. 29 provides agencies with considerations for defining individual physical heritage assets units as a collection, or a group of assets, where appropriate. NASA has reviewed and categorized its heritage assets into collection-type and non-collection-type assets. NASA's collection-type heritage assets include Air and Space Displays and Artifacts, and Art as described in the following paragraphs.

- Air and Space Displays and Artifacts collections are classified based on the physical custody of the asset. There are two collections: NASA-held and Contractor-held. Each collection is composed of assorted mementos of historic NASA events. Examples include items from previous missions that have historical significance to NASA and historic mission control artifacts that possess educational value and enhance the public's understanding of NASA's numerous programs.
- Art collections includes artwork inspired by the U.S. Aerospace program, as well as historical books, documents, and other library materials that document NASA's history. This collection is comprised of items created by artists who have contributed their time and talent to record their impressions of the history of the U.S. Aerospace Program through paintings, drawings, written form, and other media. These works of art not only provide a historic record of NASA projects, but they also support NASA's mission by giving the public a new and more comprehensive understanding of advancements in aerospace.

NASA's non-collection-type heritage assets include historic buildings, bunkers, towers, test stands, and properties that are listed or eligible to be listed on the National Register of Historic Places and National Historic Landmarks, and other resources.

- Non-collection-type heritage assets were established by locations for specific reasons and to pursue a variety of goals. Each is home to specific areas of expertise and support different elements of NASA's missions, taking on a unique identity. They provide the public with tangible examples of assets with historical significance or educational importance to NASA programs and missions at each location.

Total physical units, along with the additions and withdrawals for the fiscal year ended September 30, 2020 and 2019 for NASA's heritage assets are displayed in the table to the right:

Heritage Assets (In Physical Units)	2019	Additions	Withdrawals	2020
Collection-type				
Air and Space Displays and Artifacts	2	—	—	2
Art	1	—	—	1
Non-Collection type				
NASA Locations	9	—	—	9
Total Heritage Assets	**12**	**—**	**—**	**12**

Note 7: Other Assets

NASA's Other Assets consist of Advances and G-PP&E that NASA determined are no longer needed and are awaiting disposal, retirement, or removal from service. The Advances primarily represent the payments to an energy service company for the Energy Savings Performance Contract (ESPC) at Glenn Research Center. The G-PP&E Other Assets are recorded at estimated net realizable value. Other Assets at the end of the period totaled $6 million and $5 million as of September 30, 2020 and September 30, 2019, respectively.

(In Millions)	2020	2019
Non-Intragovernmental Assets		
Other Advances	$ 1	$ 2
G-PP&E - Removed from Service and Pending Disposal	5	3
Total Other Assets	**$ 6**	**$ 5**

Note 8: Liabilities Not Covered by Budgetary Resources

Liabilities not covered by budgetary resources include certain environmental matters (see Note 9, *Environmental and Disposal Liabilities* for more information), annual leave, workers' compensation under FECA, accounts payable related to cancelled appropriations, legal claims, energy savings performance contracts, and pensions and other retirement benefits.

The present value of the FECA actuarial liability estimate at year-end was calculated by the Department of Labor using a discount rate of 2.41 percent in FY 2020 and 2.61 percent in FY 2019. This liability includes the estimated future costs for claims incurred but not reported (IBNR) or approved as of the end of each year. NASA has recorded accounts payable related to canceled appropriations for which there are contractual commitments to pay. These payables will be funded from appropriations available for obligation at the time a bill is processed, in accordance with P.L. 101-510, National Defense Authorization Act.

(In Millions)	2020	2019
Intragovernmental Liabilities:		
Other Liabilities		
Workers' Compensation	$ 7	$ 8
Total Intragovernmental	7	8
Public Liabilities:		
Accounts Payable		
Accounts Payable for Cancelled Appropriations	68	62
Federal Employee Benefits		
Actuarial FECA Liability	30	39
Environmental and Disposal Liabilities	2,173	1,969
Less: Environmental and Disposal Liabilities - Funded	(138)	(125)
Other Liabilities		
Unfunded Annual Leave	284	249
Contingent Liabilities	—	2
Total Liabilities Not Covered by Budgetary Resources	**2,424**	**2,204**
Total Liabilities Covered by Budgetary Resources	**3,847**	**3,541**
Total Liabilities Not Requiring Budgetary Resources	**31**	**21**
Total Liabilities	**$ 6,302**	**$ 5,766**

Note 9: Environmental and Disposal Liabilities

In accordance with guidance issued by FASAB, if an agency is required by Federal, state, and local statutes and regulation to clean up hazardous waste resulting from Federal operations, the amount of cleanup cost, if estimable, must be reported and/or disclosed in the financial statements.

The statutes and regulations most applicable to NASA environmental response, clean-up, and monitoring liabilities include: the Comprehensive Environmental Response, Compensation and Liability Act; the Resource Conservation and Recovery Act; the Nuclear Waste Policy Act of 1982; and applicable state and local laws.

NASA assesses the likelihood of required cleanup as probable (more likely than not to occur), reasonably possible (more than remote but less than probable), or remote (slight chance of occurring). If the likelihood of required cleanup is probable and the cost can be reasonably estimated, a liability is recorded in the financial statements. If the likelihood of required cleanup is reasonably possible, the estimated cost of cleanup is disclosed in the notes to the financial statements. If the likelihood of required cleanup is remote, no liability or estimate is recorded or disclosed.

Environmental and Disposal Liabilities Represent Cleanup Costs Resulting From:

- Operations, including facilities obtained from other governmental entities, that have resulted in contamination from waste disposal methods, leaks and spills;
- Other past activity that created a public health or environmental risk, including identifiable costs associated with asbestos abatement; and,
- Total cleanup costs associated with the removal, containment, and/or disposal of hazardous wastes or material and/or property at permanent or temporary closure or shutdown of associated PP&E.

Environmental and disposal liabilities as of September 30, 2020 and 2019 were as follows:

(In Millions)	2020	2019
Environmental Liabilities		
Restoration Projects	$ 1,912	$ 1,730
Asbestos	179	161
End of Life Disposal of Property, Plant & Equipment	82	78
Total Environmental and Disposal Liabilities	**$ 2,173**	**$ 1,969**

Restoration Projects

NASA recorded a total estimated liability for known restoration projects of $1.912 billion in FY 2020. This was an increase of $182 million from $1.730 billion recorded in FY 2019. The increase in this liability is primarily due to the availability of new or updated information on the extent of contamination and refinements to the estimation methodology. The liability for each restoration project is estimated for a duration of no more than 30 years, except where required by state statutes, regulations, or an agreement.

In addition to the probable cleanup costs for known hazardous conditions recognized in the financial statements, there are other remediation sites where the likelihood of required cleanup for known hazardous conditions is reasonably possible. Remediation costs at certain sites classified as reasonably possible were estimated to be $13 million for FY 2020 and $5 million for FY 2019. The change in estimate is primarily due to the addition of a large-scale demolition project at Santa Susana Field Laboratory where clean-up was deemed reasonably possible.

With respect to environmental remediation that NASA considers probable or reasonably possible but not estimable, NASA concluded that either the likelihood of a NASA liability is less than probable but more than remote, but the regulatory drivers and/or technical data that exist are not reliable enough to calculate an estimate.

Continued on the next page →

Note 9: Environmental and Disposal Liabilities (continued)

Asbestos

NASA maintains numerous structures and facilities across each of its Centers that are known to contain asbestos. In accordance with FASAB Technical Bulletin 2006-1, *Recognition and Measurement of Asbestos Related Cleanup Costs*, NASA and other Federal entities are required to recognize a liability for probable asbestos cleanup costs. FASAB Technical Release 10, Implementation Guidance on Asbestos Cleanup Costs Associated with Facilities and Installed Equipment, allows for an extrapolation of asbestos cleanup cost estimates for similar properties to develop an Agency wide cleanup estimate. NASA uses actual costs incurred to clean up asbestos in NASA structures and facilities that were recently demolished or fully renovated to estimate the asbestos liability. Agency-wide asbestos cleanup cost factors were developed for both structures and facilities measured in square feet and for those not measured in square feet. These cost factors were then extrapolated across applicable NASA structures and facilities. The asbestos cleanup cost liability of $179 million in FY 2020 represents an increase of $18 million compared to the $161 million recorded in FY 2019.

End of Life Disposal of Property, Plant & Equipment

Consistent with SFFAS No. 5, *Accounting for Liabilities of the Federal Government* and with SFFAS No. 6, *Accounting for Property, Plant, and Equipment*, NASA estimates the anticipated environmental disposal cleanup costs for PP&E.

NASA recognizes and records in its financial statements an environmental cleanup liability for end-of-life disposal of PP&E that is probable and measurable.

NASA recorded a total estimated liability for the end-of-life disposal of PP&E of $82 million in FY 2020. This was an increase of $4 million over the $78 million recorded in FY 2019. This estimate includes both facilities with permits that require cleanup and an estimate for all remaining PP&E. As described in the following paragraphs, this estimate also considers end-of-life disposal costs for assets in space, including the ISS and satellites.

The current proposed decommissioning approach for the ISS is to execute a controlled targeted deorbit to a remote ocean location. This is consistent with the approach used to deorbit other space vehicles (e.g., Russia's Progress, Europe's Automated Transfer Vehicle (ATV) and Japan's H-II Transfer Vehicle (HTV)). The documented target reliability for this decommissioning approach is 99 percent. Prior to decommissioning the ISS, any hazardous materials on board the ISS would be removed or jettisoned. As a result, only residual quantities of hazardous, toxic, and radioactive materials would remain prior to the decommissioning.

Based on past experience with the re-entry of satellites, larger portions or fragments of the ISS would be expected to survive the thermal and aerodynamic stresses of re-entry. However, the historical disposal of satellites and vehicles into broad ocean areas with a controlled deorbit has left little evidence of their re-entry. Any remaining contamination in the ISS debris field would not be expected to have a substantive impact on marine life. Therefore, the probability of NASA incurring environmental cleanup costs related to the ISS is remote and no estimate for such costs has been developed or reported in these financial statements.

Note 10: Other Liabilities and Other Accrued Liabilities

Intragovernmental Other Liabilities primarily represent accrued cost estimates for goods and services performed by Federal trading partners, and Advances from Others relates to agreements for services between NASA and Federal trading partners for reimbursable services performed.

Other Liabilities with public entities primarily represents unfunded annual leave and funded sick leave that have been earned but not taken by NASA employees, and Advances from Others that primarily consists of payments received from non-Federal entities in advance of NASA's performance of services under reimbursable agreements.

Other Accrued Liabilities primarily consist of the accrual of contractor costs for goods and services performed. The period of performance for contractor contracts typically spans the duration of NASA programs, which could be for a number of years prior to final delivery of the product. In such cases, NASA records a cost accrual throughout the fiscal year as the work is performed. Other Accrued Liabilities also include the accrual of IBNR grant program costs incurred in support of NASA's research and development and other related activities.

	2020			2019		
(In Millions)	Current	Non-Current	Total	Current	Non-Current	Total
Intragovernmental Liabilities:						
Advances from Others	$ 61	$ —	$ 61	$ 87	$ —	$ 87
Workers' Compensation	6	1	7	7	1	8
Employer Contributions and Payroll Taxes	38	—	38	19	—	19
Liability for Non-Entity Assets	—	—	—	—	—	—
Total Other Liabilities	105	1	106	113	1	114
Other Accrued Liabilities	104	—	104	91	—	91
Total Intragovernmental	**209**	**1**	**210**	**204**	**1**	**205**
Unfunded Annual Leave	—	284	284	—	249	249
Accrued Funded Payroll	117	—	117	95	—	95
Advances from Others	121	—	121	138	—	138
Employer Contributions and Payroll Taxes	—	—	—	10	—	10
Liability for Deposit and Clearing Funds	31	—	31	21	—	21
Contingent Liabilities	—	—	—	—	2	2
Capital Lease Liabilities	—	—	—	—	—	—
Deferred Liabilities	13	—	13	—	—	—
Other Liabilities	57	—	57	58	—	58
Total Other Liabilities	339	284	623	322	251	573
Other Accrued Liabilities	1,892	—	1,892	1,681	—	1,681
Total Public	**2,231**	**284**	**2,515**	**2,003**	**251**	**2,254**
Total Other Liabilities/Other Accrued Liabilities	**$ 2,440**	**$ 285**	**$ 2,725**	**$ 2,207**	**$ 252**	**$ 2,459**

Note 11: Commitments and Contingencies

NASA is a party in various administrative proceedings, court actions (including tort suits), and claims. For cases in which management and legal counsel believe it is probable that the outcomes will result in a loss to NASA, contingent liabilities are recorded. There are certain cases where the likelihood of loss is deemed reasonably possible. A contingent liability is not required to be recorded for these cases; however, the estimated range of loss is disclosed below.

Additionally, there are cases reviewed by legal counsel where the likelihood of loss is deemed remote. A contingent liability is not required to be recorded or disclosed for these cases.

	Current FY 2020 Legal Contingencies			Prior FY 2019 Legal Contingencies		
		ESTIMATED RANGE OF LOSS			ESTIMATED RANGE OF LOSS	
(In Millions)	Accrued Liabilities	Lower End	Upper End	Accrued Liabilities	Lower End	Upper End
Legal Contingencies						
Probable	$ —	$ —	$ —	$ 2	$ 2	$ 2
Reasonably Possible		$ —	$ 8		$ —	$ 6

Note 12: Explanation of Differences Between the Statement of Budgetary Resources(SBR) and the Budget of the U.S. Government

The FY 2022 Budget of the United States Government (President's Budget), which presents the actual amounts for the year ended September 30, 2020, has not been published as of the issue date of these financial statements. Upon approval of the Administration, NASA will publish its FY 2022 President's Budget Request on the NASA Website at https://www.nasa.gov/news/budget.

NASA reconciled the amounts of the FY 2019 column on the SBR to the actual amounts for FY 2019 in the FY 2021 President's Budget for budgetary resources, obligations incurred, distributed offsetting receipts, and net outlays as presented below.

(In Millions)	Budgetary Resources	Obligations	Distributed Offsetting Receipts	Net Outlays
Combined Statement of Budgetary Resources	$ 26,354	$ 23,971	$ (3)	$ 20,182
Included on SBR, not in President's Budget				
Expired Accounts	(294)	(189)	—	—
Distributed Offsetting Receipts	—	—	3	—
Budget of the United States Government	**$ 26,060**	**$ 23,782**	**$ —**	**$ 20,182**

The difference between the SBR and the President's Budget represents expired accounts and distributed offsetting receipts reported on the SBR but not in the President's Budget.

Note 13: Undelivered Orders at the End of the Period

Undelivered Orders represent the amount of goods and/or services ordered to perform NASA's mission objectives, which have not been received. Undelivered Orders totaled $11 billion as of September 30, 2020.

(In Millions)	2020
Federal	
Unpaid	$ 705
Paid	185
Total	890
Non Federal	
Unpaid	10,139
Paid	(5)
Total	10,134
Total Undelivered Orders	**$ 11,024**

Note 14: Reconciliation of Net Cost of Operations to Net Outlays

Budgetary accounting is used for planning and control purposes and relates to both the receipt and use of cash, as well as reporting the Federal deficit. Financial accounting is intended to provide a picture of the Government's financial operations and financial position on an accrual basis. The accrual basis includes information about costs arising from the consumption of assets and the incurrence of liabilities. The reconciliation of net outlays is presented on a budgetary basis, and the net cost is presented on an accrual basis, which provides an explanation of the relationship between budgetary and financial accounting information. The reconciliation serves not only to identify costs in the past and those paid in the future, but also to assure integrity between budgetary and financial accounting. The analysis below illustrates this reconciliation by listing the key differences between net cost of operations and net outlays.

2020			
(In Millions)	**Intragovernmental**	**With the Public**	**Total**
Net Operating Cost (SNC)	**$ (267)**	**$22,398**	**$ 22,131**
Components of Net Operating Cost Not Part of the Budgetary Outlays			
Property, plant, and equipment depreciation	—	(547)	(547)
Property, plant, and equipment disposal & reevaluation	—	(105)	(105)
Other	—	764	764
Increase/(decrease) in assets not affecting Budgetary Outlays			
Accounts receivable	(29)	(1)	(30)
Other assets	40	(1)	39
(Increase)/decrease in liabilities not affecting Budgetary Outlays			
Accounts payable	(48)	(19)	(67)
Salaries and benefits	(19)	(11)	(30)
Environmental and disposal liabilities	—	(204)	(204)
Other liabilities (Unfunded leave, unfunded FECA, actuarial FECA)	(12)	(245)	(257)
Other financing sources			
Federal employee retirement benefit costs paid by OPM and imputed to agency	(149)	—	(149)
Total Components of Net Operating Cost Not Part of the Budgetary Outlays	(217)	(369)	(586)
Components of the Budgetary Outlays That Are Not Part of Net Operating Cost			
Other	(1)	(21)	(22)
Total Components of the Budgetary Outlays That Are Not Part of Net Operating Cost	(1)	(21)	(22)
Net Outlays (Calculated Total)	**$ (485)**	**$ 22,008**	**$ 21,523**
Related Amounts on the Statement of Budgetary Resources			
Outlays, net (SBR 4190)			$ 21,545
Distributed offsetting receipts (SBR 4200)			(22)
Agency Outlays, Net (SBR 4210)			**$ 21,523**

Continued on the next page →

Note 14: Reconciliation of Net Cost of Operations to Net Outlays (continued)

2019			
(In Millions)	Intragovernmental	With the Public	Total
Net Operating Cost (SNC)	**$ (422)**	**$ 21,232**	**$ 20,180**
Components of Net Operating Cost Not Part of the Budgetary Outlays			
Property, plant, and equipment depreciation	—	(575)	(575)
Property, plant, and equipment disposal & reevaluation	—	(76)	(76)
Other	—	573	573
Increase/(decrease) in assets not affecting Budgetary Outlays			
Accounts receivable	29	1	30
Other assets	21	—	21
(Increase)/decrease in liabilities not affecting Budgetary Outlays			
Accounts payable	(44)	55	11
Salaries and benefits	(1)	(12)	(13)
Environmental and disposal liabilities	—	(280)	(280)
Other liabilities (Unfunded leave, unfunded FECA, actuarial FECA)	(9)	(126)	(135)
Other financing sources			
Federal employee retirement benefit costs paid by OPM and imputed to agency	(183)	—	(183)
Total Components of Net Operating Cost Not Part of the Budgetary Outlays	(187)	(440)	(627)
Components of the Budgetary Outlays That Are Not Part of Net Operating Cost			
Other	—	(4)	(4)
Total Components of the Budgetary Outlays That Are Not Part of Net Operating Cost	—	(4)	(4)
Net Outlays (Calculated Total)	**$ (609)**	**$ 20,788**	**$ 20,179**
Related Amounts on the Statement of Budgetary Resources			
Outlays, net (SBR 4190)			$ 20,182
Distributed offsetting receipts (SBR 4200)			(3)
Agency Outlays, Net (SBR 4210)			**$ 20,179**

Note 15: Disclosure Entity

The Jet Propulsion Laboratory (JPL) is a NASA-owned facility which serves as a Federally Funded Research and Development Center (FFRDC). The facility commenced activities in the mid-1930s and at that time was sponsored by the U.S. Army to develop rocket technology and missile systems.

The California Institute of Technology (Caltech), a private, not-for-profit 501(c)(3) university, manages JPL pursuant to a sole-source, five-year, Federal Acquisition Regulation (FAR)-based contract with NASA. The value of NASA's Caltech contract for FY 2020 was $3 billion. Under this contract, NASA issues task orders to Caltech for various research programs and projects conducted at JPL. The contract is subject to the usual FAR-based Federal contract oversight and reporting requirements. Caltech has managed JPL as a NASA FFRDC since 1959.

Caltech and NASA's relationship at JPL is governed by the terms and conditions of their contract which does not give NASA responsibility for or insight into Caltech's business objectives or operations at JPL. JPL staff is comprised of Caltech employees and contractors, while NASA has a resident office at the facility staffed by Federal managers who administer the NASA/Caltech contract. The physical plant and equipment used to conduct operations under the contract are Government furnished property and material, made available to Caltech for the performance of its contract with NASA, and includes contractor-acquired property. The work performed by JPL for NASA is funded by NASA as part of one or more of NASA's major programs and supports NASA's missions and programs. Every year, JPL issues a review of its accomplishments. JPL's Annual Reports are found at https://www.jpl.nasa.gov/about/reports.php.

NASA has the unilateral authority to establish or amend the fundamental purpose and mission of activities at its JPL FFRDC. NASA's contract with Caltech reflects and incorporates NASA's authority into its terms and conditions. NASA also has the unilateral authority to orderly phase down and close its FFRDC and thus, the NASA contract with Caltech. As such, the contract terms allow NASA to close the FFRDC, transfer sponsorship of the FFRDC to another sponsor (Federal agency), transition the FFRDC to another contractor (e.g., another University), or renew the contract. In the event of a termination of its contract with Caltech for the management of JPL, JPL would only receive costs that NASA deems allowable, allocable, and reasonable under the contract's terms.

Note 16: Reclassification of Balance Sheet, Statement of Net Cost, and Statement of Changes in Net Position for FR Compilation Process

To prepare the Financial Report of the U.S. Government (FR), the Department of the Treasury requires agencies to submit an adjusted trial balance, which is a listing of amounts by U.S. Standard General Ledger account that appear in the financial statements. Treasury uses the trial balance information reported in the Governmentwide Treasury Account Symbol Adjusted Trial Balance System (GTAS) to develop a Reclassified Balance Sheet, Reclassified Statement of Net Cost, and a Reclassified Statement of Changes in Net Position for each agency, which are accessed using GTAS. Treasury eliminates all intragovernmental balances from the reclassified statements and aggregates lines with the same title to develop the FR statements. This note shows the Agency's financial statements and the Agency's reclassified statements prior to elimination of intragovernmental balances and prior to aggregation of repeated FR line items. A copy of the 2019 FR can be found here: https://www.fiscal.treasury.gov/reports-statements/ and a copy of the 2020 FR will be posted to this site as soon as it is released.

The term "intragovernmental" is used in this note to refer to amounts that result from other components of the Federal Government.

The term "non-Federal" is used in this note to refer to Federal Government amounts that result from transactions with non-Federal entities. These include transactions with individuals, businesses, non-profit entities, and State, local, and foreign governments. The Agency does not have funds from dedicated collections.

FY 2020 NASA Balance Sheet		Line Items Used to Prepare FY 2020 Government-wide Balance Sheet	
Financial Statement Line	**Amounts**	**Amounts**	**Reclassified Financial Statement Line**
ASSETS			**ASSETS**
Intragovernmental Assets			**Intragovernmental Assets**
Fund Balance with Treasury	14,914	14,914	Fund Balance with Treasury
Investments	16	16	Federal Investments
Accounts Receivable, Net	110	110	Accounts Receivable, Net
Total Intragovernmental Assets	**15,040**	**15,040**	**Total Intragovernmental Assets**
General PP&E, Net	6,195	6,195	General PP&E, Net
Other Assets	6	6	Other
Total Assets	**21,241**	**21,241**	**Total Assets**
LIABILITIES			**LIABILITIES**
Intragovernmental Liabilities			**Intragovernmental Liabilities**
Accounts Payable	83	186	Accounts Payable
Other Liabilities	103		
Other Liabilities	107	33	Benefit Program Contributions Payable
		61	Advances from Others & Deferred Credits
		13	Other Liabilities (without reciprocals)
Total Intragovernmental Liabilities	**293**	**293**	**Total Intragovernmental Liabilities**
Accounts Payable	1,291	1,291	Accounts Payable
Federal Employee and Veteran Benefits	30	314	Federal Employee and Veteran Benefits Payable
Other Liabilities	284		
Environmental and Disposal Liabilities	2,173	2,173	Environmental and Disposal Liabilities
Other Accrued Liabilities	339	2,231	Other
Other Liabilities	1,892		
Total Liabilities	**6,302**	**6,302**	**Total Liabilities**
NET POSITION			**NET POSITION**
Unexpended Appropriations	11,230	11,230	Unexpended Appropriations - All Other Funds
Cumulative Results of Operations	3,709	3,709	Cumulative Results of Operations - All Other Funds
Total Net Position	**14,939**	**14,939**	**Total Net Position**
Total Liabilities & Net Position	**21,241**	**21,241**	**Total Liabilities & Net Position**

Continued on the next page →

Note 16: Reclassification of Balance Sheet, Statement of Net Cost, and Statement of Changes in Net Position for FR Compilation Process (continued)

FY 2020 NASA Statement of Net Cost		Line Items Used to Prepare FY 2020 Government-wide Statement of Net Cost	
Financial Statement Line	**Amounts**	**Amounts**	**Reclassified Financial Statement Line**
Gross Costs	23,907		Non-Federal Costs
		22,628	Non-Federal Gross Cost
		22,628	**Total Non-Federal Costs**
			Intragovernmental Costs
		516	Benefit Program Costs
		149	Imputed Costs
		554	Buy/Sell Costs
		60	Other Expenses (w/o Reciprocals)
		1,279	**Total Intragovernmental Costs**
Total Gross Costs	23,907	23,907	*Total Reclassified Gross Costs*
Earned Revenue	1,776		**Non-Federal Earned Revenue**
		230	Non-Federal Earned Revenue
		230	**Total Non-Federal Earned Revenue**
			Intragovernmental Earned Revenue
		1,546	Buy/Sell Revenue
		1,546	**Total Intragovernemental Earned Revenue**
Total Earned Revenue	1,776	1,776	*Total Reclassified Earned Revenue*
Net Cost	**22,131**	**21,131**	**Net Cost**

Continued on the next page →

Note 16: Reclassification of Balance Sheet, Statement of Net Cost, and Statement of Changes in Net Position for FR Compilation Process (continued)

FY 2020 NASA Statement of Changes in Net Position		Line Items Used to Prepare FY 2020 Government-wide Statement of Changes in Net Position	
Financial Statement Line	**Amounts**	**Amounts**	**Reclassified Financial Statement Line**
UNEXPENDED APPROPRIATIONS			
Beginning Balance	10,542	10,542	Net Position, Beginning of Period
BUDGETARY FINANCING SOURCES			
Appropriations Received	22,689	22,599	Appropriations Received as Adjusted
Other Adjustments	(90)		
Appropriations Used	(21,911)	(21,911)	Appropriations Used (Federal)
Total Budgetary Financing Sources	688	688	
Total Unexpended Appropriations	**11,230**	**11,230**	
CUMULATIVE RESULTS OF OPERATIONS			
Beginning Balance	3,708	3,708	Net Position, Beginning of Period
BUDGETARY FINANCING SOURCES			
Appropriations Used	21,911	21,911	Appropriations Expended
Non-Exchange Revenue	22	93	Other Taxes and Receipts
OTHER FINANCING SOURCES			
Donations and Forfeitures of Property	71		
Imputed Financing	149	149	Imputed Financing Sources (Federal)
Other	(21)	(21)	Non-Entity Collections Transferred to the General Fund of the U.S. Government
Total Other Financing Sources	**22,132**	**22,132**	
Net Cost of Operations	**(22,131)**	**(22,131)**	
Net Change	**1**	**1**	
Cumulative Results of Operations	**3,709**	**3,709**	**Net Position - Ending Balance**
Net Position	**14,939**	**14,939**	**Total Net Position**

Note 17: COVID-19 Activity

NASA received $60 million in CARES Act funding (Public Law 116-136) for Safety, Security and Mission Services. This funding was used for the prevention, preparation for, and response to coronavirus, domestically or internationally. The amount received is not significant to NASA's total budgetary resources as stated on the FY 2020 financial statements. See Financial and Performance Impact of COVID-19 on page 38 for additional information.

Required Supplementary Information

Combining Statement of Budgetary Resources
For the Fiscal Year Ended September 30, 2020

(In Millions)	Space Operations Mission	Science Mission	Exploration Mission	Aeronautics Mission	Safety, Security and Mission Services	STEM Engagement Mission
Budgetary Resources:						
Unobligated Balance from Prior Year Budget Authority, Net	$ 395	$ 859	$ 247	$ 36	$836	$13
Appropriations	4,135	7,073	5,960	784	2,973	120
Spending Authority from Offsetting Collections	—	—	—	—	1,697	—
Total Budgetary Resources	**$ 4,530**	**$ 7,932**	**$ 6,207**	**$ 820**	**$ 5,506**	**$ 133**
Status of Budgetary Resources:						
New Obligations and Upward Adjustments (Total)	$ 4,361	$ 7,277	$ 5,999	$ 788	$4,561	$ 121
Unobligated Balance, End of Year:						
Apportioned, Unexpired Accounts	111	640	188	30	929	9
Unapportioned, Unexpired Accounts	1	—	9	—	12	—
Unexpired Unobligated Balance, End of Year	112	640	197	30	941	9
Expired Unobligated Balance, End of Year	57	15	11	2	4	3
Unobligated Balance, End of Year (Total)	169	655	208	32	945	12
Total Status of Budgetary Resources	**$ 4,530**	**$ 7,932**	**$ 6,207**	**$ 820**	**$ 5,506**	**$ 133**
Outlays, Net:						
Outlays, Net (Total)	$ 4,364	$ 6,743	$ 5,382	$ 826	$ 2,737	$ 106
Distributed Offsetting Receipts (-)	—	—	—	—	—	—
Agency Outlays, Net	**$ 4,364**	**$ 6,743**	**$ 5,382**	**$ 826**	**$2,737**	**$106**

(Continued)

(In Millions)	Office of Inspector General	Science Technology Mission	Construction and Environmental Compliance and Restoration	Other	Total
Budgetary Resources:					
Unobligated Balance from Prior Year Budget Authority, Net	$ 3	$ 80	$ 340	$ 45	$ 2,854
Appropriations	42	1,100	432	1	22,620
Spending Authority from Offsetting Collections	1	—	21	518	2,237
Total Budgetary Resources	**$ 46**	**$ 1,180**	**$ 793**	**$564**	**$27,711**
Status of Budgetary Resources:					
New Obligations and Upward Adjustments (Total)	$ 44	$ 1,091	$ 502	$ 527	$25,271
Unobligated Balance, End of Year:					
Apportioned, Unexpired Accounts	—	82	270	27	2,286
Unapportioned, Unexpired Accounts	—	—	18	—	40
Unexpired Unobligated Balance, End of Year	—	82	288	27	2,326
Expired Unobligated Balance, End of Year	2	7	3	10	114
Unobligated Balance, End of Year (Total)	2	89	291	37	2,440
Total Status of Budgetary Resources	**$ 46**	**$ 1,180**	**$ 793**	**$ 564**	**$ 27,711**
Outlays, Net:					
Outlays, Net (Total)	$ 40	$ 973	$ 397	$ (23)	$21,545
Distributed Offsetting Receipts (-)	—	—	—	(22)	(22)
Agency Outlays, Net	**$ 40**	**$ 973**	**$ 397**	**(45)**	**$ 21,523**

Required Supplementary Information (continued)

Combining Statement of Budgetary Resources
For the Fiscal Year Ended September 30, 2019

(In Millions)	Space Operations Mission	Science Mission	Exploration Mission	Aeronautics Mission	Safety, Security and Mission Services	STEM Engagement Mission
Budgetary Resources:						
Unobligated Balance from Prior Year Budget Authority, Net	$ 305	$ 554	$ 478	$ 33	$641	$13
Appropriations	4,640	6,887	5,045	725	2,755	110
Spending Authority from Offsetting Collections	—	—	—	—	1,819	—
Total Budgetary Resources	**$ 4,945**	**$ 7,441**	**$ 5,523**	**$ 758**	**$ 5,215**	**$ 123**
Status of Budgetary Resources:						
New Obligations and Upward Adjustments (Total)	$ 4,792	$ 6,684	$ 5,316	$ 729	$ 4,430	$ 110
Unobligated Balance, End of Year:						
Apportioned, Unexpired Accounts	99	744	198	27	780	9
Unapportioned, Unexpired Accounts	—	—	—	—	1	—
Unexpired Unobligated Balance, End of Year	99	744	198	27	781	9
Expired Unobligated Balance, End of Year	54	13	9	2	4	4
Unobligated Balance, End of Year (Total)	153	757	207	29	785	13
Total Status of Budgetary Resources	**$ 4,945**	**$ 7,441**	**$ 5,523**	**$ 758**	**$ 5,215**	**$ 123**
Outlays, Net:						
Outlays, Net (Total)	$ 4,497	$ 6,247	$ 4,521	$ 710	$ 2,833	$107
Distributed Offsetting Receipts (-)	—	—	—	—	—	—
Agency Outlays, Net	**$ 4,497**	**$ 6,247**	**$ 4,521**	**$ 710**	**$2,833**	**$107**

(Continued)

(In Millions)	Office of Inspector General	Science Technology Mission	Construction and Environmental Compliance and Restoration	Other	Total
Budgetary Resources:					
Unobligated Balance from Prior Year Budget Authority, Net	$ 3	$ 55	$ 406	$ 28	$ 2,516
Appropriations	39	927	372	1	21,501
Spending Authority from Offsetting Collections	1	—	21	496	2,337
Total Budgetary Resources	**$ 43**	**$ 982**	**$ 799**	**$525**	**$26,354**
Status of Budgetary Resources:					
New Obligations and Upward Adjustments (Total)	$ 41	$ 908	$ 478	$ 483	$23,971
Unobligated Balance, End of Year:					
Apportioned, Unexpired Accounts	1	60	320	32	2,270
Unapportioned, Unexpired Accounts	—	7	—	—	8
Unexpired Unobligated Balance, End of Year	1	67	320	32	2,278
Expired Unobligated Balance, End of Year	1	7	1	10	105
Unobligated Balance, End of Year (Total)	2	74	321	42	2,383
Total Status of Budgetary Resources	**$ 43**	**$ 982**	**$ 799**	**$ 525**	**$ 26,354**
Outlays, Net:					
Outlays, Net (Total)	$ 38	$ 811	$ 453	$ (35)	$20,182
Distributed Offsetting Receipts (-)	—	—	—	(3)	(3)
Agency Outlays, Net	**$ 38**	**$ 811**	**$ 453**	**$ (38)**	**$ 20,179**

Required Supplementary Information (continued)

Deferred Maintenance and Repairs for FY 2020

Federal agencies are required to report information related to the estimated cost to remedy deferred maintenance of property, plant and equipment as required supplementary information in accordance with SFFAS No. 42, *Deferred Maintenance and Repairs*.

Maintenance and repairs (M&R) are activities directed toward keeping fixed assets in an acceptable condition. Activities include preventive maintenance; replacement of parts, systems, or components; and other activities needed to preserve or maintain the asset. M&R, as distinguished from capital improvements, excludes activities directed toward expanding the capacity of an asset or otherwise upgrading it to serve needs different from, or significantly greater than, its current use. Deferred maintenance and repairs (DM&R) are M&R activities that were not performed when they should have been or were scheduled to be and which, therefore, are put off or delayed for a future period. DM&R reporting enables NASA to be accountable to citizens for the proper administration and stewardship of its assets. Specifically, DM&R reporting assists users by providing an entity's realistic estimate of DM&R amounts and the effectiveness of asset maintenance practices the entities employ in fulfilling their missions.

Facilities, Buildings, and Other Structures

It is NASA's policy to ensure that NASA-owned and operated assets are properly aligned with the NASA mission and are safe, environmentally sound, affordable, the right type and size, and in acceptable operating condition. NASA's facilities are maintained in the most cost effective fashion to minimize risk to processes and products, protect the safety and health of personnel and the environment, protect and preserve capabilities and capital investments, provide quality work places for NASA employees, and enable the Agency's mission. Estimates reported herein include DM&R for all facilities on-site or off-site that are owned, leased, occupied, or used by NASA (NASA Programs or Contractors) including heritage assets without regard to capitalization thresholds or depreciation status. NASA does not assess DM&R on general land parcels.

Equipment

Pursuant to the cost/benefit considerations provided in SFFAS No. 6 and SFFAS No. 42, NASA has determined that it is not cost beneficial to report DM&R on personal property (capital equipment).

Defining and Implementing M&R Policies

NASA uses a Deferred Maintenance parametric estimating method (DM method) in order to conduct a consistent condition assessment of its facilities, buildings and other structures (including heritage assets). This method measures NASA's current real property asset condition and documents the extent of real property deterioration. The DM method produces both a cost estimate of DM&R, and a Facility Condition Index (FCI). Both measures are indicators of the overall condition of NASA's facilities. The facilities condition assessment methodology involves an independent, rapid visual assessment of nine different systems within each facility to include: structure, roof, exterior, interior finishes, heating, ventilating and air conditioning (HVAC) systems, electrical, plumbing, conveyance, and program support equipment (PSE). The DM method is designed for application to a large population of facilities; results are not necessarily applicable for individual facilities or small populations of facilities.

Ranking and Prioritizing M&R Activities

NASA typically prioritizes the M&R activities for health, safety, life safety, fire detection and protection, and environmental requirements. NASA also prioritizes the M&R projects with an emphasis on mission critical facilities, followed by mission support, then Center support. The evaluation of the facility conditions by building type indicates that NASA continues to focus M&R activities on direct mission-related facilities and infrastructure.

Factors Considered in Determining Acceptable Condition Standards

NASA applies industry accepted codes and standards or equipment manufacturer's recommendations to all facilities related work. The standard of condition depends on the intended use, the mission criticality, utilization or health and safety aspects of that use.

Required Supplementary Information (continued)

Deferred Maintenance and Repairs for FY 2020

Changes from Prior Year

As of September 30, 2020, $2.663 billion of DM&R was estimated to be required to return real property assets to an acceptable operating condition. This is an overall increase of $13 million from $2.650 billion as of September 30, 2019. The increase in the DM&R estimate can be attributed to various reasons; including changes to deterioration of facilities due to natural disasters, damage from testing to PSE in high-value assets (HVA), normal inflation increases in Current Replacement Value (CRV) of assets and high value infrastructure assets as upgrades progress, and demolition of assets and the reduction of their DM&R.

NASA performs DM assessment on Real Property Assets in a two-year cycle. In FY 2019, the DM assessment was performed on half of NASA's Real Property Assets and in FY 2020, the remaining assets were assessed. Due to the impacts of COVID-19 in FY 2020, an in-person assessment was performed at two NASA Centers and the remaining four Centers were assessed virtually.

(In Millions)	2020	2019
Asset Category		
General PP&E - Real Property	$ 2,609	$ 2,602
Heritage Assets - Real Property	54	48
Total Deferred Maintenance and Repairs	**$ 2,663**	**$ 2,650**

NASA OFFICE OF INSPECTOR GENERAL

OFFICE OF AUDITS

SUITE 8U71, 300 E ST SW
WASHINGTON, D.C. 20546-0001

November 16, 2020

TO: James F. Bridenstine
Administrator

Stephen Shinn
Acting Chief Financial Officer

SUBJECT: *Audit of NASA's Fiscal Year 2020 Financial Statements* (Report No. IG-21-005; Assignment No. A-20-007-00)

The Office of Inspector General contracted with the independent public accounting firm CliftonLarsonAllen LLP (CLA) to audit NASA's fiscal year (FY) 2020 financial statements. CLA performed the audit in accordance with the Government Accountability Office's (GAO) *Government Auditing Standards* and the Office of Management and Budget's Bulletin No. 19-03, *Audit Requirements for Federal Financial Statements*.

This audit resulted in a "clean" or unmodified opinion on NASA's FY 2020 financial statements (see attached enclosure). An unmodified opinion means the financial statements present fairly, in all material respects, the financial position and results of NASA's operations in conformity with U.S. generally accepted accounting principles.

CLA also reported on NASA's internal control over financial reporting and compliance with laws and regulations. For FY 2020, CLA identified one significant deficiency related to information technology management and did not report any instances of noncompliance.

In our oversight of the contract, we reviewed CLA's report and related documentation and inquired of its representatives. Our review, as differentiated from an audit of the financial statements in accordance with GAO's *Government Auditing Standards*, was not intended to enable us to express, and we do not express, an opinion on NASA's financial statements, conclusions about the effectiveness of internal control over financial reporting, or conclusions on compliance with certain laws and regulations, including but not limited to the Federal Financial Management Improvement Act of 1996. Rather, CLA is responsible for the enclosed auditor's report dated November 16, 2020, and the conclusions expressed therein. However, our review disclosed no instances where CLA did not comply, in all material respects, with GAO's *Government Auditing Standards*.

We appreciate the courtesies extended to our team during the audit. Please contact Kimberly F. Benoit, Assistant Inspector General for Audits, at 202-358-0378 or kimberly.f.benoit@nasa.gov if you have any questions about the enclosed report.

Paul K. Martin
Inspector General

Enclosure – 1

CliftonLarsonAllen LLP
CLAconnect.com

Independent Auditors' Report

Administrator
National Aeronautics and Space Administration

Inspector General
National Aeronautics and Space Administration

In our audits of the fiscal years 2020 and 2019 financial statements of the National Aeronautics and Space Administration (NASA), we found:

- NASA's financial statements as of and for the fiscal years ended September 30, 2020, and 2019, are presented fairly, in all material respects, in accordance with United States of America (U.S.) generally accepted accounting principles;
- no material weaknesses and one significant deficiency for fiscal year 2020 in internal control over financial reporting based on the limited procedures we performed; and
- no reportable noncompliance for fiscal year 2020 with provisions of applicable laws, regulations, contracts, and grant agreements we tested and other matters.

The following sections discuss in more detail (1) our report on the financial statements, which includes required supplementary information (RSI)[1] and other information[2] included with the financial statements; (2) our report on internal control over financial reporting; (3) our report on compliance with laws, regulations, contracts, and grant agreements and other matters; and (4) NASA's response to our findings and recommendations.

Report on the Financial Statements

We have audited NASA's financial statements in accordance with U.S. generally accepted auditing standards; the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States; and Office of Management and Budget (OMB) Bulletin No. 19-03, *Audit Requirements for Federal Financial Statements* (OMB Bulletin 19-03). NASA's financial statements comprise the balance sheets as of September 30, 2020, and 2019; the related statements of net cost, changes in net position, and budgetary resources for the fiscal years then ended; and the related notes to the financial statements.

We believe that the audit evidence we obtained is sufficient and appropriate to provide a basis for our audit opinions.

[1] The RSI consists of Management's Discussion and Analysis, the Combining Statement of Budgetary Resources, and Deferred Maintenance and Repairs, which are included with the financial statements.
[2] Other information consists of information included with the financial statements, other than the RSI and the auditors' report.

Independent Auditors' Report (Continued)

Management's Responsibility

NASA management is responsible for (1) the preparation and fair presentation of these financial statements in accordance with U.S. generally accepted accounting principles; (2) preparing, measuring, and presenting the RSI in accordance with U.S. generally accepted accounting principles; (3) preparing and presenting other information included in documents containing the audited financial statements and auditors' report, and ensuring the consistency of that information with the audited financial statements and the RSI; and (4) maintaining effective internal control over financial reporting, including the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audits. *Government Auditing Standards* require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free from material misstatement. We are also responsible for applying certain limited procedures to RSI and other information included with the financial statements.

An audit of financial statements involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the auditors' assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditors consider internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit of financial statements also involves evaluating the appropriateness of the accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements. Our audits also included performing such other procedures as we considered necessary in the circumstances.

Opinion on Financial Statements

In our opinion, NASA's financial statements present fairly, in all material respects, NASA's financial position as of September 30, 2020, and 2019, and its net cost of operations, changes in net position, and budgetary resources for the fiscal years then ended in accordance with U.S. generally accepted accounting principles.

Other Matters

Required Supplementary Information

U.S. generally accepted accounting principles issued by the Federal Accounting Standards Advisory Board (FASAB) require that the RSI be presented to supplement the financial statements. Although the RSI is not a part of the financial statements, FASAB considers this information to be an essential part of financial reporting for placing the financial statements in appropriate operational, economic, or historical context. We have applied certain limited procedures to the RSI in accordance with *Government Auditing Standards*, which consisted of inquiries of management about the methods of preparing the RSI and comparing the information for consistency with management's responses to the auditors' inquiries, the financial statements, and other knowledge we obtained during the audits of the financial statements, in order to report omissions or material departures from FASAB guidelines, if any, identified by these limited procedures. We did not audit

Independent Auditors' Report (Continued)

and we do not express an opinion or provide any assurance on the RSI because the limited procedures we applied do not provide sufficient evidence to express an opinion or provide any assurance.

Other Information
NASA's other information contains a wide range of information, some of which is not directly related to the financial statements. This information is presented for purposes of additional analysis and is not a required part of the financial statements or the RSI. In addition, management has included references to information on websites or other data outside of the Agency Financial Report. We read the other information included with the financial statements in order to identify material inconsistencies, if any, with the audited financial statements. Our audits were conducted for the purpose of forming an opinion on NASA's financial statements. We did not audit and do not express an opinion or provide any assurance on the other information.

Report on Internal Control over Financial Reporting

In connection with our audits of NASA's financial statements, we considered NASA's internal control over financial reporting, consistent with our auditors' responsibility discussed below. We performed our procedures related to NASA's internal control over financial reporting in accordance with *Government Auditing Standards*.

Management's Responsibility
NASA management is responsible for maintaining effective internal control over financial reporting, including the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility
In planning and performing our audit of NASA's financial statements as of and for the year ended September 30, 2020, in accordance with *Government Auditing Standards*, we considered NASA's internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances for the purpose of expressing our opinion on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the NASA's internal control over financial reporting. Accordingly, we do not express an opinion on the NASA's internal control over financial reporting. We are required to report all deficiencies that are considered to be material weaknesses or significant deficiencies. We did not consider or evaluate all internal controls relevant to operating objectives, such as those controls relevant to preparing performance information and ensuring efficient operations.

Definition and Inherent Limitations of Internal Control over Financial Reporting
An entity's internal control over financial reporting is a process effected by those charged with governance, management, and other personnel, the objectives of which are to provide reasonable assurance that (1) transactions are properly recorded, processed, and summarized to permit the preparation of financial statements in accordance with U.S. generally accepted accounting principles, and assets are safeguarded against loss from unauthorized acquisition, use, or disposition, and (2) transactions are executed in accordance with provisions of applicable laws, including those governing the use of budget authority, regulations, contracts, and grant agreements, noncompliance with which could have a material effect on the financial statements.

Independent Auditors' Report (Continued)

Because of its inherent limitations, internal control over financial reporting may not prevent, or detect and correct, misstatements due to fraud or error.

Results of Our Consideration of Internal Control over Financial Reporting

Our consideration of internal control was for the limited purpose described above, and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies or to express an opinion on the effectiveness of NASA's internal control over financial reporting. Given these limitations, material weaknesses or significant deficiencies may exist that have not been identified. During our audit, we did not identify any deficiencies in internal control over financial reporting that we consider to be material weaknesses. However, we did identify a certain deficiency in internal control over financial reporting that we consider to be a significant deficiency. This deficiency is listed below and described in Exhibit A.

- *Information Technology Management*

A *deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected, on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control over financial reporting that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

During our 2020 audit, we identified deficiencies in NASA's internal control over financial reporting that we do not consider to be material weaknesses or significant deficiencies. Nonetheless, these deficiencies warrant NASA management's attention. We have communicated these matters to NASA management and, where appropriate, will report on them separately.

Intended Purpose of Report on Internal Control over Financial Reporting

The purpose of this report is solely to describe the scope of our consideration of NASA's internal control over financial reporting and the results of our procedures, and not to provide an opinion on the effectiveness of NASA's internal control over financial reporting. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering internal control over financial reporting. Accordingly, this report on internal control over financial reporting is not suitable for any other purpose.

Report on Compliance with Laws, Regulations, Contracts, and Grant Agreements and Other Matters

In connection with our audits of NASA's financial statements, we tested compliance with selected provisions of applicable laws, regulations, contracts, and grant agreements consistent with our auditors' responsibility discussed below. We caution that noncompliance may occur and not be detected by these tests. We performed our tests of compliance in accordance with *Government Auditing Standards*.

We also performed tests of compliance with certain provisions of the Federal Financial Management Improvement Act (FFMIA). However, providing an opinion on compliance with FFMIA was not an objective of our audit, and accordingly, we do not express such an opinion.

Independent Auditors' Report (Continued)

Management's Responsibility
NASA management is responsible for complying with laws, regulations, contracts, and grant agreements applicable to NASA, including ensuring NASA's financial management systems are in substantial compliance with FFMIA requirements.

Auditors' Responsibility
Our responsibility is to test compliance with selected provisions of applicable laws, regulations, contracts, and grant agreements applicable to NASA that have a direct effect on the determination of material amounts and disclosures in NASA's financial statements, including whether NASA's financial management systems substantially comply with the FFMIA Section 803(a) requirements, and perform certain other limited procedures. Accordingly, we did not test compliance with all laws, regulations, contracts, and grant agreements applicable to NASA. Also, our work on FFMIA would not necessarily disclose all instances of noncompliance with FFMIA requirements.

Results of Our Tests for Compliance with Laws, Regulations, Contracts, and Grant Agreements and Other Matters
Our tests for compliance with selected provisions of applicable laws, regulations, contracts, and grant agreements disclosed no instances of noncompliance or other matters for fiscal year 2020 that would be reportable under *Government Auditing Standards*. In addition, our tests of compliance with the FFMIA Section 803(a) requirements disclosed no instances in which NASA's financial management systems did not substantially comply with (1) federal financial management systems requirements, (2) applicable federal accounting standards, or (3) the U.S. Government Standard General Ledger (USSGL) at the transaction level. However, the objective of our tests was not to provide an opinion on compliance with laws, regulations, contracts, and grant agreements applicable to NASA. Accordingly, we do not express such an opinion.

Intended Purpose of Report on Compliance with Laws, Regulations, Contracts, and Grant Agreements and Other Matters
The purpose of this report is solely to describe the scope of our testing of compliance with selected provisions of applicable laws, regulations, contracts, and grant agreements, and the results of that testing, and not to provide an opinion on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering compliance. Accordingly, this report on compliance with laws, regulations, contracts, and grant agreements and other matters is not suitable for any other purpose.

NASA's Response to Audit Findings and Recommendations

NASA's response to the findings and recommendation identified in our report is presented in Exhibit B. NASA's response was not subjected to the auditing procedures applied in the audits of the financial statements and, accordingly, we express no opinion on it.

Independent Auditors' Report (Continued)

Status of Prior Year's Significant Deficiency

We have reviewed the status of NASA's corrective actions with respect to the findings and recommendations included in the prior year's Independent Auditors' Report, dated November 15, 2019. The status of prior year findings is presented in Exhibit C.

CliftonLarsonAllen LLP

Greenbelt, Maryland
November 16, 2020

Independent Auditors' Report (Continued)
Exhibit A
Significant Deficiency

Information Technology Management

Background

The United States Government Accountability Office (GAO) has stated that protecting government computer systems has never been more important because of the complexity and interconnectivity of systems (including those exposed to the Internet and wireless connections), the ease of obtaining and using hacking tools, the steady advances in the sophistication and effectiveness of attack technologies, and the emergence of new and more destructive attacks. Further, the boundary lines between internal and external networks are diminishing as a result of increased interconnectivity. GAO cited challenges, such as maintaining software at current versions with the latest security patches to protect against known vulnerabilities, as contributing factors to weaknesses within Federal agency security programs.

To address these issues throughout the government, the Office of Management and Budget (OMB) revised OMB Circular No. A-130, Managing Federal Information as a Strategic Resource (OMB Circular A-130) in July 2016. This circular defines agencies' responsibilities for protecting Federal information resources. NASA relies extensively on information technology (IT) system controls to govern the initiation and authorization of financial transactions at user workstations, and the transmission of those transactions across the network to servers that record, process, summarize, and report financial transactions in support of the financial statements. Internal controls over these financial and supporting operations are essential to ensure the confidentiality, integrity, and availability (C-I-A) of critical data while reducing the risk of error, fraud, and other illegal acts.

IT controls include general controls (at the network, system, and application layers), as well as application business process controls. General controls are the policies and procedures that apply to all or a large segment of an entity's information systems and help ensure their proper operation. The effectiveness of general controls is a significant factor in establishing the effectiveness of business process application controls. Application level general controls consist of general controls operating at the business process application level, including those related to security management, access controls, configuration management, segregation of duties, and contingency planning. Weaknesses in application level general controls can result in unauthorized access, use, disclosure, disruption, modification, or destruction of applications and application data. Without effective general application controls, business process application controls may be rendered ineffective by circumvention or modification.

One of the key general control areas includes configuration management controls. These controls are intended to provide reasonable assurance that systems, networks, and applications are configured and operating securely. Vulnerability management, an important component of configuration management, specifically addresses mitigating the risks associated with known vulnerabilities.

Conditions

Over the last six years, we have noted that NASA did not have an effective vulnerability management program related to the monitoring, detection, and remediation of known system vulnerabilities. Though NASA has made some progress toward remediation of certain configuration management and information security controls, deficiencies continue to persist in the following areas: A) Missing Software Patches, B) Configuration Weaknesses, and C) Unsupported Software. Specifically, a significant percentage of outstanding vulnerabilities identified by NASA were outside of the agency's timelines for remediation. The vulnerability totals

Independent Auditors' Report (Continued)
Exhibit A
Significant Deficiency

and the timeliness of remediation revealed an inconsistent and a lack of sustainable vulnerability remediation efforts typical of a mature and comprehensive vulnerability management program. In addition, since 2015, we noted unremediated control deficiencies at the financial system application layer related to segregation of duties (SoD). Further, since 2016, we have also noted unremediated control deficiencies at the financial system application layer related to user administration and least privilege and audit logging and monitoring.

To address the prior year issues, management developed short-term and long-term corrective action plans to remediate the weaknesses. The plans included creating new and enhancing existing processes, acquiring and leveraging audit logging tools, and migrating to a new risk management application. Furthermore, NASA has made progress in terms of either reducing risk for certain repeat findings or remediating certain prior year findings relating to its vulnerability management program and IT general controls.

While management has made progress in specific areas, it will take time to effectively implement and execute all their corrective action plans across the enterprise to comprehensively address their IT weaknesses. As such, we found security weaknesses similar in type and risk level to our prior year findings.

In recent years, NASA remediated several prior year findings related to specific vulnerabilities and has incorporated a program aimed at reducing vulnerability totals and meeting vulnerability remediation timelines. However, NASA's vulnerability management program has not matured to the extent that vulnerabilities associated with the financial application and general support systems are remediated consistently and timely in accordance with NASA-established risk prioritization and security policies and procedures. These weaknesses expose NASA to significant risk of exploitation and manipulation of financial information and privileges. Below are the categories of control deficiencies related to NASA's vulnerability management program:

1. **Missing Software Patches:** Systems, applications, and networks supporting financial applications were not patched timely in accordance with NASA policy to mitigate known and unknown information security vulnerabilities.
2. **Configuration Weaknesses:** Operating systems and applications were poorly configured which placed critical systems at unnecessary risk of unauthorized access, alteration, or destruction.
3. **Unsupported Software:** Unsupported systems and programs that were no longer fully maintained by the software vendors remained in place and exposed NASA to vulnerabilities that cannot be fully mitigated.

NASA relied on its defense in depth (DiD) approach, the intent of which was to implement controls at each layer of the IT environment, in order to comprehensively address security risks from vulnerabilities. However, weaknesses noted above remain open and have persisted for many years, in certain cases going back to 2015.

While we found that NASA had implemented certain defensive technologies and processes to protect the C-I-A of NASA's data, we noted specific deficiencies in NASA's DiD approach. Specifically, NASA did not substantially address prior year deficiencies related to its financial systems' general application controls outlined below:

Independent Auditors' Report (Continued)
Exhibit A
Significant Deficiency

1. **Segregation of Duties** – NASA's financial system's SoD management tool was not appropriately designed and configured to comprehensively prevent or detect SoD conflicts.
2. **User Administration and Least Privilege** – We noted inaccuracies in guidance associated with certain types of temporary elevated access roles to be consistently logged and monitored. We also noted financial supporting systems users' access rights were not consistently recertified. Finally, we noted instances where not all available application layers of security were being utilized to form a comprehensive layered DiD approach.
3. **Audit Logging and Monitoring** – NASA did not have a consistent and effective process to comprehensively review audit logs for financial systems and their supporting databases to address suspicious and potentially harmful activity.

NASA did not follow internal and Federal standards in implementing configuration management and access controls as required by the following standards:

- NASA Information Technology Security Handbook, *Risk Assessment: Security Categorization, Risk Assessment, Vulnerability Scanning, Expedited Patching, & Organizationally Defined Values*, (ITS-HBK 2810.04-01A) outlines the mitigation requirements for non-mission systems as follows: expedited patches within seven business days; non-expedited patches within 30 days; high and medium vulnerabilities from monthly scans within 30 days of scan date; high and medium vulnerabilities from quarterly scans within 90 days from scan date; and low vulnerabilities from monthly and quarterly scans within 180 days from scan date.

- OMB Circular A-130, *Managing Information as a Strategic Resource*, Appendix I, establishes minimum requirements for Federal information programs and assigns Federal agency responsibilities for the security of information and information systems. The Circular specifically prohibits agencies from the use of unsupported information systems and system components, and requires agencies to ensure that systems and components that cannot be appropriately protected or secured are given a high priority for upgrade or replacement. In addition, the Circular requires agencies to implement and maintain current updates and patches for all software and firmware components of information systems.

- The National Institute of Standards and Technology (NIST) Special Publication (SP) 800-53, Revision 4, *Security and Privacy Controls for Federal Information Systems and Organizations*, outlines security controls related to patch management, configuration management, and access controls, including the following:

  - AC-2, Account Management, states that an organization creates, modifies, disables, and removes information system accounts in accordance with organizational defined procedures.
  - AC-5, Separation of Duties, states that an organization must separate organizationally-defined duties of individuals, document separation of duties of individuals, and define information system access authorizations to support separation of duties.
  - AC-6, Least Privilege, states that an organization must employ the principle of least privilege, allowing only authorized access for users (or processes acting on behalf

Independent Auditors' Report (Continued)
Exhibit A
Significant Deficiency

of users) which are necessary to accomplish assigned tasks in accordance with organizational missions and business functions.

- AC-6, Enhancement 9, Auditing Use of Privileged Functions, states that the information system audits the execution of privileged functions.
- AU-6, Audit Review, Analysis and Reporting, states that an organization must review and analyze information system audit records for indications of inappropriate or unusual activity.
- AU-6, Enhancement 1, Audit Review, Analysis and Reporting | Process Integration, states that the organization employs an automated mechanism to integrate audit review, analysis and reporting processes to support organizational processes for investigation and response to suspicious activities.
- AU-7, Audit Reduction and Report Generation, states that the information system provides an audit reduction and report generation capability which supports on-demand audit review, analysis and reporting requirements and after-the-fact investigations of security incidents; and no alteration of the original content or time ordering of audit records.
- CA-7, Continuous Monitoring, states that the organization develops a continuous monitoring strategy and implements a continuous monitoring program that includes response actions to address results of the analysis of security-related information.
- CM-7, Least Functionality, states that an organization configures the information system to provide only essential functions; and prohibits or restricts the use of functions, ports, protocols, and services based on organizational defined prohibited or restricted functions, ports, protocols and/or services.
- SC-7, Boundary Protection, states that the information system monitors and controls communication at the external boundary of the system and at key internal boundaries within the system.
- SI-2, Flaw Remediation, states that an organization must identify information systems affected by announced software flaws, including potential vulnerabilities resulting from those flaws, and report this information to designated organizational personnel with information security responsibilities. Security-relevant software updates include, for example, patches, service packs, hot fixes, and anti-virus signatures.
- SI-3, Malicious Code Protection, states that an organization employs malicious code protection mechanisms at information system entry and exit points to detect and eradicate malicious code.
- SI-7, Software, Firmware, and Information Integrity, states that the organization employs integrity verification tools to detect unauthorized changes to software, firmware and information.

- NIST SP 800-40, Revision 3, *Guide to Enterprise Patch Management Technologies*, states that patches are usually the most effective way to mitigate software flaw vulnerabilities, and are often the only fully effective solution. Sometimes there are alternatives to patches, such as temporary workarounds involving software or security control reconfiguration, but these workarounds often negatively impact functionality.

Absent an effectively implemented and enforced configuration management program that addresses significant persistent security weaknesses, there remains escalating risk that financial information may be inadvertently or deliberately disclosed, manipulated, or misappropriated. Additionally, inappropriate or unnecessary changes may be made to key financial information systems, which could result in compromising the accuracy and integrity of financial information.

Independent Auditors' Report (Continued)
Exhibit A
Significant Deficiency

Further, without effective application access controls, there is an increased risk of unauthorized or inappropriate access to financial and sensitive data.

We have provided NASA management with separate notices of findings and recommendations and a limited distribution report that further details these IT control deficiencies and vulnerabilities in NASA's systems. Due to the sensitivity of the subject matter, we have not discussed the matters in detail in this report.

Recommendations
We recommend that NASA enhance its efforts to analyze and prioritize remediation efforts to address security and control deficiencies with a focus on key tasks that include, but are not limited to:

1. Improving the patch and vulnerability management program.
2. Eliminating configuration weaknesses.
3. Improving technical controls, including controls that monitor and control communications at the boundary of information systems.
4. Improving the scope and extent of segregation of duties monitoring controls.
5. Improving user administration controls, specifically around temporary elevated access and user access recertification.
6. Utilizing available layers of application security controls to enhance the existing "defense in depth" approach.
7. Improving the scope and extent of financial system, database, and infrastructure audit logging and review controls.

Independent Auditors' Report (Continued)
Exhibit B
Management's Response

National Aeronautics and Space Administration

Headquarters
Washington, DC 20546-0001

November 16, 2020

Reply to Attn of: Office of Chief Financial Officer

TO: Inspector General

FROM: Chief Financial Officer

SUBJECT: Management Response to Report of Independent Auditors

I am pleased to accept your audit report on the Consolidated Financial Statements of the National Aeronautics and Space Administration (NASA) for Fiscal Year (FY) 2019 and FY 2020. The Office of the Chief Financial Officer (OCFO) commitment to sound financial management is clearly reflected in the audit opinion. For the tenth year in a row, the OCFO has led NASA to receive an unmodified "clean" opinion on its financial statements with no reported material weaknesses. Further, NASA continues to be in substantial compliance with the Federal Financial Management Improvement Act.

NASA's independent auditors (CliftonLarsonAllen (CLA)) reported one significant deficiency related to NASA's vulnerability management process and the financial systems' general application controls. NASA's response to this deficiency is provided below.

NASA's Vulnerability Management Process

The annual financial statement audit provides NASA with valuable insight into enhancement opportunities to protect the confidentiality, integrity, and availability of Agency financial data. NASA continues improvements in the vulnerability management program by holding system owners accountable, increasing management visibility, and refining vulnerability detection efforts.

While the vulnerability management process tracks and addresses all vulnerabilities, the immediate emphasis remains on any Critical and High vulnerabilities identified through critical work such as the annual financial statement audit.

NASA was pleased to learn that the FY 2020 Vulnerability Assessment and Pentation Testing Report noted significant improvements in configuration weakness from prior years. The Agency can report an 88% decrease in configuration weaknesses in comparison to the number reported in FY 2018, which demonstrates NASA's maturity and ability to manage configuration weakness.

The instances of unsupported software also trended lower with an 81% noted improvement in this area since FY 2018. Although the FY 2020 Vulnerability and Penetration Test Report noted an increase in missing patches from FY 2019, the Agency continues to demonstrate significant improvements in patch management with a 93% decrease in missing patches in comparison to the number reported in FY 2018.

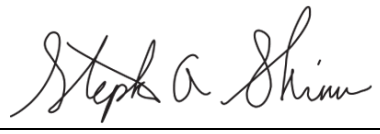
Independent Auditors' Report (Continued)
Exhibit B
Management's Response

Financial Systems' IT General Application Controls

NASA maintains a comprehensive Defense in Depth (DiD) approach to ensure appropriate controls are in place at the appropriate levels to remediate and reduce the risk of the recurrence of particular findings. While NASA believes it has designed and implemented appropriate controls at each level, CLA documented deficiencies in the following areas: 1) SAP Segregation of Duties (SOD) Enforcement and Monitoring, 2) User Administration and Least Privilege, and 3) Audit Logging and Monitoring.

In FY 2020, NASA continued the implementation of corrective actions in response to the reported deficiencies such as: 1) added an additional layer of SAP SOD controls at the transaction code level to assist with identifying, responding to, and resolving unauthorized sensitive activities, 2)improvements in the Temporary Elevated Access Grant (TAG) management process, which reduced the likelihood of users gaining unauthorized access, and 3)seeking an enterprise-wide Security Information and Event Management (SIEM) system to address auditable event logging and monitoring requirements. NASA has implemented countermeasures to reduce the likelihood and overall risk associated with the identified deficiencies and will continue to evaluate the need for additional improvements..

I appreciate the efforts and leadership of NASA's OIG and the auditors throughout the audit of NASA's financial statements and related internal controls over financial reporting. Please convey my sincere appreciation and thanks to your team for the professionalism and cooperation exhibited during this audit.



Stephen A. Shinn
Acting Chief Financial Officer

Independent Auditors' Report (Continued)
Exhibit C
Status of Prior Year's Significant Deficiency

Our assessment of the current status of the findings related to the prior year audit is presented below:

FY 2019 Finding	*Fiscal Year 2020 Status*
Information Technology Management	Repeat – See Exhibit A

SECTION 3

Other Information

A United Launch Alliance Atlas V rocket with NASA's Mars 2020 Perseverance rover on board launches from Space Launch Complex 41, Thursday, July 30, 2020, at Cape Canaveral Air Force Station in Florida. The Perseverance rover is part of NASA's Mars Exploration Program, a long-term effort of robotic exploration of the Red Planet.

Photo Credit: NASA/Joel Kowsky

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NASA
National Aeronautics and Space Administration

Office of Inspector General

Office of Audits

2020 Report on NASA's Top Management and Performance Challenges

November 12, 2020

Office of Inspector General

To report, fraud, waste, abuse, or mismanagement, contact the NASA OIG Hotline at 800-424-9183 or 800-535-8134 (TDD) or visit https://oig.nasa.gov/hotline.html. You can also write to NASA Inspector General, P.O. Box 23089, L'Enfant Plaza Station, Washington, D.C. 20026. The identity of each writer and caller can be kept confidential, upon request, to the extent permitted by law.

To suggest ideas or request future audits, contact the Assistant Inspector General for Audits at https://oig.nasa.gov/aboutAll.html.

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INTRODUCTION

As required by the Reports Consolidation Act of 2000, this report presents the Office of Inspector General's (OIG) independent assessment of the top management and performance challenges facing NASA. For 2020, we identified seven challenges and linked each challenge to one of NASA's strategic objectives (see figure 1).[1] We also considered the initial effects of the coronavirus pandemic (COVID-19) on the Agency's operations and missions.

Figure 1: 2020 Top Management and Performance Challenges Linked to NASA Strategic Objectives

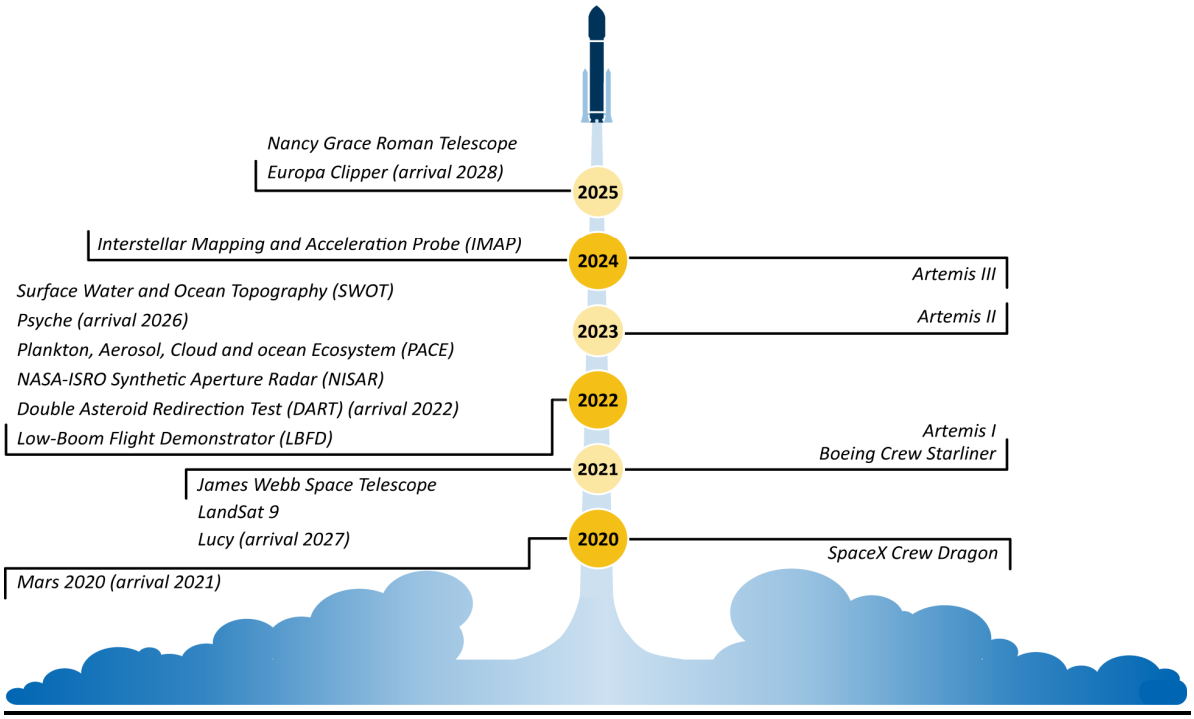
Source: NASA OIG analysis.

NASA stands at the forefront of aeronautics, science, and space exploration, and is responsible for numerous scientific discoveries and technological innovations. In NASA's first half century, long-term human space flight missions such as Apollo, the Space Shuttle Program, and the International Space Station (ISS or Station) progressed through formulation, development, and operation across multiple Administrations and congresses. However, in the past 10 years the Agency's space exploration priorities

[1] NASA, *NASA Strategic Plan 2018* (February 12, 2018; last accessed September 1, 2020).

have shifted multiple times from the Constellation Program's lunar ambitions to an asteroid retrieval effort focused on developing technologies to enable a human mission to Mars and then back to an expedited crewed return to the Moon. Additionally, the Agency has been challenged to temper its culture of optimism and require more realistic cost and schedule estimates for major projects by establishing well-defined and stable requirements and maturing technologies early in development. Despite all of this, NASA has continued to develop and manage some of the world's most complex systems and projects while juggling the annual appropriations process and shifting timetables. As the Agency moves forward with key decisions on several of its major projects, addressing the challenges discussed in this report will be paramount to success (see figure 2).

Figure 2: Timeline of Major Projects and Missions



Source: NASA OIG presentation of NASA information.

In deciding whether to identify an issue as a "top challenge," we considered its significance in relation to NASA's mission; whether its underlying causes are systemic in nature; and its susceptibility to fraud, waste, and abuse. Identification of an issue as a top challenge does not necessarily denote significant deficiencies or lack of attention on NASA's part. Rather, these issues are long-standing and inherently difficult challenges central to the Agency's core missions and, as such, will likely remain challenges for many years. Consequently, they require consistent, focused attention from NASA management and ongoing engagement on the part of Congress, the public, and other stakeholders.

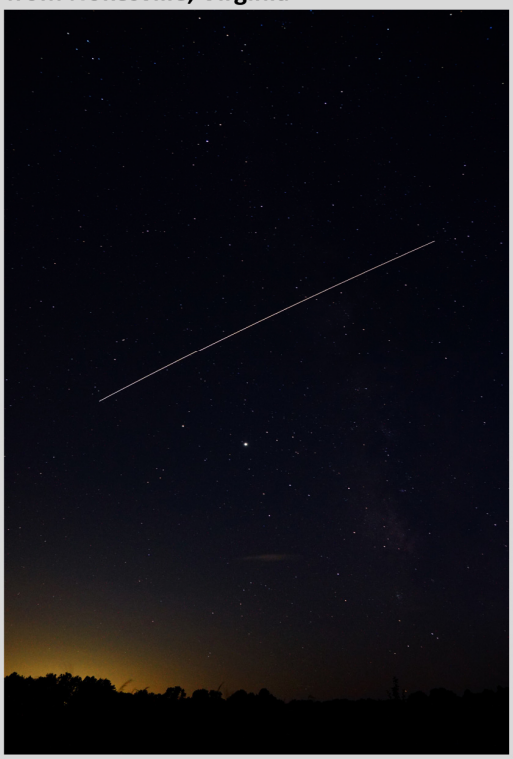
Given the importance and scope of the issues, this year's list includes many of the same challenges discussed in previous reports. However, because it has permeated every aspect of NASA's operations, the effects of COVID-19 is a theme repeated in many of the top challenges. In March 2020, in accordance with Centers for Disease Control guidance, the President directed federal agencies to modify

their operations including closing facilities and mandatory telework of nonessential federal and contractor employees. In NASA's case, while maintaining vital operations such as the ISS and efforts to launch the first commercial flight of astronauts into space, the Agency altered—essentially overnight—how it does business in an effort to protect employees. By mid-April 2020, 12 of the Agency's 18 major facilities were closed and the rest had transitioned to "mission critical" operations that could not be accomplished remotely. Additionally, 90 percent of the Agency's workforce was working from home since mid-March and all nonessential travel was canceled. Given this unprecedented telework situation, the Agency was faced with the challenge of managing and securing its numerous information technology (IT) systems. NASA has been proactive in expanding telework readiness and disseminating information to staff through email, establishing dedicated internal websites, and routinely communicating with its workforce through virtual town hall meetings. The OIG continues to monitor the Agency's response to the pandemic as well as implementation of its plans for returning to on-site work.

Beyond protecting its workforce and property, NASA has had to prioritize which missions would continue and which would be delayed. For example, the Agency slipped the launch date for the already years-delayed James Webb Space Telescope—the planned successor to the Hubble Space Telescope—due to the pandemic while the Mars 2020 mission remained on track and launched successfully in July.

NASA is actively supporting the federal government's response to the pandemic. In recent months, the Agency announced an employee crowdsourcing initiative to solicit new ideas focused on developing personal protective equipment; developed new ventilation devices; and used NASA data, analytics, high performance computing, and artificial intelligence to predict the spread of COVID-19 and help address its environmental, economic, and societal impacts. NASA engineers also designed a new ventilator and oxygen helmet specifically for coronavirus patients with milder symptoms.

Time-lapse of the ISS passing over Jupiter and Saturn on October 8, 2020, viewed from Nokesville, Virginia



Source: Ray Tolomeo

As NASA continues to work under the "new normal" for the foreseeable future, the Agency has developed a science and common sense-based Return to On-Site Work Framework consistent with guidance from the White House, Office of Personnel Management, Office of Management and Budget, and Centers for Disease Control and Prevention. The plan utilizes a four-stage, risk-based approach and emphasizes the Agency's commitment to the health and safety of its workforce. NASA is also establishing protocols for face covering requirements, reconfiguring office space to ensure social distancing, ensuring personal protective equipment is on-site and available for situations when social distancing cannot be maintained, and implementing enhanced cleaning techniques. For example, the Agency formed a Clean Team Task Force that includes industrial hygiene professionals from multiple locations who are exploring various options for cleaning NASA facilities and workspaces as well as ensuring HVAC systems are providing optimal air filtration.

The Coronavirus Aid, Relief, and Economic Security Act (CARES Act) enacted in March 2020 provided funding for federal agencies to respond to the pandemic along with loans, grants, and other forms of assistance for individuals, businesses, and state and local governments. NASA received $60 million in CARES Act funding to prevent, prepare for, and respond to COVID-19 domestically or internationally. As of October 2020, NASA had committed approximately $42 million for contractor impact claims, information technology services, cleaning supplies, and personal protective equipment.[2] Utilizing these funds appropriately is a challenging task and one the OIG will continue to monitor.

In this report and all related work, the OIG is committed to providing independent, aggressive, and objective oversight of NASA programs and projects with the singular goal of improving the Agency. To that end, we plan to conduct audits and investigations in the coming year that focus on NASA's continuing efforts to meet these and other top challenges.

Paul K. Martin
Inspector General

[2] Contractor impact claims may be made pursuant to the Denied Access and Stop Work Order provisions in a contract but also may fall under Section 3610 of the CARES Act, which allows agencies to reimburse contractors—using CARES Act funding or regular appropriations—for paid leave caused by the pandemic.

Challenge 1: Landing the First Woman and the Next Man on the Moon by 2024

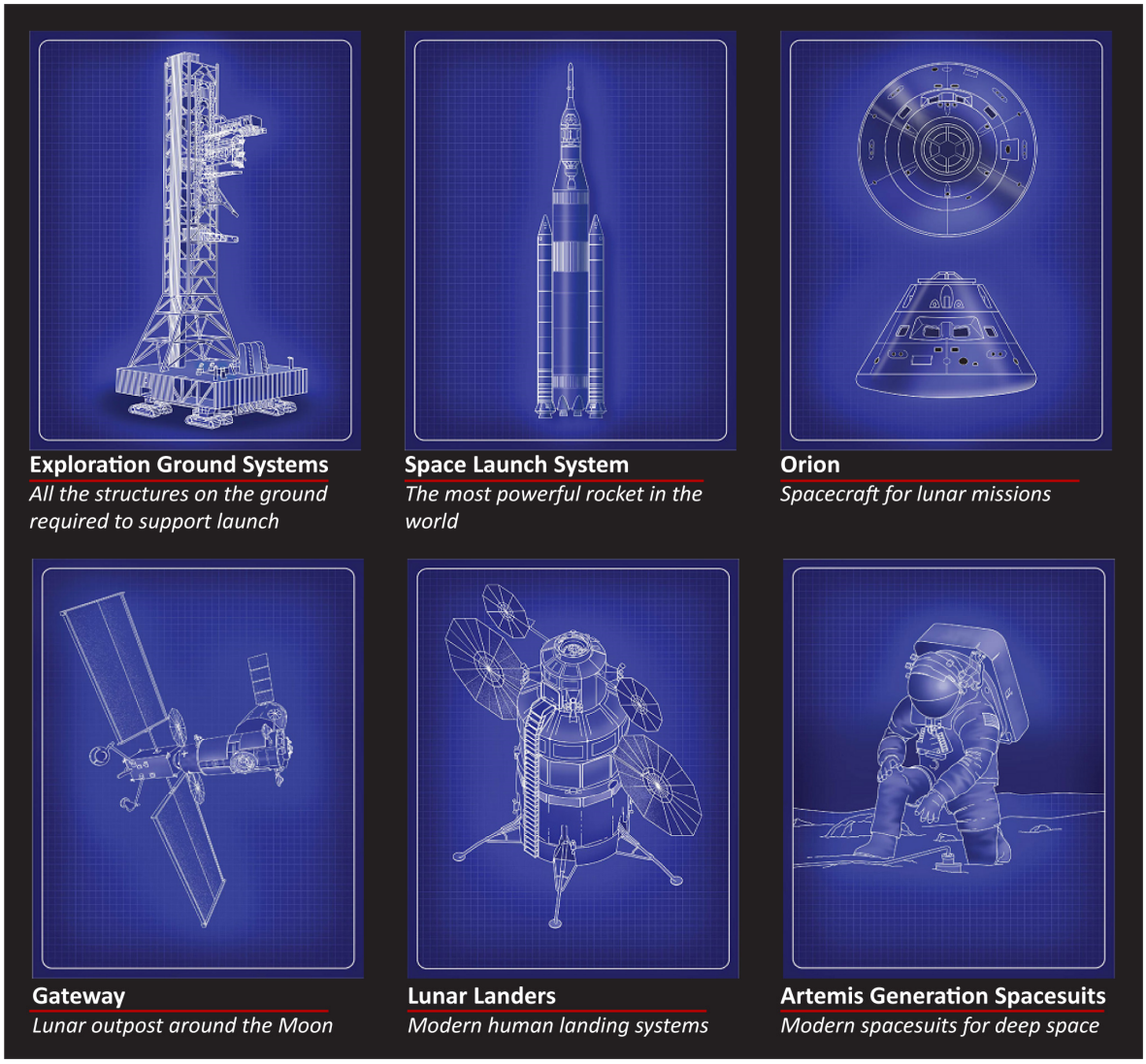
Why This Is a Challenge

NASA is working toward landing the first woman and next man on the Moon by the end of 2024, with the eventual goal of landing humans on Mars. In March 2019, the White House directed NASA to accelerate its plans for a lunar landing, and NASA subsequently renamed this effort the Artemis program. The Agency requested an additional $1.6 billion in its fiscal year (FY) 2020 budget as initial funding to help meet the program's new timetable. To support the initial lunar landing capability, NASA requested over $7 billion for Artemis in FY 2021; in order to realize its lunar ambitions on the expedited timetable, the Agency has estimated it will cost approximately $28 billion between 2021 and 2025.[3]

The development of a deep-space human exploration capability to reach the Moon and then Mars is NASA's most ambitious and costliest ongoing activity. The Agency is currently developing the Space Launch System (SLS)—a two-stage, heavy-lift rocket—that will launch the Orion Multi-Purpose Crew Vehicle (Orion) to carry crew and cargo into space. Launch infrastructure under development by the Agency's Exploration Ground Systems (EGS) Program includes two mobile launchers (ML-1 and ML-2) that will serve as the ground structure to assemble, process, transport, and launch the SLS. Additionally, the Agency is updating its spacesuits, developing a robotic lunar rover for long duration operations, and using commercial partnerships to provide end-to-end payload delivery services to the Moon. Within the next few years, the Agency plans to develop new systems, including the Human Landing System that will provide crew transportation from lunar orbit to the Moon and back, and the Lunar Gateway (Gateway), a small spacecraft similar in design to the ISS yet only about the size of a studio apartment that would orbit the Moon and act as a waypoint for crews traveling to the lunar surface or deep space destinations. See Figure 3 for the systems in development for the Artemis missions.

[3] This amount is for Phase I of the Artemis missions including costs for Artemis I, II, and III but does not include Gateway.

Figure 3: Artemis Systems in Development



Source: NASA.

The Artemis mission's first launch will be Artemis I, an uncrewed test flight lasting approximately 22 to 25 days that will orbit the Moon before returning to Earth. Originally scheduled for 2020, the Artemis I launch has been delayed to late 2021. Artemis II, a crewed test flight currently scheduled to launch in 2023, will follow a similar trajectory to Artemis I, while Artemis III plans to land crew on the Moon by late 2024.

The Artemis mission has experienced a series of challenges exacerbated more recently by COVID-19's impact on Agency facilities and operations. Beginning in April 2020, 12 of the Agency's 18 major facilities were closed except to protect life and critical infrastructure. As a result, key development activities for SLS and Orion had to be delayed or suspended. The Green Run test—a hot fire testing and analysis of the integrated SLS rocket core stage—originally scheduled for August 2020 was delayed until the fall. Michoud Assembly Facility (where the SLS Core Stage was manufactured) and Stennis Space Center (where the

Green Run test will be run) were both shut down for almost 2 months due to the pandemic. This could further delay the Artemis I launch date currently set for late 2021. In addition, development of hardware for SLS and Orion was temporarily halted during this period, with NASA still working to assess the cost and schedule impact of those delays.

Progress in Addressing the Challenge

While the SLS, Orion, and EGS programs are making progress, each has experienced significant cost increases and schedule delays. Specifically, the SLS Program exceeded its Agency Baseline Commitment (ABC) by at least 33 percent at the end of FY 2019, a figure that could reach 43 percent or higher if Artemis I experiences additional delays.[4] By the end of FY 2020, NASA will have spent more than $17 billion on SLS—including almost $6 billion not tracked or reported as part of the ABC.[5] Further, each of the major contracts for building the SLS for Artemis I have experienced technical challenges, performance issues, and requirement changes that have resulted in $2 billion of overall cost increases and at least 2 years of schedule delay.[6]

Orion has also experienced significant issues with cost and schedule. The Orion Program excluded $17.5 billion in its ABC costs from FY 2006 to FY 2030, significantly limiting visibility into how the program spends its money. Since Orion's cost and schedule ABC was set in 2015, the Program has experienced over $900 million in cost growth through 2019, a figure expected to rise to at least $1.4 billion through 2023. In the same timeframe, the Program's schedule for Artemis I slipped 3 years while the schedule for Artemis II slipped 2 years, and additional delays are likely as Orion completes development efforts for these missions. Moreover, Orion is proceeding with production of crew capsules for later Artemis missions before completing key development activities, increasing the risk of additional cost growth and schedule delays as technical issues are discovered late in the development effort, potentially requiring costly rework. While the Orion Program has undertaken a series of development, production, and infrastructure initiatives aimed at controlling costs which we view as positive steps, most are in the early stages and their actual impact remains unclear.

For its part, the EGS Program is working to complete launch control software while also managing late requirements changes and cost overruns. As of January 2020, modification of the first mobile launcher (ML-1) to accommodate the SLS has cost $693 million—$308 million over budget—and is running more than 3 years behind schedule. Looking ahead, the project faces a risk of further cost increases and schedule slippage as ML-1 completes testing for Artemis I and undergoes modifications for Artemis II. While the Agency has taken positive steps to address lessons learned from ML-1, NASA is missing opportunities to improve project management and oversight of the $486 million ML-2 project. First, the ML-2 schedule is risky due to requirements changes for Orion and later variations of SLS. Second, the contract structure established for ML-2 may limit the Agency's ability to motivate contractor

[4] The ABC is the cost and schedule baselines committed to Congress against which a program is measured.

[5] The $6 billion not tracked or reported as part of the ABC is a result of the SLS Program deviating from program requirements and federal law for cost reporting, both of which require a life-cycle cost estimate of the entire program and the setting of an ABC based on all formulation and development costs. As a result of the deviation, NASA has not established a cost commitment for Artemis II activities and beyond and is not tracking these costs as part of the SLS ABC, meaning cost increases for those activities are not reported through the ABC process.

[6] NASA contracted with The Boeing Company to provide the launch systems' Core Stage and Upper Stage (known as the Interim Cryogenic Propulsion Stage); Aerojet-Rocketdyne to provide the RS-25 Engines; and Northrop Grumman the Solid Rocket Boosters that help power the SLS.

performance and control costs. Finally, the Agency's approach to managing the ML-2 project lacks key project management requirements that would provide greater levels of oversight and transparency.

In August 2020, NASA alerted Congress of development cost increases of 30 percent for both SLS and EGS.[7] Specifically, NASA aligned the development costs for SLS and EGS through Artemis I and established revised cost commitments placing the new development baseline cost for SLS at $9.1 billion, and the commitment for the initial ground systems capability to support the mission at $2.4 billion.

While NASA is fast tracking the development or purchase of additional capabilities needed to meet its lunar goals, the Agency has yet to make final decisions on key aspects, including the Gateway—the initial elements of which are currently set to launch in January 2024, several months later than originally planned—and the Human Landing System. Although the Agency has not determined whether the Human Landing System will dock with the Gateway in lunar orbit for the planned 2024 Artemis III mission, the lander will dock with Gateway for future missions. While the Agency requested over $3 billion in its FY 2021 budget to accelerate development of the Human Landing System, the House of Representatives appropriation provided less than half that amount for all exploration research and development efforts, and it remains uncertain how much will be approved by Congress.[8] For the Gateway, NASA awarded a contract to Maxar Technologies in 2019 to develop power, propulsion, and communications with a planned launch date of 2022. The Agency has also announced a sole-source award for the Habitation and Logistics Outpost—the first step in an anticipated larger pressurized habitation module for cargo and astronauts—to Northrop Grumman. To reduce costs and mitigate the risks associated with a rendezvous in orbit, NASA decided to launch the power and propulsion element and Habitation and Logistics Outpost together in 2024. This will be the Agency's first attempt at integrating and launching a system of this magnitude. Due to these challenges, we anticipate further schedule delays and cost increases, making the Gateway unlikely to be available for the planned 2024 lunar landing.

Key Implemented Recommendations

Develop a corrective action plan for completing the two Core Stages and EUS and brief that plan to Boeing and senior NASA officials to gain their approval (IG-19-001).

Complete a review of the Boeing Stages contract that includes an independent federal government cost estimate to confirm the funding amounts needed to complete all deliverables (IG-19-001).

Work That Needs to Be Done

Although NASA has made significant progress to further its human exploration efforts, many questions remain about the total cost, schedule, and scope of the Agency's lunar ambitions. In the near term for the SLS, production and certification for flight, and engine and core stage testing need to be completed; Orion needs to finalize assembly and test for Artemis I and continue hardware production for Artemis II; and EGS needs to continue to prepare launch infrastructure. Additionally, as mandatory telework orders

[7] NASA is required to submit a report to relevant congressional committees when development costs increase by 30 percent or more.

[8] The House of Representatives FY 2021 appropriation bill provides a top line funding amount for exploration, research, and development but does not break out funding for the various efforts such as the Human Landing System.

remain in place for most NASA employees and contractors, ongoing impacts to these missions will need to be continuously evaluated. For later lunar missions, NASA will need to complete development of the SLS Exploration Upper Stage, which would be used in post-Artemis III missions, and complete the second Mobile Launcher. Concurrently, plans for the Gateway and lunar lander need to be finalized to meet NASA's goal of landing on the Moon by 2024.

Given the multiple challenges outlined above, we believe the Agency will be hard-pressed to land astronauts on the Moon by the end of 2024. At the very least, achieving any date close to this ambitious goal—and reaching Mars in the 2030s—will require strong, consistent, sustained leadership from the President, Congress, and NASA, as well as stable and timely funding. For its part, NASA must determine the true long-term costs of its human exploration programs, set realistic schedules, define system requirements and mission planning, form or firm up international partnerships, and leverage commercial space capabilities. Over the past decade, our oversight work has found NASA consistently struggling to address each of these significant issues and the Artemis mission's accelerated timetable will likely further exacerbate these challenges.

Key Unimplemented Recommendations

Review HEOMD and NASA program management policies, procedures, and ABC reporting processes to provide greater visibility into current, future, and overall cost and schedule estimates for the SLS Program and other human space flight programs (IG-20-012).

Establish methodologies and processes to track and set cost commitments for Artemis II (IG-20-012).

Require the ML-2 project to develop an ABC separate from the EGS Program (IG-20-013).

Ongoing and Planned Audit Work

Audit of NASA's Management of Astronaut Space Suit Development
This audit is assessing NASA's management and development of space suits for upcoming Artemis missions and future deep space applications.

NASA's Challenges to Ensure Safe Return of Humans to the Moon
NASA's goal is to return humans to the Moon by 2024. This audit is identifying the top safety issues in that pursuit and the Agency's plans for mitigating those issues.

COVID-19 Impact on NASA's Programs and Projects
This review is identifying impacts of COVID-19 on NASA's programs and projects, including any cost and schedule performance challenges and technical issues.

Challenge 2: Improving Management of Major Projects

Why This Is a Challenge

NASA is planning to invest at least $65 billion over the life cycle of its current portfolio of 25 major Earth science, human exploration, planetary science, astrophysics, aeronautics, and technology demonstration projects in development.[9] NASA's major projects have historically cost significantly more and taken much longer to complete than planned. Cost increases and schedule slippage with major ongoing projects such as Mars 2020, the Stratospheric Observatory for Infrared Astronomy (SOFIA), the Europa Clipper, the James Webb Space Telescope (JWST), and the Nancy Grace Roman Space Telescope (Roman Space Telescope) can affect project schedules and funding for other NASA projects.[10]

- *Mars 2020.* As of January 2020, the Mars 2020 program reported cost growth of $310.9 million due to multiple development difficulties, delayed deliveries, and higher-than-anticipated procurement costs. That said, the Perseverance Rover successfully launched on July 30, 2020, with an anticipated Mars landing on February 18, 2021.
- *SOFIA.* Originally estimated to cost $265 million and take 4 years to complete, SOFIA has actually cost $1.1 billion and taken more than 17 years to reach full operational capability. These cost overruns and schedule delays resulted in a replan, a rebaseline, and a major program

Stratospheric Observatory for Infrared Astronomy (SOFIA)

Source: NASA

[9] The Government Accountability Office (GAO) categorizes "major projects" as those with life-cycle costs over $250 million; GAO-20-405, *NASA: Assessments of Major Projects* (April 2020).

[10] Mars 2020/Perseverance rover is designed to better understand the geology of Mars and seek evidence of ancient life. The mission will collect and store a set of rock and soil samples that could be returned to Earth in the future. It will also test new technology to benefit future robotic and human exploration of Mars. SOFIA is a Boeing aircraft modified to carry a telescope. SOFIA is designed to observe the infrared universe and allows astronomers to study the solar system in ways that are not possible with ground-based telescopes. The Europa Clipper will conduct detailed reconnaissance of Jupiter's moon Europa and investigate whether the moon could harbor conditions suitable for life. The JWST is an orbiting infrared observatory that will be able to search for the unobserved formation of the first galaxies, as well as look inside dust clouds where stars and planetary systems are forming today. The Wide Field Infrared Survey Telescope (WFIRST) was renamed the Nancy Grace Roman Space Telescope (Roman Space Telescope) in May 2020. The Roman Space Telescope will conduct large surveys of the infrared universe to explore everything from our solar system to the edge of the observable universe, including planets throughout our galaxy and the nature of dark energy.

reorganization.[11] Moreover, NASA spends $80 million a year to operate SOFIA, with questionable returns on its investment. While the President's Budget Request has attempted to cancel the program several times, Congress has required the Agency to maintain the program and continues to provide appropriations for SOFIA.

- *Europa Clipper.* In August 2019, the Europa Clipper project established its cost and schedule baselines at $4.25 billion with a launch date of September 2025—$250 million more and 2 years later than the project's preliminary cost and schedule estimates. These cost increases and schedule delays are due in part to a congressional mandate that SLS be used as the launch vehicle, even though an SLS will not be available until 2025 at the earliest. In addition, in August 2020 the Europa Clipper mission announced a series of hardware compatibility issues if the Clipper is required to fly on the SLS. As a result, the Clipper team is developing the spacecraft to accommodate the differing launch and flight capabilities of the SLS and a commercial launch vehicle. However, the Agency has recently asked for relief from the SLS requirement. In its FY 2021 budget request, NASA proposed to launch Europa as early as 2024 on a commercial launch vehicle, which would save over $1.5 billion compared to using SLS. The House of Representatives version of the FY 2021 funding passed in July 2020 directs the Agency to launch Clipper by 2025 and the Europa lander by 2027 and states SLS should be used for both missions "if available," permitting use of a commercial launch alternative. As of September 2020, a decision on a launch vehicle had not been made.
- *JWST.* In June 2018, NASA established a revised life-cycle cost commitment of $9.7 billion and launch readiness date of March 2021—$828 million more and 2 years later than the baselines established by the project in 2011. Technical challenges since the program's last replan have further strained the schedule, while delays related to COVID-19 forced the Agency to delay the planned launch from March to October 2021.
- *Roman Space Telescope.* The Roman Space Telescope was envisioned to cost $2 billion; however, current cost estimates range from $3.3 to $3.9 billion. Due to its significant cost and higher priorities within NASA such as JWST, for three consecutive years the President's Budget Request has proposed canceling the Roman Space Telescope. To date, Congress has refused NASA's request and continues to fund the telescope.

Over its storied history, NASA has developed and managed some of the world's most complex systems and projects. Yet, along with that scientific success, the Agency has also experienced significant cost overruns and schedule delays. GAO has designated NASA's management of acquisitions as a high-risk area for almost 3 decades. In its 2020 assessment of NASA's major projects, GAO found the cost performance of NASA's portfolio of major projects had worsened for the third consecutive year, while the average schedule delay had decreased. Additionally, GAO reported that cost growth had increased from 27.6 percent to approximately 31 percent, while the average launch delay decreased from 13 months to approximately 12 months.

In our *2019 Report on NASA's Top Management and Performance Challenges*, we discussed several factors affecting NASA's ability to complete major projects within their planned costs and schedules,

[11] A rebaseline is a process initiated when the NASA Administrator determines the development cost growth for a project is more than 30 percent of the estimate provided in the project's baseline, or if other events make a rebaseline appropriate. When the Administrator determines that development cost growth is likely to exceed 15 percent, or a program milestone is likely to be delayed from the baseline's date by 6 months or more, NASA must submit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate. 51 U.S.C § 30104(e)(2)(reporting requirement).

including a culture of optimism, underestimating technical complexity, and funding instability. Other factors driving schedule delays and cost overruns include flawed estimating assumptions, congressional directives, and poor project management. In addition to these historic challenges, in the short term the Agency will face cost and schedule concerns attributable to COVID-19 closures.

Progress in Addressing the Challenge

To its credit, NASA has taken steps in the last few years aimed at curbing cost growth and schedule delays which have shown early indications of improved performance for several projects including the Surface Water and Ocean Topography (SWOT), NASA-Indian Space Research Organisation (ISRO) Synthetic Aperture Radar (NISAR), and Plankton, Aerosol, Cloud and ocean Ecosystem (PACE).[12] For example, in part to address concerns highlighted on GAO's High Risk list, in December 2018 the Agency established a corrective action plan to strengthen its project management efforts and improve transparency to stakeholders and monitoring of contractors.[13] In addition, NASA plans to broaden its use of a project management process known as Earned Value Management, a tool that integrates information on a project's cost, schedule, and technical efforts for management and decision makers.[14] The Agency plans to add one additional full-time employee to focus on this initiative and has established the NASA Earned Value Management Working Group to ensure agency-wide representation in developing implementation procedures and addressing review issues.

NASA also plans to assess and update its project cost and schedule estimates at additional points in the acquisition process. The Agency originally implemented a Joint Cost and Schedule Confidence Level (JCL) analysis policy to help reduce cost and schedule growth in its portfolio, improve transparency, and increase the likelihood of meeting project expectations. A May 2019 update to the Agency's JCL policy requires projects with life-cycle costs over $1 billion to conduct JCLs at key decision points (KDP) B and C, Critical Design Review, and potentially at KDP-D if current development costs have exceeded their development agency baseline commitment cost by 5 percent.[15]

Moreover, NASA is establishing an updated training curriculum for its programmatic analysts to strengthen the Agency's programmatic capabilities and promote consistency of the agency's best

[12] SWOT is a satellite mission to make the first global survey of Earth's surface water, observe the fine details of the ocean's surface topography, and measure how water bodies change over time. The NISAR mission is a joint project between NASA and ISRO to develop and launch a dual-frequency synthetic aperture radar on an Earth observation satellite. PACE is a NASA Earth-observing satellite mission that will advance observations of global ocean color, biogeochemistry, and ecology, as well as carbon cycle, aerosols, and clouds.

[13] GAO first cited the Agency's acquisition management as a high risk in 1990. GAO, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas* (GAO-19-157SP, March 6, 2019), is the most recent in which NASA's acquisition management is cited as a high risk. NASA's corrective action plan is located at https://www.nasa.gov/sites/default/files/atoms/files/nasa_high_risk_corrective_action_plan_2020.pdf (last accessed May 20, 2020).

[14] Earned value management measures the value of work accomplished in a given period and compares it with the planned value of work scheduled for that period and the actual cost of work accomplished.

[15] A JCL produces a point-in-time estimate that includes all cost and schedule elements in project life-cycle phases A through D, incorporates and quantifies known risks, assesses the impacts of cost and schedule to date, and addresses available annual resources, among other things.

practices. Courses will cover NASA programmatic policy, JCL implementation, independent assessments, scheduling, cost estimating, and project integration and communication.

Key Implemented Recommendations

Require all Standing Review Boards to explicitly monitor and document variances from NASA's JCL policy, specifically regarding international partners and launch vehicle risks, and their potential cost and schedule impacts (IG-18-011).

Require that all JCL analyses include all discrete development risks managed outside of the project; such as a project's launch vehicle with potential cost and/or schedule impacts (IG-19-018).

Rebaseline Artemis I costs to appropriately and transparently track costs that include SLS development costs and activities tied to the first SLS launch (IG-20-012).

Work That Needs to Be Done

We have consistently reported on NASA's culture of optimism and the positive and negative effects this has had on project management. NASA's ability to overcome technological and scientific obstacles to accomplish its objectives has become part of the Agency's culture and helped foster a belief that NASA can accomplish anything. Many of the Agency's planned missions are ambitious endeavors that need to be grounded in more realistic cost and schedule commitments. NASA should carefully consider its commitment to congressional and other stakeholders and seek to undertake missions on sustainable budgets and realistic timelines that take into account the Agency's overall goals and priorities. Complicating matters this year will be the Agency's evaluation of the impact of COVID-19 on its projects, costs, and schedules. Without transparent and accurate accounting of cost and schedule commitments, it will be difficult for NASA, Congress, and external stakeholders to make informed decisions about future projects and programs.

Key Unimplemented Recommendations

Document and provide the JCL analysis approach used by LBFD to the NASA Chief Knowledge Officer to serve as a reference for future large-scale-X-plane development projects (IG-20-015).

Establish a process to be used during source evaluation boards and source selections that includes direct contact with the Center EVM Working Group Representative and cognizant Defense Contract Management Agency (DCMA) office to verify all contractor proposed information related to EVM (IG-20-015).

Reassess SOFIA's strategy and mission to identify and consider implementing alternative operational approaches and models to maximize SOFIA's capabilities within the Astrophysics portfolio and return on investment (IG-20-022).

Ongoing and Planned Audit Work

COVID-19 Impact on NASA's Programs and Projects
This review is identifying impacts of COVID-19 on NASA's programs and projects, including cost and schedule performance challenges and technical issues.

NASA's Astrophysics Portfolio
This audit will evaluate the current state of the portfolio and identify and assess risks to future astrophysics missions.

Audit of NASA's Multi-Mission Program Estimates
This audit will examine the effectiveness of NASA's project definition and estimating processes for large multi-mission programs.

Challenge 3: Sustaining a Human Presence in Low Earth Orbit

Why This Is a Challenge

Orbiting roughly 200 miles above the Earth's surface, the International Space Station (ISS or Station) is a unique platform that has allowed humans to live and work in space for more than 20 years. However, the $3 to $4 billion annual cost of operating the ISS and transporting astronauts to and from the Station consumes about half of NASA's human space flight budget. With the proposed extension of the Station's operations from its current planned retirement in 2024 to a retirement date in 2030, combined with the Artemis mission's goal of returning humans to the Moon by 2024, the Agency will be challenged to obtain the funds to sustain ISS operations while simultaneously achieving its lunar goals.[16]

In recent years, and under the direction of Congress, NASA has sought opportunities to commercialize low Earth orbit by transitioning from being the sole operator of the ISS to serving as one of many customers for a privately owned and operated platform.[17] The Agency has relied on commercial partners to successfully transport cargo to and from the ISS since 2012 and had a recent first success in the long road to development of a commercial crew transportation capability.[18] In May 2020, the Space Exploration Technologies Corporation (SpaceX) launched two American astronauts to the ISS and safely returned them 64 days later in the first successful test of a commercial crew mission. However, leading up to this point, SpaceX and The Boeing Company (Boeing)—the Agency's second commercial crew partner—experienced years-long delays. As a result, in 2020 the U.S. segment of the ISS has twice operated with a single crew member.[19] Typically, the U.S. segment of the Station operates with three to four astronauts, and a reduction in crew decreases the time available to conduct on-board scientific research. Presently, the ISS is the only platform available to NASA for critical on-orbit research into human health risks and demonstration of technologies required for Artemis missions to the Moon and future missions to Mars.

NASA's broader plans for increasing commercialization of low Earth orbit are contingent on the Agency's ability to increase and sustain commercial activity on the ISS. Similar to findings in prior NASA OIG reports, in February 2020 a NASA-initiated independent review found significant issues with the effectiveness of the Center for the Advancement of Science in Space, Inc. (CASIS), which manages commercial, non-NASA

[16] 51 U.S.C. § 70907(b)(3). ISS operations are currently authorized through September 2024, but several legislative proposals propose extending Station operations through 2030.

[17] National Aeronautics and Space Administration Transition Act of 2017, Pub. L. No. 115-10 § 303 (2017).

[18] Russia and Japan have spacecraft that deliver cargo to the ISS that NASA has used when needed.

[19] The ISS is comprised of two connecting segments: the Russian segment is operated by the Roscosmos State Corporation for Space Activities and the United States On-Orbit Segment is operated by NASA and its international partners at the Canadian Space Agency, European Space Agency, and Japan Aerospace Exploration Agency. Beginning on April 17, 2020, one astronaut served aboard the ISS until the two-member SpaceX demonstration mission crew arrived on May 31, 2020. When the SpaceX crew departed the ISS on August 1, 2020, the U.S. segment once again operated with a single astronaut until October 14, 2020 when a second U.S. astronaut arrived via a seat purchased on the Russian Soyuz.

research activities on the U.S. segment of the ISS. Specifically, the review team found that (1) CASIS's business structure does not reflect the typical structure or function of other non-profit organizations; (2) CASIS's model for selecting projects to conduct research on the National Laboratory is outdated; (3) NASA has poorly managed its oversight of CASIS, and (4) CASIS's procedures for partner access to the National Laboratory are poorly defined.[20] Given the important role CASIS plays in increasing commercialization of the ISS and low Earth orbit, proper management and oversight of the organization is key to creating and sustaining a commercial market for low Earth orbit.

Progress in Addressing the Challenge

After numerous delays by both commercial crew partners, on August 2, 2020, SpaceX became the first private company to successfully launch astronauts into low Earth orbit and return them after a 2-month stay on the ISS. As the final test flight for SpaceX's Dragon 2 capsule and Falcon 9 rocket before the company begins regular transportation to the ISS, this mission validated key components of the company's crew transportation system, including the launch pad infrastructure; rocket; spacecraft; operational capabilities, including docking with the ISS; and reentry capabilities, including parachutes and splashdown. However, NASA's other commercial partner—Boeing—has experienced significant additional delays related to an aborted uncrewed test flight in December 2019. Given the need to re-fly that test mission, Boeing will not be ready to launch a crewed mission to the ISS until summer 2021 at the earliest. To ensure a continued U.S. presence on the ISS, in May 2020 NASA agreed to pay Roscosmos, the Russian state space corporation, more than $90 million to purchase a seat on a Soyuz spacecraft that launched to the ISS in mid-October 2020.

Spacewalk to Upgrade ISS Battery

Source: NASA

NASA has accomplished many of the goals originally set for the ISS Program, including mitigating the majority of the health concerns associated with space travel. The program has also sponsored research in life and physical sciences, human health, astrophysics, Earth sciences, space science, and commercial research and development for pharmaceuticals, materials, manufacturing, and consumer products. Additionally, in response to the above mentioned February 2020 independent assessment of CASIS, NASA and CASIS are reexamining the organization's board of directors and creating a User Advisory Committee to provide input on how the National Laboratory's resources should be managed. NASA also appointed the Agency's Chief Economist as the Program Executive of the National Laboratory.

[20] ISS Cooperative Agreement Independent Review Team, *Final Report to NASA* (February 4, 2020). The National Laboratory is the U.S. portion of the ISS research facilities.

To spur interest in commercial activity in low Earth orbit, NASA announced several initiatives in recent years. Most recently, in June 2020 the Agency created the Suborbital Crew office within the Commercial Crew Program to enable astronauts, principal investigators, and other Agency personnel to fly on commercial suborbital space transportation systems, which are expected to be more accessible and affordable alternatives to the ISS. This announcement builds on the Agency's June 2019 Plan for Commercial Low Earth Orbit Development, which established five goals: (1) establish ISS commercial use and pricing policies, (2) enable private astronaut missions to the ISS, (3) initiate process for commercial development of LEO destinations, (4) seek out and pursue opportunities to stimulate demand for low Earth orbit, and (5) quantify the Agency's long-term needs for activities in low Earth orbit.[21] Furthermore, in July 2019 the Agency issued the Next Space Technologies for Exploration Partnerships Broad Agency Announcement, which will allow commercial entities to enter into public-private partnerships to develop commercial destination technologies—including habitable modules, external platforms, and deployable structures—for low Earth orbit.[22] Although these initiatives are a positive step, the Agency's new commercialization policy does not include performance metrics for evaluating NASA's development of commercial markets, even though the Agency agreed with a suggestion we submitted during our review of the interim directive to add language establishing future metrics. Further, NASA may need to clarify how to manage commercial missions and private astronaut requests with respect to their impact on the Agency's commercial crew missions and ISS crew capacity.

Key Implemented Recommendations

Initiate internal processes and coordinate with congressional and other stakeholders to obtain an extension of INKSNA (Iran, North Korea, and Syria Nonproliferation Act) exemptions (IG-20-005).

Ensure there is a contingency plan for each human health risk not scheduled to be mitigated prior to 2024 (IG-18-021).

Establish goals for CASIS raising non-NASA funds to offset ISS operating expenses (IG-18-010).

Work That Needs to Be Done

Commercial crew transportation is fundamental to full utilization of the ISS. SpaceX's successful crewed demonstration flight in August 2020 was a critical achievement; however, in order to conduct regular crewed missions to the ISS, the company has a number of elevated risks that must be addressed, including those related to both the Falcon 9 rocket and the Dragon 2 spacecraft's propulsion systems. Moreover, risks that NASA accepted for the demonstration mission may not be accepted for regular crewed missions. For its part, Boeing must overcome multiple technical issues before it can conduct a manned test flight. The company's December 2019 uncrewed test flight of its Starliner capsule and Atlas V rocket encountered significant software glitches that prevented the capsule from reaching the ISS. As a result, Boeing is repeating its uncrewed test flight no earlier than December 2020, which pushes the contractor's first crewed test flight back to summer 2021 at the earliest. Until both SpaceX and Boeing are operating regular crew transportation flights to the ISS, the Station will be challenged to

[21] NASA, *NASA Plan for Commercial LEO Development* (June 7, 2019).

[22] NASA, *Next Space Technologies for Exploration Partnerships-2: Broad Agency Announcement NNH16ZCQ001K* (September 23, 2019). NASA released the initial Next Space Technologies for Exploration Partnerships Broad Agency Announcement in 2014 and made selections in 2015.

operate at full utilization, impacting the amount of on-board research and Station maintenance that can be accomplished.

NASA's plan for the ISS, as detailed in the President's FY 2021 budget request, envisions new commercial facilities and platforms in low Earth orbit. This plan includes a request for $150 million for commercialization of low Earth orbit. The effectiveness of this plan while continuing to provide substantial funding to maintain and operate the ISS remains to be seen, particularly with regard to the feasibility of fostering increased commercial activity in low Earth orbit. It is clear that the ISS will require significant federal funding beyond 2025, given the current limited commercial market interest in assuming the Station's operational costs. To the point, an independent review conducted in 2017 concluded that the profitability of a commercial platform like the ISS in low Earth orbit is questionable and will be highly dependent upon generating sufficient revenue from commercial activities and keeping operation costs low.[23]

Moving forward, NASA will need to continue to support opportunities for private operators to sustain private platforms in low Earth orbit. This includes working with other federal agencies to ensure that the adoption of regulations for the commercial use of space promote economic growth while minimizing uncertainty for taxpayers, investors, and private industry.[24] More broadly, whether NASA decides to extend, increase commercialization of, or retire the ISS, the timing of each of these decisions has a cascading effect on the funding available to support space flight operations in low Earth orbit, ambitions for establishing a permanent presence on the Moon, and ultimately sending humans to Mars. The sooner NASA, the Administration, and Congress agree on a definitive path forward for the ISS, the better NASA will be able to plan for that future.

Key Unimplemented Recommendations

Correct identified safety-critical technical issues before the crewed test flights, including parachute, propulsion, and launch abort systems, to ensure sufficient safety margins exist (IG-20-005).

Ensure there is a contingency plan for each exploration-enabling technology demonstration not scheduled to be fully tested by 2024 (IG-18-021).

Complete all end-of-mission critical systems and open work related to nominal and contingency deorbit operations (IG-18-021).

Ongoing and Planned Audit Work

NASA's Management and Utilization of Low Earth Orbit
This audit will examine NASA's utilization and management of the ISS and its plans and progress toward developing a commercial market in low Earth orbit.

[23] Science and Technology Policy Institute, "Market Analysis of a Privately Owned and Operated Space Station," March 2017.

[24] 83 Fed. Reg. 24901, Space Policy Directive 2: Streamlining Regulations on Commercial Use of Space (May 30, 2018).

Challenge 4: Attracting and Retaining a Highly Skilled Workforce

Why This Is a Challenge

The success of NASA's projects and missions relies on the Agency attracting and retaining a highly skilled workforce with diverse technical and management skills. Although 2019 marked the 8th year in a row that NASA was voted the top large agency in the *Best Places to Work in the Federal Government* rankings, workforce challenges remain a concern.[25]

The OIG and GAO have reported on multiple NASA projects—Europa Clipper, Low-Boom Flight Demonstrator, and Mars 2020 to name a few—that have experienced workforce challenges, including not having enough staff or not having staff with the right skills. Our September 2020 report on the Planetary Science Division noted that 16 of NASA's 19 engineering technical disciplines experienced a medium- to high-risk of their workforce being unable to meet current and future mission needs.[26]

Several of the Agency's workforce challenges can be traced to factors external to NASA. In July 2017, the National Academy of Public Administration concluded that "the Federal Government's human capital system is fundamentally broken."[27] The Academy identified issues such as: comparative decline in Federal employment to the U.S. population but increasing expectations for government to solve major issues; challenges in recruiting and retaining millennials into the aging Federal workforce; gaps in data driven governance; governance sprawl across sectors including higher contractor to civil service ratios; and the evolving nature of government occupations. In addition, NASA must compete for talent within the limited national supply of Science Technology Engineering and Math (STEM) workers. The Executive Director of the American Institute of Aeronautics and Astronautics testified to Congress in June 2018 about a nationwide shortage of STEM workers across the aerospace community that will require significant investments to overcome.[28]

A series of internal factors also contribute to NASA's workforce challenges. Primary among these is the growing risk from an impending retirement wave. Roughly 11,000 of NASA's 17,000 employees (65 percent) fall under the occupation category "science and engineering"—the portion of the workforce that provides technical capabilities to enable space flight and science missions. Within this category, 6,000 of the 11,000 are more than 50 years old, and of those approximately 3,200 employees

[25] The Partnership for Public Service is a nonprofit, nonpartisan organization that strives for a more effective government for the American people.

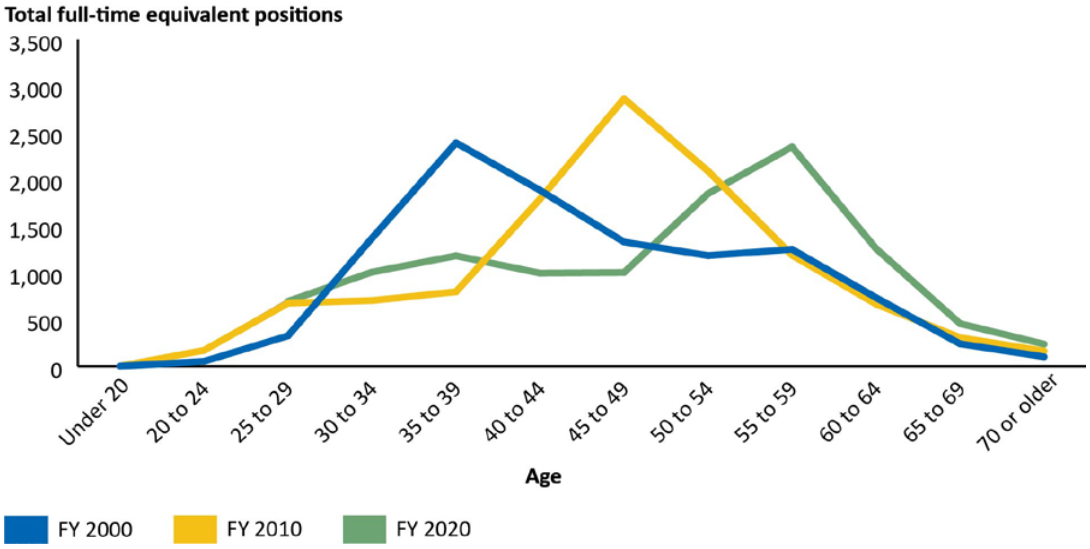
[26] The 19 technical discipline capabilities are Aerosciences; Avionics; Cryogenics; Electrical Power; Flight Mechanics; Guidance, Navigation, and Control; Human Factors; Life Support/Active Thermal; Loads and Dynamics; Materials; Mechanical Systems; Non-Destructive Evaluation; Passive Thermal; Propulsion; Sensors and Instruments; Software; Space Environments; Structures; and Systems Engineering.

[27] National Academy of Public Administration, *No Time to Wait: Building a Public Service for the 21st Century* (July 2017).

[28] Testimony of Daniel L. Dumbacher before the Subcommittee on Space Committee on Science, Space, and Technology, United States House of Representatives (June 14, 2018). The American Institute of Aeronautics and Astronautics' membership includes nearly 30,000 engineers and scientists from 88 countries dedicated to the global aerospace profession.

are eligible to retire in 2020, with an additional 2,000 employees becoming eligible within the next 5 years. This wave of impeding retirements, shown in Figure 4, could result in a significant loss of institutional knowledge and skills at a critical time for NASA. The Agency's ability to monitor and mitigate this risk is hampered by a lack of retirement and staffing data applicable to the key technical disciplines, gaps in the transfer of knowledge (e.g., ad hoc or lack of formal mentoring), challenges in ensuring a robust employment pipeline, and ineffective use of available hiring flexibilities. NASA's workforce capacity is being further challenged as the Agency's ambitious Artemis mission ramps up to meet its goal of returning humans to the Moon in 2024.

Figure 4: Science and Engineering Workforce Trend



Source: NASA OIG presentation of Agency workforce data.

Progress in Addressing the Challenge

NASA has made several attempts to "right-size" its workforce over last decade.[29] In 2012, the Agency studied a new agency operating model through its Technical Capabilities Assessment Team (TCAT). TCAT's goal was to identify and assess the technical capabilities the Agency needs to meet current and future missions and make recommendations on investing in, consolidating, or eliminating unneeded capabilities. Subsequent related efforts included the Business Service Assessment which focused on evaluating mission support functions such as information technology, procurement, human capital, and facilities and the Capability Leadership Model which evaluated technical capabilities such as Astrophysics or Aircraft Operations. Additionally, the Mission Support Future Architecture Program (MAP), begun in 2017, is a phased plan to evaluate and realign each mission support organization to more efficiently utilize employee skills across the Agency, creating enterprise workforce structures to meet evolving mission needs.

[29] "Right-size" refers to the processes of restructuring NASA's infrastructure and workforce to align with current and future organizational goals.

Critical to maintaining a sufficiently talented aerospace workforce supply is improved engagement with the education community and young professionals. To encourage the next generation of employees to join aerospace and STEM professions, NASA is partnering with nonprofit organizations and educational institutions. For example, the CubeSat Launch Initiative (CSLI) provides rideshare opportunities for small satellite payloads—built by universities, high schools, or non-profit organizations—to fly on launches when space is available. Since its inception in 2010, CSLI has flown 108 CubeSats. Additionally, the Agency's NASA's Robotics Alliance Project inspires youth in STEM fields through robotics competitions that reach thousands of students. Missions such as the Lucy Student Pipeline Accelerator and Competency Enabler (L'SPACE) provide undergraduates the opportunity to support NASA's Lucy Mission.[30]

NASA has also increased utilization of several special hiring authorities to address workforce gaps in highly specialized, critical skill areas. For example, the National Aeronautics and Space Act authorizes the Administrator to hire up to 425 scientific, engineering, or administrative employees (NASA Excepted, or "NEX") without regard to the Classification Act of 1949 rules for classifying positions and assigning pay rates.[31] Further, NASA obtained direct hire authority in 2019 and 2020 for STEM, professional, administrative, and technical occupations to support the Artemis mission. Additionally, in July 2020 the Office of the Chief Human Capital Officer issued the *NASA FY20-21 Human Capital Operating Plan* that details how NASA plans to execute the human capital elements in the Agency's Strategic Plan.

Key Implemented Recommendations

Issue an Implementation Plan that aligns and remains current with NASA's Strategic Plan and accurately reflects the Office of Education's strategic direction and management of the education portfolio (IG-16-001).

Create standardized guidance for performing annual capability assessments that considers, at a minimum, the appropriate time and resources for performing the assessments and the required data, analyses, and expected goals or results (IG-17-015).

Evaluate current and future critical technical staffing requirements by project over the next 5 years (IG-19-019).

Work That Needs to Be Done

To maintain a world-class workforce, NASA must fill current critical workforce gaps and prepare for those yet to emerge. Meeting this challenge will require planning about how to mitigate the Agency's looming retirement wave. Furthermore, the ability to successfully address that risk will require the Agency to have detailed visibility into workforce skill types—data that the Agency currently does not collect. Ideally, NASA would use that data, in combination with national STEM priorities, to support the Agency's technical needs. NASA will also need funded, formal mentoring and knowledge-sharing programs to enable the transfer of institutional knowledge before it is lost.

[30] Lucy is a satellite spacecraft mission expected to launch in October 2021 with a primary mission to visit "Trojan" asteroids of Jupiter that are grouped ahead and behind the giant planet.

[31] National Aeronautics and Space Act, codified at 51 U.S.C. § 20113(b), and Classification Act of 1949, codified at Title 5 U.S.C. Chapter 51.

Over the past four years, NASA has unsuccessfully proposed eliminating its traditional education programs, which include funds for internships provided by Space Grants, minority engagement in K-12 education in the New Minority University Research and Education Project, university participation in the Established Program to Stimulate Competitive Research, and general STEM engagement in STEM Education and Accountability Projects.[32] These NASA programs, together with those mentioned above, seek to produce increased numbers of graduates prepared for STEM occupations. Moreover, NASA should focus sustained efforts toward areas of critical workforce need.

As noted above, NASA has made efforts to "right-size" its workforce through the TCAT, Business Services Assessments, Capability Leadership Model, and now MAP. Our audits have shown that despite establishing frameworks for change, NASA has had limited success implementing these efforts to reorganize Agency-wide operations.

Key Unimplemented Recommendations

Finalize and fully implement the performance metrics dashboard to measure acquisition performance (IG-21-002).

Engage relevant Centers and technical capability leaders to identify and implement budgetary and accounting system options to support the health of critical discipline capabilities (IG-20-023).

Institute additional opportunities based on existing NASA leading practices to foster and track mentoring to ensure a robust pipeline for Planetary Science Division related disciplines (IG-20-023).

Ongoing and Planned Audit Work

We will continue to monitor progress on the Agency's workforce master plan and may initiate an audit to assess NASA's workforce challenges. We will also continue to examine specific workforce issues as part of broader audits and reviews.

[32] In fiscal year 2020, Congress appropriated the Office of STEM Engagement $120 million that was not requested by NASA.

Challenge 5: Improving Oversight of Contracts, Grants, and Cooperative Agreements

Why This Is a Challenge

In FY 2019, NASA spent approximately $19.5 billion of its $24 billion in total obligations on contracts, grants, and cooperative agreements awarded primarily to businesses, educational and nonprofit institutions. Given NASA's continued reliance on contractors to provide essential goods and services, the Agency must ensure it receives fair value for these investments and that funds are spent appropriately. However, the Agency continues to face challenges in managing contracts, grants, and cooperative agreements for research and development activities, services, supplies, and equipment. Additionally, under Section 3610 of the pandemic relief legislation known as the CARES Act, agencies are permitted to reimburse contractors for work stoppages caused by the pandemic to keep employees and subcontractors in a ready state given the closure of NASA Centers. This provision is particularly relevant to an agency like NASA that relies so heavily on private contractors for its science and space exploration projects. It is imperative that NASA ensure these Section 3610 funds are appropriately identified, recorded, and segregated, since the reimbursement may be paid not only from NASA's $60 million in CARES Act funding, but also from its annual appropriations. Furthermore, it will be incumbent upon NASA contracting officers to oversee contractor activity and obtain appropriate documentation to identify contractors that qualify for this relief.

Throughout its history, NASA has faced long-standing challenges with oversight of its contracts and grants. GAO first designated the Agency's acquisition management as high risk in 1990, and it has remained a high-risk area for almost 3 decades due to persistent cost growth and schedule delays in many of NASA's major projects. Similarly, the OIG has highlighted acquisition as a management challenge for the past 14 years. In recent years, we have expressed concerns related to contract management practices on several of NASA's acquisition efforts:

- NASA lacked visibility into its contract with Boeing to produce the SLS Core Stage because the contractor's key development activities were co-mingled into one contract line item, making it difficult for the Agency to separate and track individual expenditures. Additionally, flaws in NASA's evaluation of Boeing's performance resulted in the Agency inflating the contractor's scores and leading to overly generous award fees in an environment of substantial cost overages and schedule delays—of which we questioned $64 million. Finally, contracting officers approved contract modifications and issued task orders to several contracts without proper authority, exposing NASA to $321.7 million in unauthorized commitments, most of which required follow-up contract ratification.[33]
- The Agency also experienced challenges with its commercial crew contract with Boeing. NASA agreed to pay an additional $287.2 million above Boeing's fixed prices to mitigate a perceived 18-month gap in ISS flights anticipated in 2019 for the company's third through sixth crewed missions (which, to date, have yet to begin), and to ensure the company continued as a second

[33] According to the FAR, "ratification" is the act of approving an unauthorized commitment by an official who has the authority to do so.

commercial crew provider. In our judgment, the additional compensation was unnecessary and any gap could have been addressed through the purchase of additional Soyuz seats – seats that the Agency ultimately purchased. In total, we questioned $187 million of the NASA's additional payment to Boeing as unnecessary costs.

- Similarly, NASA has also been overly generous with award fees for Lockheed Martin, the prime contractor for the Orion Program. The program used subjective award fee evaluations, as well as nebulous and outdated criteria, resulting in the contractor receiving 91.4 percent of its available award fee—$863 million between 2006 and March 2020—despite significant performance shortfalls and substantial cost and schedule growth. In addition, the "look-back clause" for end-item contracts like the one used for Orion serve as a disincentive to contractor performance because they give the contractor a second opportunity to collect unearned fees once the end-item (in this case the Orion capsule) is delivered.[34]

NASA's grants and cooperative agreements are also at risk of mismanagement and fraud. Key areas of concern include ensuring grant investments achieve intended results, overseeing the use of grant funds, and obtaining timely and accurate financial and performance information from grantees. We find repeated cases where NASA and award recipients lacked an adequate system of controls to ensure proper administration and management of awards, and as a result funds were not used for their intended purposes. For example, we identified instances of inappropriate use of grants for the construction of telescopes and operation and maintenance of an observatory where a contract would have been more appropriate and would provide NASA greater oversight and the ability to minimize risks of improper spending by the grantee.

Prior NASA financial statement audits have also identified oversight and internal control issues related to the grant management process. Specifically, in recent financial statement audits we found no controls to ensure grantee expenditures were managed and administered appropriately, thereby ensuring that federal funding is expended and associated programs are implemented in full accordance with statutory and public policy requirements. For active grants reviewed during our annual financial statement audits since FY 2015, NASA was unable to provide documentation indicating whether the grantee expenses were reviewed for reasonableness.

Our Office of Investigations conducts criminal investigations involving grant fraud and abuse. Over the past 3 years, we have conducted 8 grant fraud investigations resulting in 4 indictments, 1 prosecution, $740,000 in direct recoveries to NASA, $2.6 million in civil settlements, and 5 debarments.

Collectively, our audit and investigative work has shown that NASA's inadequate management and oversight of contracts, grants, and cooperative agreements has resulted in inappropriate expenditures and wasted taxpayer dollars that negatively impacted the Agency's mission. In 2015, we launched a data analytics initiative to help identify indicators of contract, grant, and procurement fraud, and since that time, our Advanced Data Analytics Program has provided numerous analytic products to our investigative and audit teams to help identify potential fraud. For example, our auditors now review grant recipient's general ledger data, which has successfully uncovered unallowable costs. Additionally, our investigators utilize data sets based on similar fraud indicators from previously successful prosecutions, thereby better focusing their oversight efforts. We continue to use a variety of statistical

[34] For contracts with this clause, NASA evaluates contractor performance and makes interim award-fee payments throughout the course of the contract, but the amount of award fee the contractor ultimately receives is based upon demonstrated performance of the end-item deliverable.

and mathematical techniques to gather, analyze, and interpret Agency and open-source data to identify fraud indicators and help target OIG audit and investigations resources.

Progress in Addressing the Challenge

Illustration of the Low-Boom Flight Demonstrator

Source: NASA

While NASA has made several enterprise-wide changes to address challenges related to its procurement oversight and acquisition management, progress remains slow. In what we view as a positive trend, NASA's use of award-fee contracts has diminished as a percentage of procurement dollars paid to businesses from 56 percent in FY 2014 to 47 percent in FY 2019. In addition, the Agency revised the NASA Federal Acquisition Regulation Supplement in 2016 to address a number of questionable practices we identified in a 2013 report, including award fees not justified by contractor performance and high ratings not supported by technical, cost, and/or schedule performance. Similarly, in a May 2020 audit of NASA's Low-Boom Flight Demonstrator (LBFD) Project, we found that management instituted a sound acquisition strategy when Lockheed Martin was issued a task order under an existing contract for the preliminary design of the aircraft and was then selected as the contractor for LBFD's subsequent phases after a full and open competition. The LBFD Project also implemented an innovative project management structure that leveraged geographically dispersed aeronautics expertise across multiple NASA Centers rather than designating a single Center as the lead for LBFD development. In addition, the LBFD Project provided the contractor more-than-expected amounts of government furnished equipment, which reduced procurement costs. Additionally, several OIG recommendations have been implemented within the SLS Program that will establish greater controls within the program, enhance government oversight into contract costs, and address excessive payments of award fee. While we recognize these are positive trends in NASA's contract management, we believe sustained leadership commitment and attention is needed to make meaningful progress in addressing this long-standing challenge.

NASA has also made efforts to increase its efficiency in closing expired grants. Over the past 5 years, the Agency has revised its Grants and Cooperative Agreement Manual—including updating procedures regarding pre-award risk reviews and closeout of awards—in response to OIG recommendations and its own initiatives, which has strengthened the Agency's grants management and oversight.[35] Furthermore, in October 2019 NASA entered into a new contract with its grant closeout service provider under which payments to the provider are based on the volume of grants closed. We believe that this new contract should provide further incentive for closing grants in a timely manner.

[35] The *NASA Grant and Cooperative Agreement Manual* and associated information can be found at https://prod.nais.nasa.gov/pub/pub_library/srba/index.html (last accessed May 19, 2020).

Key Implemented Recommendations

Renegotiate the Boeing Stages contract based on both Boeing and federal government cost estimates (IG-19-001).

Separate each deliverable (Core Stage 1, Core Stage 2, and EUS) into its own CLIN for tracking costs, performance, and award fees (IG-19-001).

For large award fee contracts where NASA has on-site personnel, ensure they are appointed in writing and clearly assigned the task of monitoring and reporting on the performance of the contractor (IG-20-012).

Work That Needs to Be Done

In 2017, NASA initiated MAP to optimize all mission support functions with a more interdependent enterprise model that enables the sharing of capabilities across Centers, realign budget structures, and improve collaboration. The Headquarters Office of Procurement began operating under the new model in October 2019. Also, in 2018 the Headquarters Office of Procurement developed an Acquisition Portfolio Assessment Team to address inefficient procurement operations across NASA, including redundant and duplicative contracts, duplicative services and workforce capabilities across multiple Centers, and limited procurement workload capacity.

Successful implementation of these initiatives could provide more consistency in oversight and management of contracts, grants, and cooperative agreements, as well as sharing of lessons learned. However, as we have seen in past NASA enterprise-wide initiatives, progress can be slow and halting due largely to the Agency's decentralized management structure, lack of insight into Agency-wide operations, and the limited authority of Headquarters officials to control budgets and implement change at the Center level. We have similar concerns with the Agency's ability to reorganize procurement management authority, operations, and oversight into a Headquarters-based, enterprise-level function. Finally, NASA needs to improve its oversight of the grants process to include documentation requirements and developing a process for tracking questioned costs. Moving forward, ensuring proper use of NASA's resources remains a top priority and Agency contracting personnel need to be proactive in their efforts to prevent fraud and mismanagement before it occurs.

Key Unimplemented Recommendations

Develop policies and procedures for how desk reviews and on-site visits will be conducted and documented, including the frequency with which such grantee monitoring will occur to cover programmatic and financial requirements (IG-20-009).

In coordination with the NASA Shared Services Center, comply with the Federal Grant and Cooperative Agreements Act of 1977 on the proper use of grants and contracts to allow Center and Program personnel greater visibility into partner operations and to ensure that funding levels and performance are commensurate with requirements (IG-20-023).

Establish science metrics, such as publications and citations per year, as criteria for the performance evaluation of the USRA contract award fee (IG-20-022).

Ongoing and Planned Audit Work

The OIG's Offices of Audits and Investigations, in conjunction with our Advanced Data Analytics Program, will continue to assist NASA in its acquisition oversight efforts by examining Agency-wide procurement and grant-making processes. These efforts will include actions NASA is taking to identify and mitigate grant fraud risks; auditing individual contracts, grants, and cooperative agreements; and investigating potential misuse of contract and grant funds. Additionally, in fall 2020 we contracted with several external entities to perform incurred cost audits of four NASA subcontractors.

NASA's Management of the Universities Space Research Association
This audit is evaluating NASA's partnership with the Universities Space Research Association relative to proper use of and accounting for Agency resources while meeting program requirements.

Oversight of CARES Act Funding
This audit will evaluate NASA's expenditure of its $60 million in CARES Act pandemic relief funds.

Challenge 6: Managing and Mitigating Cybersecurity Risk

Why This Is a Challenge

NASA spends more than $2.2 billion annually on a portfolio of information technology (IT) assets, and protection of its data and IT systems is central to the success of the Agency's aeronautics, space exploration, science, and overall operations. To accomplish its wide-ranging and complex operations, NASA depends on institutional and mission networks, software, and IT products and services to control spacecraft, collect and process scientific data, and provide security for critical Agency programs and infrastructure.[36] For FY 2020, the Office of the Chief Information Officer (OCIO) allocated approximately $74 million on cybersecurity. Given the unrelenting threats to its IT infrastructure, we remain concerned about gaps between NASA's threat exposure and its ability to effectively manage and mitigate cyber risk.

While there are various ways to measure cybersecurity risk, one key indicator of cyber vulnerability is how much of an agency's data is available on the darknet (also known as the dark web) that can be misused by hackers or criminals. NASA's darknet risk score ranks 7th highest in the federal government, just behind branches of the military.[37] Another measure of NASA's cybersecurity posture is its annual ratings judged against federal IT criteria: the Federal Information Security Modernization Act (FISMA) and the Federal Information Technology Acquisition Reform Act (FITARA).[38] During the 2020 FISMA evaluation, NASA's information security program remained at a Level 2 out of 5—meaning the Agency has issued, but has not consistently implemented, policy and procedures defining its security program. Additionally, in July 2020 NASA received an overall FITARA grade of C+ given its challenges in managing major IT investment risk and cyber threats.

This year, our emphasis on managing and mitigating cybersecurity risk is heightened because, like other federal agencies, NASA's IT infrastructure has seen an uptick of cyber threats, with phishing attempts doubled and malware attacks exponentially increasing during the COVID-19 pandemic. To address the complexity and uncertainty of its cybersecurity challenges, NASA must address three critical areas: lax IT security plans, numerous corrective action plans to remedy security deficiencies, and an extensive web footprint. Until these vulnerabilities are addressed by the OCIO, NASA's IT systems will remain susceptible to a multitude of existing and emerging cyber-related threats.

[36] NASA's IT assets generally fall into two broad categories: institutional and mission. Institutional (corporate) systems support the day-to-day work of NASA employees and include networks, data centers, web services, desktop and laptop computers, enterprise business applications, and other end-user tools such as email and calendaring. Mission systems support the Agency's aeronautics, science, and space exploration programs and host hundreds of IT systems distributed throughout the United States.

[37] The Darknet Index US Government Edition: Ranking US Government Agencies Using Darknet Intelligence. By comparison, the Federal Bureau of Investigation, Nuclear Regulatory Commission, Central Intelligence Agency, and U.S. Cyber Command rank 11, 31, 48, and 57, respectively.

[38] FISMA, as amended in 2014 (Pub. L. No. 113-283), requires agencies to develop, implement, and document an agency-wide information security program. FITARA puts federal agency Chief Information Officers in control of their agency's IT investments.

Recent OIG audits have found NASA's ability to detect and recover from cyberattacks are hampered by incomplete and inaccurate system security plans that categorize systems and data; prescribe formal techniques for protecting information systems from unauthorized users, viruses, and other events; and specify the actions needed to respond to these threats.[39] For example, in recent reports we found numerous instances of the Agency's system security plans lacking the required measures and information such as system categorization, contingency plans, risk assessments, and system boundary descriptions—elements that are essential in identifying and managing cyber risk.[40] Importantly, an imprecise system security plan directly impacts the requirements and controls needed to address specific cyber risks within the IT environment. The continuing laxness of NASA's security plans raises concerns about the Agency's overall level of cybersecurity preparedness.

Although NASA developed a remedial action process and maintains a database to track the status of corrective actions for security vulnerabilities, as of May 2020 more than 1,800 actions remain open. Agency officials attribute these corrective action delays to operational priorities and resource constraints. However, delays in addressing these weaknesses pose a threat to the Agency's overall security posture since the delays could allow intruders to exploit these deficiencies. For example, as we recently reported, NASA needs to fully implement security controls that help protect its networks from unauthorized access by personal mobile IT devices (smartphones, tablets, and laptop computers).

Additionally, NASA's inventory of nearly 3,000 web domains, including more than 42,000 publicly-accessible datasets, presents a significant cyber risk.[41] In May 2019, the NASA Administrator requested "a full review of NASA's Web footprint and digital presence" and an assessment team led by the NASA Office of the Chief Scientist was tasked with recommending ways to reduce cyber vulnerabilities by strengthening digital security.[42] Until the Agency obtains a comprehensive accounting of all its websites and reduces the number, security vulnerabilities remain. For example, in November 2019 we issued a Management Referral regarding the compromise of a NASA system hosting more than 40,000 records containing personally identifiable information such as social security numbers and dates of birth. These records were improperly accessed when an Internet-facing server at a NASA Center was compromised and the attackers remained undetected for nearly a month after the intrusion. Believed to have originated from a Chinese IP address, this attack occurred because of inadequate monitoring and NASA's failure to apply a software patch to the server in a timely fashion. If not for notification by NASA

[39] System and data categorization is designed to provide a foundation for determining the security controls that should be applied to an information system commensurate to its criticality in an effort to ensure appropriate confidentiality, integrity, and availability risk is addressed.

[40] The system and authorization boundary establish the scope of protection for an IT system, which includes people, processes, and technologies.

[41] NASA's clearinghouse for data provided to the public encompassing a variety of datasets such as earth science, geospatial data, and atmospheric chemistry is data.nasa.gov.

[42] A "digital presence" refers to how NASA appears online and is what people find when searching for NASA on the Internet. For example, digital presence includes content that the Agency controls, like its websites and social media profiles, but also content that it cannot control, such as online reviews or comments. Web Site Modernization and Enhanced Security Protocols Memorandum, May 15, 2019.

counterintelligence officials, it is unclear when the intruders would have been detected through existing NASA cybersecurity processes and capabilities. As a result of this incident, NASA paid approximately $150,000 to a credit monitoring company for identity theft monitoring services for the affected employees.

Progress in Addressing the Challenge

Over the past several years, the OCIO has taken positive steps to improve NASA's overall information security program and posture, including implementing Department of Homeland Security directives and legislative requirements. For example, NASA began using cyber risk software and established the use of Risk Information Security Compliance System (RISCS) across the Agency. Although RISCS allows IT system owners to administer and track cybersecurity compliance, additional functionality and quality-checking data entered into the system needs to be implemented.

Likewise, the Agency made progress in the areas of identity management and authentication which provides visibility into who and what is connected to the institutional network. NASA requires 100 percent of privileged users to sign in before using its IT assets with Personal Identity Verification (PIV) credentials with privileged users having more IT system authority than ordinary (non-privileged) user. For example, privileged users might be able to install or remove software, upgrade the operating system, or modify application configurations. Also, they might have access to files not normally accessible to non-privileged users. Importantly, in 2019 NASA met the 90 percent FISMA Risk Management Assessment target of unprivileged users required to utilize PIV. With that said, implementing similar PIV capabilities for their unique mission systems requires continued focused attention.

Lastly, having organization-wide governance and appropriate resources is essential to mitigating cybersecurity risk. In September 2019, NASA updated its IT Strategic Plan that identifies critical activities, milestones, and resources needed to manage IT as a strategic resource. For example, consistent with the plan and past OIG recommendations, NASA streamlined its previously fragmented IT governance model by integrating its mission processes across organizational boundaries. To further improve its IT operating model, the OCIO is participating in MAP, which is intended to improve NASA's mission support services by moving toward an enterprise computing model to centralize and consolidate IT capabilities while ensuring unique local requirements are met.[43] As a result, the OCIO expects to complete its MAP assessment by March 2021 with implementation in 2021. Ultimately, MAP's success depends in large part on the OCIO efforts to be agile, transformational, and forward thinking. Subsequently, as MAP progresses, we will continue to assess to what extent the planned IT realignment has centralized and strengthened cybersecurity throughout the Agency, as well as overcoming long-standing agency resistance to consolidating management of budgets at Headquarters versus the Centers.

[43] Enterprise computing is the use of IT systems in a centralized structure, where the IT department manages technology, and everyone works with standardized products and systems.

Key Implemented Recommendations

Ensure OCIO and OSI representatives are included in functional reviews of NASA's critical infrastructure assets and facility security assessments so that cyber and facility interdependencies are addressed appropriately (IG-17-011).

Identify and reduce unnecessary duplication of the incident monitoring, detection, and response capabilities, including toolsets and competencies available Agency-wide to enhance the capabilities and resources of the SOC and realize efficiencies in the management of these capabilities (IG-18-020).

Require the JPL CITO to complete its validation and updates of open waivers, perform annual reviews to ensure system representatives are validating the need for the waiver, and provide NASA documentation of these waivers (IG-19-022).

Work That Needs to Be Done

Managing and mitigating cybersecurity risk is critical to protecting NASA's vast network of information technology systems from malicious attacks or other breaches that may inhibit the Agency's ability to carry out its mission. While NASA has taken steps to address cybersecurity risks, it continues to face challenges in strengthening its internal controls and insight across Agency systems. Specifically, the OCIO needs to (1) address information security deficiencies within security plans, (2) ensure that corrective action plans for security deficiencies are resolved in a timely manner, and (3) reduce the Agency's vast web footprint. Concurrently, Agency leadership needs to demonstrate its commitment to timely implementation of MAP to centralize and consolidate cybersecurity activities and reduce gaps in vulnerability management. Without sustained improvement, NASA will be challenged to reduce the risk of cyberattacks that may expose sensitive information or jeopardize intellectual property and compromise the Agency's mission.

Key Unimplemented Recommendations

Perform an assessment to evaluate the feasibility of modifying RISCS to ensure that required data fields, system inventory sections, and other supporting documentation required for the creation or modification of a system security plan are completed before a system can be authorized to operate (IG 20-017).

Issue clarifying policy guidance to ensure that information security controls for all active NASA information systems that are categorized as "other than satisfied" are properly supported by either a Plan of Action and Milestones or Risk-Based Decision document and track exceptions in Agency-wide monitoring tools (IG 20-017).

Ongoing and Planned Audit Work

Cybersecurity Readiness
This audit is examining NASA's ability to identify and respond to current and future cybersecurity threats.

Evaluation of NASA's Information Security Program under the Federal Information Security Modernization Act for Fiscal Year 2020
This annual review is evaluating NASA's information security program.

Challenge 7: Addressing Outdated Infrastructure and Facilities

Why This Is a Challenge

NASA and its partners rely on the Agency's infrastructure to prepare for missions to the Moon and Mars, facilitate a commercial space industry, conduct aeronautics research, and study Earth and space science. With installations in 14 states, NASA manages $40 billion in assets with an inventory of more than 5,000 buildings and structures, making the Agency one of the largest property holders in the federal government. Over the past 60 years, NASA has used its unique facilities to develop new and innovative technologies for space exploration, scientific research, and aeronautics. To achieve its current exploration and research goals, the Agency needs to maintain these facilities in a safe and sustainable condition.

Primary among NASA's challenges in this area is the fact that over 75 percent of its facilities are beyond their original design life. While it strives to keep these facilities operational, the Agency faced a deferred maintenance backlog of $2.66 billion as of 2020. This has resulted in unscheduled maintenance costing up to three times more to repair or replace equipment after it has failed rather than if scheduled maintenance had occurred. The Agency is also responsible for 155 abandoned properties worth $307 million that present a safety and maintenance liability as many have structural or interior deficiencies.

As NASA updates its ground support infrastructure for lunar missions, many of its facilities are undergoing modifications to accommodate modern launch capabilities. For example, the EGS Program at Kennedy Space Center is upgrading infrastructure and facilities required for the Artemis program, including modernization of Pad 39B and modification of the Vehicle Assembly Building to accommodate the SLS rocket and Orion capsule. In March 2020, we reported that NASA greatly surpassed its cost and schedule targets on a project to develop the Agency's first mobile launcher. We also found that the Agency is missing opportunities to improve project management and oversight as it begins development of a second mobile launcher.

Vehicle Assembly Building for the SLS, Kennedy Space Center

Source: NASA

NASA's construction projects faced additional challenges in 2020 due to the COVID-19 pandemic. As the Agency implemented its emergency response plan, installations across the country were closed except to protect life and critical infrastructure. Consequently, NASA was forced to scale back work on construction projects that will, in turn, face challenges from increased costs and schedule delays. Additionally, as facilities were re-opened for mission critical work, the Agency has obligated $3.8 million on cleaning expenses to ensure the buildings are properly sanitized for the workforce.

NASA is also managing several significant environmental cleanup efforts including the Santa Susana Field Laboratory (SSFL), a project that accounts for 40 percent of the Agency's overall environmental cleanup liability. In March 2019, we questioned $377 million in unfunded liability costs associated with NASA's current soil cleanup plans for the SSFL. We questioned these costs because the Agency's current approach is not based on risks to human health and the environment or the expected future use of the land, the standard practice for environmental remediation at similar sites. Spending the more than $500 million required to clean the soil to the current exacting standards would preclude the Agency's ability to address other environmental cleanup priorities such as a project to remove contaminants from drinking water used by communities surrounding the Jet Propulsion Laboratory in Pasadena, California.

Progress in Addressing the Challenge

NASA's Construction of Facilities program focuses on modernizing the Agency's infrastructure into fewer, more sustainable facilities and repairing failing infrastructure to reduce overall maintenance costs. This has resulted in an increasing number of construction projects to eliminate or repurpose old or unused facilities. For example, in April 2019 Marshall Space Flight Center completed Building 4221, part of the refurbishment of the "4200 Complex" that included the demolition and replacement of old buildings with new, more sustainable facilities. Additionally, as we reported in October 2018, the Agency is utilizing $18 million in historic property lease proceeds at Ames Research Center to maintain facilities including the Unitary Planned Wind Tunnel, Arc Jet Complex, and Vertical Motion Simulator.

Furthermore, NASA has initiated a number of significant infrastructure projects to support its Artemis program, such as refurbishing Kennedy Space Center's Vehicle Assembly Building and Launch Complex 39B; activating Stennis Space Center's B-2 Test Stand in preparation for the SLS rocket's Green Run test; and constructing the new Modular Supercomputing Facility at Ames Research Center to run complex simulations in support of the Artemis program.

Key Implemented Recommendation

Decide whether to preserve or demolish the remaining six test stands and related structures before soil remediation begins and take action on that decision (IG-19-013).

Work That Needs to Be Done

Over the past few years, we have assessed a variety of infrastructure issues including the Agency's environmental remediation efforts; management of NASA's historic real and personal property; efforts to "rightsize" the NASA workforce, facilities, and other supporting assets; construction of new assets such as test stands; and NASA's efforts to reduce unneeded infrastructure and facilities. Common themes from these reviews are NASA's slow implementation of corrective actions, inconsistent

implementation of Agency policies, and the need for stronger life-cycle cost considerations in facility construction decisions.

NASA will need to continue to make difficult decisions to invest, divest, or consolidate unneeded infrastructure; effectively communicate those decisions to stakeholders; and withstand the inevitable political pressure to retain unnecessary capabilities and facilities at Centers throughout the country. These decisions will become even more essential following the COVID-19 pandemic, which has resulted in widespread telework and reignited questions about the number and size of facilities the Agency will need in the future. Additionally, despite some progress, the Agency needs to address its substantial deferred maintenance backlog and significant environmental cleanups at multiple sites.

Key Unimplemented Recommendation

Ensure life-cycle and milestone reviews incorporate programmatic and technical risks and are conducted with the Associate Administrator for Human Exploration and Operations Mission Directorate and other senior Agency officials (IG-20-013).

Ongoing and Planned Audit Work

NASA's Construction of Facilities
This audit is assessing the extent to which the Agency is effectively managing its Construction of Facilities process.

NASA's Management of Hazardous Materials
This audit is examining the Agency's management of hazardous materials.

NASA Management of Ames Research Center's Lease Management Practices
This audit will examine Ames Research Center's implementation and management of its lease agreements.

APPENDIX A: RELEVANT OIG REPORTS

Landing Humans on the Moon by 2024

NASA's Management of the Gateway Program for Artemis Missions (IG-21-004, November 10, 2020)

Orion Multi-Purpose Crew Vehicle (IG-20-018, July 16, 2020)

Audit of NASA's Development of Its Mobile Launchers (IG-20-013, March, 17, 2020)

NASA's Management of Space Launch Systems Program Costs and Contracts (IG-20-012, March 10, 2020)

NASA's Management of the Space Launch System Stages Contract (IG-19-001, October 10, 2018)

NASA's Plans for Human Exploration Beyond Low Earth Orbit (IG-17-017, April 13, 2017)

Improving Management of Major Projects

NASA's Management of the Gateway Program for Artemis Missions (IG-21-004, November 10, 2020)

NASA's Management of the Stratospheric Observatory for Infrared Astronomy Program (IG-20-022, September 14, 2020)

NASA's Management of the Space Launch System Stages Contract (IG-19-001, October 10, 2018)

NASA's Surface Water and Ocean Topography Mission (IG-18-011, January 17, 2018)

NASA's Plans for Human Exploration Beyond Low Earth Orbit (IG-17-017, April 13, 2017)

NASA's Mars 2020 Project (IG-17-009, January 30, 2017)

NASA's Challenges to Meeting Cost, Schedule, and Performance Goals (IG-12-021, September 27, 2012)

Attracting and Retaining a Highly Skilled Workforce

NASA's Management of Its Acquisition Workforce (IG-21-002, October, 27, 2020)

NASA's Planetary Science Portfolio (IG-20-023, September 16, 2020)

Management of NASA's Europa Mission (IG-19-019, May 29, 2019)

NASA's Surface Water and Ocean Topography Mission (IG-18-011, January 17, 2018)

NASA's Efforts to "Rightsize" its Workforce, Facilities, and Other Supporting Assets (IG-17-015, March 21, 2017)

Sustaining a Human Presence in Low Earth Orbit

NASA's Management of Crew Transportation to the International Space Station (IG-20-005, November 15, 2020)

NASA's Management and Utilization of the International Space Station (IG-18-021, July 30, 2018)

NASA's Management of the Center for the Advancement of Science in Space (IG-18-010, January 11, 2018)

NASA's Response to SpaceX's June 2015 Launch Failure: Impacts on Commercial Resupply of the International Space Station (IG-16-025, June 28, 2016)

NASA's Efforts to Maximize Research on the International Space Station (IG-13-019, July 8, 2013)

Improving Oversight of Contracts, Grants, and Cooperative Agreements

NASA's Planetary Science Portfolio (IG-20-023, September 16, 2020)

NASA's Management of the Stratospheric Observatory for Infrared Astronomy Program (IG-20-022, September 14, 2020)

Management of the Low Boom Flight Demonstrator Project, (IG-20-015, May 6, 2020)

Fiscal Year 2019 Financial Accounting Management Letter, Prepared by CliftonLarsonAllen LLP (IG-20-009, December 17, 2019)

Cybersecurity Management and Oversight at the Jet Propulsion Laboratory (IG-19-022, June 18, 2019)

Ames Research Center Protective Services Contract (IG-19-017, April 25, 2019)

NASA's Strategic Assessment Contract (IG-19-015, March 28, 2019)

NASA's Engineering and Technical Services Contracts (IG-19-014, March 26, 2019)

NASA's Management of the Space Launch System Stages Contract (IG-19-001, October 10, 2018)

Audit of the National Space Biomedical Research Institute (IG-18-012, February 1, 2018)

NASA's Management of the Center for the Advancement of Science in Space (IG-18-010, January 11, 2018)

NASA's Efforts to Improve the Agency's Information Technology Governance (IG-18-002, October 19, 2017)

Audit of NASA Space Grant Awarded to the University of Texas at Austin (IG-16-013, February 18, 2016)

Extending the Operational Life of the International Space Station Until 2024 (IG-14-031, September 18, 2014)

NASA's Use of Award-fee Contracts (IG-14-003, November 19, 2013)

NASA's Efforts to Maximize Research on the International Space Station (IG-13-019, July 8, 2013)

Audit of NASA Grant Awarded to HudsonAlpha Institute for Biotechnology (IG-12-019, August 3, 2012)

Audit of NASA Grants Awarded to the Philadelphia College Opportunity Resources for Education (IG-12-018, July 26, 2012)

Audit of NASA Grants Awarded to the Alabama Space Science Exhibit Commission's U.S. Space and Rocket Center (IG-12-016, June 22, 2012)

NASA Should Reconsider the Award Evaluation Process and Contract Type for the Operation of the Jet Propulsion Laboratory (IG-09-022, September 25, 2009)

Managing and Mitigating Cybersecurity Risk

Testimony before the House of Representatives Subcommittee on Space and Aeronautics, Committee on Science, Space, and Technology on *Cybersecurity at NASA: Ongoing Challenges and Emerging Issues for Increased Telework During COVID-19* (September 18, 2020)

Audit of NASA's Policy and Practices Regarding the Use of Non-Agency IT Devices (IG-20-021, August, 27, 2020)

Evaluation of NASA's Information Security Program under the Federal Information Security Modernization Act for Fiscal Year 2019 (IG-20-017, June 25, 2020)

NASA's Management of Distributed Active Archive Centers (IG-20-011, March 3, 2020)

Cybersecurity Management and Oversight at the Jet Propulsion Laboratory (IG-19-022, June 18, 2019)

Audit of NASA's Security Operations Center (IG-18-020, May 23, 2018)

NASA's Efforts to Improve the Agency's Information Technology Governance (IG-18-002, October 19, 2017)

NASA's Information Technology Governance (IG-13-015, June 5, 2013)

Sustaining Infrastructure and Facilities

Audit of NASA's Development of Its Mobile Launchers (IG-20-013, March 17, 2020)

NASA's Progress with Environmental Remediation Activities at the Santa Susana Field Laboratory (IG-19-013, March 19, 2019)

Audit of NASA's Historic Property (IG-19-002, October 22, 2018)

NASA's Efforts to "Rightsize" its Workforce, Facilities, and Other Supporting Assets (IG-17-015, March 21, 2017)

NASA's Efforts to Reduce Unneeded Infrastructure and Facilities (IG-13-008, February 12, 2013)

AGENCY RESPONSE TO OIG REPORT ON NASA'S TOP MANAGEMENT AND PERFORMANCE CHALLENGES

National Aeronautics and Space Administration

Office of the Administrator
Washington, DC 20546-0001

TO: Inspector General

FROM: Administrator

SUBJECT: Agency Response to Office of Inspector General Report, "2020 Report on NASA's Top Management and Performance Challenges"

The National Aeronautics and Space Administration (NASA) appreciates the opportunity to review and comment on the Office of Inspector General (OIG) report entitled, "2020 Report on NASA's Top Management and Performance Challenges."

The audits and investigations conducted by your office provide NASA's leadership and management with valuable contributions to the collective effort to provide oversight and gain insight into NASA's broad portfolio of programs, projects, and mission support activities with which it is entrusted. The efforts expended by your office during this past year have furthered the cause of providing the taxpayer with maximum value for each dollar invested in NASA's wide-ranging, ambitious, and challenging portfolio. As an Agency, we continue to aggressively pursue the mitigation and remediation of findings related to the audit recommendations issued by your office, including those which form the underpinnings of your observations as cited in your 2020 Report on NASA's Top Management and Performance Challenges.

While we fundamentally agree that the seven areas outlined in your 2020 report constitute significant challenges for the Agency, we would like to highlight the following mitigation and remediation efforts relative to each challenge outlined in your report that have either been taken or are currently under way. We believe these efforts substantively demonstrate NASA's commitment to addressing its most significant management and performance challenges faced by the Agency:

Challenge 1: Landing the First Woman and the Next Man on the Moon by 2024

NASA agrees that landing the first woman and the next man on the Moon by 2024 is a significant challenge, and the Agency is working hard to achieve this goal. Despite challenges associated with the COVID-19 virus, NASA continued to make steady progress towards the launch of Artemis I, the first test flight of the launch vehicle that will carry astronauts and cargo into space for the 2024 mission. With the exception of the Core Stage, all major elements of flight hardware for the first Artemis flight have been delivered to Kennedy Space Center. The Core Stage is currently undergoing green run testing, and six of eight tests have been completed as of early October. NASA is well into production for the Artemis II mission, and Artemis III hardware builds are under way.

NASA has selected three U.S. companies to develop preliminary designs for a human landing system (HLS) under the Next Space Technologies for Exploration Partnerships (NextSTEP-2) Appendix H Broad Agency Announcement (BAA). NASA has completed Contractor Certification Baseline Reviews (CBRs) for each of the three HLS contractors as planned and is on schedule in early 2021 to select the contractor(s) who will complete HLS design and development to enable the 2024 crewed mission.

The Gateway Program continues to make significant progress and has selected the first U.S. commercial provider under the Gateway Logistics Services contract to deliver cargo, experiments, and other supplies to the Gateway in lunar orbit. NASA has initiated manufacturing of the Exploration Extravehicular Mobility Unit Development Verification Test (DVT) suit, which will be the space suit astronauts will use on the lunar surface on Artemis III.

NASA has implemented a number of the OIG's key recommendations to improve cost, schedule, and technical performance and is working to complete implementation of the remaining open recommendations. NASA's status on key unimplemented recommendations is shown below:

Key Unimplemented Recommendations:

Review Human Exploration and Operations Mission Directorate and NASA program management policies, procedures, and ABC reporting processes to provide greater visibility into current, future, and overall cost and schedule estimates for the SLS Program and other human space flight programs (IG-20-012).

NASA agrees with this recommendation and has been implementing improvements to better track cost and schedule and to report progress against baselines. In addition, NASA is evaluating changes to NASA Procedural Requirements (NPR) 7120.5, "Space Flight Program and Project Management Requirements," to better enable the necessary insight into program affordability and efficient monitoring of total program costs and execution for multi-year, multi-cadence type programs. NASA estimates completion of this recommendation by spring of 2021.

Challenge 2: Improving Management of Major Projects

NASA is focused on its mission of bold exploration and discovery. In support of this mission, the Agency has developed a rigorous process for program formulation, approval, implementation and evaluation. We see excellence in program management as a core capability and critical for enabling exploration. NASA's program management expertise brings together the people, resources, and processes necessary to execute the most challenging and complex programs as we explore our world and our universe.

As NASA carries out the Nation's exploration plans, the Agency has been making strident progress on improving program planning and control and increasing transparency for external stakeholders. NASA leadership continues to evaluate the considerable progress made to date on implementation of the initiatives contained in the Agency's High Risk Corrective Action Plan (CAP). In July 2020, NASA leadership determined seven of nine CAP initiatives had been fully completed, including the creation of a technology readiness assessment best practices document, an update to the Agency's probabilistic programmatic policy (i.e., Joint Confidence Level (JCL)), increased transparency by inclusion of original Agency baseline commitments in external reporting for re-baselined projects, among other initiatives. NASA leadership also added an additional four initiatives to a renewed CAP in July 2020. New initiatives under way include a full implementation of a Schedule Repository, a comprehensive HEOMD ESD/AES cost and schedule transparency effort, enhancements to the CADRe data collection for Category 3 Class D projects, and the adoption of a risk assessment and financial evaluation of contractors' activity. The 2020 CAP is accessible via the NASA Reports and Transcripts webpage[1]. NASA leadership's progress on and renewal of the CAP is evidence that the Agency is committed to pursuing the most critical changes to increase transparency, improve cost and schedule estimation, and maintain focus on accountability.

NASA is also making substantial progress in the implementation of the Program Management Improvement and Accountability Act (PMIAA). As part of the PMIAA implementation, NASA appointed a Program

[1] https://www.nasa.gov/sites/default/files/atoms/files/nasa_high_risk_corrective_action_plan_2020.pdf

Management Improvement Officer (PMIO) within the Office of the NASA Associate Administrator. The PMIO has convened an Agency stakeholder team to lead the implementation of PMIAA and has conducted two rounds of annual NASA portfolio reviews focused on the identification, capture, and improvement of PM practices. Practices that have been addressed include improvements to schedule analyses; improvements to life-cycle reviews; and furthering implementation of tailoring approaches. The NASA PMIO is also implementing a program management integration function on behalf of the NASA AA with support from OCFO and OCE and in partnership with the Mission Directorates and Field Centers. This integration will promote overall synergy and integration of PM practices and capabilities across the Agency to further enhance PM performance and mission success.

We take our responsibilities as stewards of limited Federal resources very seriously, and we will continue to apply all available authorities to accomplish our mission efficiently. At the same time, the Nation expects NASA to embrace big challenges. NASA must continue to accept risk. Our missions will continue to incorporate the leading edge of technology and to pursue the challenging goals that can only be accomplished in the hostile environment of space. NASA missions must do things that have never been done before. NASA is developing one-of-a-kind spacecraft and new technologies. One of the key ways the Agency attempts to manage expectations with our external stakeholders is by specifically waiting until Key Decision Point-C (KDP-C) to make cost and schedule commitments. Only by KDP-C are technical designs and risk assessments mature enough to make these important commitments. Two of the cost growth examples cited by the OIG (Europa Clipper and the Roman Space Telescope) are measured against early estimates of cost instead of cost commitments. The Science Mission Directorate (SMD) has made substantial investment in pre-formulation mission studies and technology development in order to address some of the concerns identified by the OIG and continues to study large missions to identify best practices for future flagships[2]. Moreover, Independent Review Boards are being formed prior to KDP-B to identify cost risks and reduce requirement creep, leading to improved early cost estimation. When cost performance is assessed against KDP-C baselines established since the implementation of the 70 percent JCL requirement, major SMD missions have, on average, cost 2 percent less than the NASA commitment. Due to the nature of NASA's mission, some projects will overrun; however, by adopting the 70 percent JCL methodology, NASA is able to minimize the portfolio disruptions due to large overruns. Our missions will employ technologies that must be developed and tested on Earth, but can only be demonstrated in space. Innovation must remain at the core of everything NASA does, and we cannot encourage innovation and discovery without accepting some risk and some uncertainty.

NASA's challenge is to develop and improve the processes necessary to ensure both efficiency and accountability in what is inevitably a dynamic development environment. We appreciate that, in order to retain the confidence of Congress and the American people, we must execute, delivering missions on cost and on schedule while identifying and characterizing risks as quickly as possible so we can promptly take the appropriate corrective action. NASA's monthly internal Baseline Performance Review chaired by the NASA Associate Administrator has continued to evolve and be refined to better reflect portfolio performance against external commitments, focus discussion on issues requiring leadership awareness, and accelerate the identification of solutions to challenges as they arise. NASA has also recently formed the NASA Acquisition Strategy Council to address acquisition decisions holistically under a single Decision Authority. NASA's renewed emphasis on strategic acquisitions will improve the Agency's efficacy in intelligently moving forward on large acquisitions and making data-driven decisions, ensuring a universal view of the aerospace industrial base, international partners, and NASA in-house performance and capacity.

[2] The SMD Large Mission Study, commenced in October 2019, will recommend ways of improving SMD's cost and schedule performance on very large, multi-billion dollar science missions. The study draws on the collected experiences of a diverse team of experts from the civil, commercial, and defense space communities and is on track to be completed by November 2020. Recommendations are expected to be applied to future large SMD missions such as Mars Sample Return and others.

As we strive to return humans to the surface of the Moon in 2024, NASA will continue to foster a culture where leaders and staff are incentivized to develop realistic cost and schedule estimates, take steps to recognize, mitigate, and communicate those estimates and demonstrate progress in our program management improvement efforts.

Challenge 3: Sustaining a Human Presence in Low Earth Orbit

NASA agrees with this challenge. The International Space Station (ISS) International Partnership and the ISS National Lab continue to mature the safe operations and utilization of this unique on-orbit research platform. Research and utilization for the wide variety of fields, including human health and performance, long-duration life support demonstrations, life and physical sciences, Earth and space science, astrophysics, and multiple technology development fields, continue to expand in the number of experiments and the number of investigators.

This is made possible by the combined ongoing efforts of the ISS Program, the ISS National Lab operator, and the commercial crew and cargo suppliers to utilize and operate the ISS to its utmost capability. The ISS Program operates based on the many years of experience learned in preflight integration activities, on-orbit crew planning and execution, logistics planning and management, and other aspects of ISS management and operations; all of which is providing dividends in returning benefits to humanity, enabling the development of a commercial market and enabling deep space long-duration exploration. Research clients are able to get experiments to orbit in as little as four months. In recognizing that different resources are required for different types of research, NASA continues to evaluate the needs of the research community and add resources to alleviate limitations whenever possible.

An Independent Review Team (IRT) completed a review of the ISS National Lab management structure in April 2020. The IRT included significant recommendations which NASA and CASIS have begun to implement, specifically:

1. Work with CASIS on the best roles and composition of the CASIS Board of Directors and leadership.
2. Support CASIS' establishment of a User Advisory Committee to provide input to the organization about how best to manage resources.
3. Create transparent project and program evaluation and prioritization processes.
4. Identify an ISS National Lab program executive at NASA Headquarters as the primary liaison to CASIS.
5. Update strategic priorities for the ISS National Lab on an annual basis.
6. Work with CASIS to optimize the allocation of ISS National Lab resources to meet strategic priorities.

While work to address these recommendations remains ongoing, a majority new-membership Board of Directors is in place at CASIS, a User Advisory Committee charter has been established and a public call for applications to serve has been announced, and an ISS National Lab program executive at NASA Headquarters has been named as the primary liaison to CASIS.

Through the NASA budget process, the ISS Program has projected the resources necessary to continue with its mission based on actual contract and on-orbit performance data for many aspects of the ISS Program, including transportation, maintenance, and operations. The ISS integration process for utilization continues to become more efficient because of private industry inputs and interactions with the National Lab providers.

Overall, the ISS Program is realizing its full potential in accomplishing NASA's and the Nation's goals in exploration, commercial development, and extending human presence beyond low Earth orbit.

Key Unimplemented Recommendations:

Correct identified safety-critical technical issues before the crewed test flights, including parachute, propulsion, and launch abort systems, to ensure sufficient safety margins exist (IG20-005).

NASA agrees with the recommendation. NASA works with its commercial partners to identify all safety-critical technical issues before every flight, including crew test flights, crew operational flights, and cargo resupply missions. NASA would never fly crewed flights with known, unresolved safety-critical technical issues, and there has been no indication to suggest otherwise in NASA's management and execution of CCP. NASA will continue this practice prior to all crewed missions.

Estimated Completion Date: July 31, 2021.

Ensure there is a contingency plan for each exploration-enabling technology demonstration not scheduled to be fully tested by 2024 (IG-18-021).

NASA agrees with the recommendation. NASA is continuing work on ensuring a sufficient plan for enabling critical exploration-research in the event that ISS operations are not extended past 2024. (Note: the OIG approved an extension on this recommendation through April 30, 2021.)

Complete all end-of-mission critical systems and open work related to nominal and contingency deorbit operations (IG-18-021).

NASA agrees with the recommendation. The ISS Program is coordinating with ROSCOSMOS for final approval of SSP 51066, "ISS Deorbit Strategy and Contingency Action Plan," which documents the proposed ISS nominal and contingency deorbit strategy. NASA continues to make progress towards a final end-of-mission plan. A draft operations product and first paper simulation was completed in October 2017, and the ISS Deorbit Plan Operations Interface Procedure (OIP) was baselined in June 2019. A NASA/Russian Joint Flight Rule, "Operations in the Event of ISS and FGB Depressurization" was approved in September 2019. NASA continues to refine analysis to define orbital parameters of the final burn sequence, expected delta velocity (d)V and propellant needs, and footprint targeting. NASA anticipates the current round of analysis will conclude by December 2021, though the analysis refinement process is expected to continue through the remaining ISS lifetime.

Additionally, following the successful Northrop Grumman Detailed Test Objective (DTO) to reboost the ISS using the OA-9 Cygnus cargo vehicle in June 2018, NASA is formally pursuing Cygnus reboost capability starting with the NG-17 vehicle in mid-2022. In addition to providing the necessary acceleration for nominal ISS reboost needs, this capability will provide supplemental deorbit support in emergency ISS deorbit scenarios where it is available.

ROSCOSMOS also continues to proceed with end-of-mission planning. Functional Cargo Block (FGB) depressurization evaluation work is complete, and the software updates installed in the FGB multiplexer-demultiplexers (MDMs) on-orbit as of February 2019 have the capability to quickly reconfigure FGB systems for vacuum conditions to ensure FGB propellant remains useable for ISS deorbit operations in the event of a catastrophic depressurization. Additionally, the Service Module (SM) 8.11 software update in February 2020 introduces an engine firing mode to allow SM main engine

firing with an aft-docked Progress vehicle. The remaining ROSCOSMOS open work for nominal ISS deorbit includes a proposed SM software mode to allow control of three Progress main engines by the SM for the three-Progress vehicle reentry burn scenario.

Challenge 4: Attracting and Retaining a Highly Skilled Workforce

NASA agrees with the challenges identified in the *Attracting and Retaining a Highly Skilled Workforce* section of the report. As the OIG has called out in their letter, several of NASA's workforce challenges can be traced to factors external to NASA. NASA is sitting on the wrong architecture for its personnel system. The antiquated system neither matches the type of complex and dynamic work NASA is required to perform nor positions the Agency to address workforce challenges to be flexible in the labor market. The current position-based, mid-century personnel system defines work as static, requires lengthy hiring processes, is agnostic to the external labor market, rewards workers for longevity, disincentives' mobility, and is overly complicated and not cost-effective, yet we continue to develop human capital solutions that partially address our workforce challenges as we are confined by the system.

- We continue to be active members of the Chief Human Capital Office Council pushing for real meaningful change to personnel laws.
- We work with the Office of Management and Budget and the Office of Personnel Management to seek out, request, and exploit necessary workforce flexibilities. We are relentless in pursuing and advocating for real change for NASA and the Federal workforce as a whole.

Additionally, as the OIG states, "to maintain a world-class workforce, NASA must fill current critical workforce gaps and prepare for those yet to emerge. Meeting this challenge will require planning to mitigate the Agency's looming retirement wave. Furthermore, the ability to successfully address that risk will require the Agency to have detailed visibility into workforce skill types—data that the Agency currently does not collect. Ideally, NASA would use that data, in combination with national STEM priorities, to support the Agency's technical needs. NASA will also need funded, formal mentoring and knowledge-sharing programs to enable the transfer of institutional knowledge before it is lost." The Office of the Chief Human Capital Officer is looking at ways to better identify the skills needed for the workforce and use the Agency Workforce Master planning process to better plan for the needs of the future. An element of the Master planning process includes projecting loss rates and the extent to which past patterns of employee tenure beyond retirement eligibility might guide the development of mitigating strategies to lessen the impact of a future retirement wave.

Challenge 5: Improving Oversight of Contracts, Grants, and Cooperative Agreements

The NASA Office of Procurement (OP) is committed to making meaningful progress in addressing contract oversight challenges and continues to strengthen its overall procurement processes and policy as a part of our ongoing transformation to an Enterprise after graduating from the Mission Support Future Architecture Program (MAP) in June 2020. Twenty-three designated institutional-related product service lines are in place to identify streamlined acquisition strategies and reduce unnecessary duplication.

NASA continually seeks to improve all aspects of its contracting activities including award fee contract administration and guidance. Recent award fee guidance was designed to ensure independence in the award fee determination process and emphasize the need for greater focus on the timely evaluation of contractor performance.

Other key NASA OP initiatives under way include a strategic sourcing Web site to optimize the use of existing contract vehicles, a robust NASA FAR Supplement (NFS) Quality Review Process to continually review and update relevant NFS parts, eliminating outdated and unnecessary policy and templates in use at each Center in favor of enterprise-wide job aids, a dedicated focus on improving the timeliness of contract

closeout, and strengthening acquisition planning to ensure that the right contract vehicle is utilized for the requirement. Lastly, OP partners with the Agency's Office of the General Counsel and the representatives of the NASA Acquisition Integrity Program (NASA AIP) to monitor and coordinate criminal, civil, contractual, and administrative (suspension and debarment) fraud remedies as fraud is identified, investigated, and prosecuted.

Challenge 6: Managing and Mitigating Cybersecurity Risks

NASA's information technology (IT) provides foundational capabilities necessary to accomplish NASA's missions. NASA remains firmly committed to managing IT as a strategic resource to enable mission success, ensure effective communications and collaboration, and safeguard both the IT environment and the resources that support the Agency's priorities. NASA's focus on IT as a strategic resource began in 2014, establishing a basis for the work that continues today. In addition to progress noted by the OIG, NASA has also accomplished the following to manage and mitigate cybersecurity risks.

1. NASA modernized and enhanced its Security Operations Center (SOC) capabilities in FY 2020. The Agency established a new SOC distributed site at Johnson Space Center, integrating with existing SOC capabilities at Ames Research Center, ensuring 24/7 continuity of operations in the event of a service disruption. Furthermore, NASA realigned cybersecurity functions, established Operational Level Agreements between the SOC and all Centers and the Jet Propulsion Laboratory, and consolidated cybersecurity resources in order to more effectively identify threats, respond to incidents, and manage core services. These SOC modernization activities allow NASA to see a holistic picture of the Agency's threat landscape and create all-encompassing trend analyses of cybersecurity threats to NASA, which in turn further fortifies NASA's infrastructure.

2. NASA has taken a more proactive and forward-leaning approach by creating a High Value Asset (HVA) Information System Owner (ISO) forum for the Office of the Chief Information Officer (OCIO) to engage with system owners. This forum serves to increase ISOs' awareness and understanding of HVA requirements and provides an opportunity for ISOs to voice challenges and collaborate on solutions, ultimately creating a cohesive and transparent effort for all involved. These efforts allow cybersecurity management to understand and address problem areas and gain better insight into the risk based decisions of HVAs. HVA data calls have also moved from de-centralized data collection to a centralized data collection within NASA's Risk Information Security Compliance System (RISCS). Combined, these efforts are expected to improve the HVA Federal Information Security Modernization Act (FISMA) scores in coming quarters and ensure the safety of NASA's most valuable assets. NASA has already improved FISMA scores for HVA metrics such as the ability to dynamically reconfigure and/or automatically disable upon the detection of a security violation or vulnerability, as well as the number of HVA systems that use Personal Identity Verification (PIV) authentication.

3. The NASA OCIO has also established a Cybersecurity Integration Team (CIT), with multiple sub-teams, focusing on efforts that will integrate cybersecurity efforts across NASA, primarily with the Missions. CIT achievements include the following:

    a. CIT 1 "Cyber Policy" has been working to address the current lack of understanding and empowerment of Mission personnel to confidently and effectively implement OCIO cybersecurity requirements. The team has identified several roadblocks in this area, including a lack of understanding about roles and responsibilities, inconsistent policy approaches across different divisions, and poor integration of cybersecurity through an entire NASA project life cycle. The team has worked to help standardize roles and responsibilities and stakeholder groups to engage, to update, and to improve key cybersecurity policies across the Agency. This team will soon present its recommendations to the NASA Information Technology Council (ITC) and hopes to move forward with engaging with those stakeholder groups.

b. CIT 2 "Critical Assets" has worked to enhance cybersecurity efforts on NASA HVAs. CIT 2 briefed its recommendations to the ITC, where they were accepted. The sub-team worked to clarify criteria NASA should use to identify critical systems and who and how those system lists are managed. The team produced a list of "HVA Identification Guidance Questions;" recommended processes for enhanced management of and sightlines into critical asset lists by NASA's Office of Protective Services (OPS), NASA's OCIO, the Agency's Continuity of Operations (COOP) Team, and the NASA Mission Directorates; created a snapshot of NASA's current critical asset inventory, which highlighted relationships across different types of assets; and submitted a White Paper of its process, findings, and its next steps. Currently, OCIO is working to implement some of the recommendations, including baselining the Agency's HVA list and updating the HVA Standard Operating Procedure (SOP).

c. CIT 6 "Cybersecurity Workforce" is working to define a cybersecurity workforce deployment model that could be used to ensure that Missions are able to receive appropriate cybersecurity guidance throughout the life-cycle phases of their projects. This sub-team is fairly early in its work, but has engaged with a number of different groups, including the NASA Cyber Task Team (CTT) led by the Science Mission Directorate (SMD), the OCIO Mission Support Future Architect Program (MAP) Workforce Group, Department of Defense (DoD), National Institute for Standards and Technology (NIST), National Initiative for Cybersecurity Education (NICE), and NASA's Aeronautics Research Mission Directorate's (ARMD's) cyber workforce lead. The team is continuing to develop its recommendations for the ITC in the coming months.

4. In concert with the Enterprise Protection Program and the Office of Strategic Infrastructure, the NASA OCIO continued to mature its policies and guidance for securing Operational Technology (OT). In FY 2020, NPD 2800.1, Managing Information Technology, was updated to define and explicitly address OT. Additionally, the OCIO published IT Security Handbook (ITS-HBK) 2810.19-01, Operational Technology, in September 2020, which provides guidance for the security assessment and authorization process for OT. Furthermore, NASA is continuing to enhance the management of its OT systems. In FY 2020, the Agency identified all NASA Critical Infrastructure (NCI) OT and collected NCI-OT Compliance Status Reports of those OT systems. These reports will allow the NASA OCIO to identify trends and recommended actions to address common issues in the OT community. Additionally, beginning in June 2020, the Industrial Control Systems Cyber Emergency Response Team (ICS-CERT) and US-CERT alerts have been automatically distributed to all NASA Information System Owners and Information System Security Officers.

While the Agency continued to enhance its cybersecurity policies, processes, and governance in FY 2020, NASA recognizes that there is still progress to be made, specifically in addressing security plans deficiencies in a timely manner and in reducing the Agency's Web footprint. The Agency remains committed to tackling these issues and to building an even stronger, more proactive risk-based cybersecurity program that safeguards NASA's IT assets, data, and its users.

Challenge 7: Addressing Outdated Infrastructure and Facilities

NASA agrees with the challenges identified in the *Addressing Outdated Infrastructure and Facilities* section of the report. To address the challenges with outdated infrastructure and facilities, we have implemented a multi-pronged approach to either remove facilities from our inventory altogether or replace them through our renewal or recapitalization program. Over the past several years, NASA has gradually increased its funding for demolition of facilities and has had great success with a dedicated demolition program manager at HQ and at each Center.

NASA is working to make improvements through implementing an Agency Master Plan to ensure its infrastructure is available and affordable, guide Agency investments to mission critical assets to increase the facility condition, and increase availability and reduce the risk of unplanned failures. To achieve this end, NASA is updating its Mission Dependency Index (MDI) score for all its facilities in an effort to identify the high MDI facilities and correlate them to the Facility Condition Index (FCI). MDI and FCI correlation will guide prioritization for capital repair and renewal projects. The Agency continues to demolish facilities with low MDI and FCI scores.

NASA has also identified investment strategies in backlogged maintenance and reliability centered maintenance efforts, such as condition-based maintenance. These efforts lead to improving the condition of important building systems and facilities across the Agency and improving the reliability of NASA facilities to meet mission needs. Implementation of tiered maintenance strategies utilizing these reliability centered maintenance principles ensures the right type of maintenance is done on the most critical assets, at the right time, and for the right reasons. Through investments in maintenance, demolition, repair, and recapitalization, NASA strives to right-size the Agency's infrastructure to more modern and efficient facilities that will continue to meet NASA mission objectives.

In addition, there is continued work in assessing and implementing the OIG's key infrastructure-related recommendations from previous infrastructure-related audits. Below are responses to the two unimplemented key recommendations mentioned in *Challenge 7: Addressing Outdated Infrastructure and Facilities:*

Key Unimplemented Recommendations:

Pursue all available options—administrative, legal, or political—to ensure NASA's SSFL soil cleanup is performed in an environmentally and financially responsible manner based on the intended future use of the property (IG-19-013).

The OIG Report (IG-19-013) identifies many issues and concerns with implementing a soil cleanup at Santa Susana Field Laboratory (SSFL) as prescribed in the 2010 Administrative Order on Consent (AOC) utilizing the provisional Lookup Table (LUT) values the State of California Department of Toxic Substance Control (DTSC) developed. In 2017, the DTSC released a Draft Programmatic Environmental Impact Report (PEIR) that identified environmental impacts associated with the SSFL cleanup. The cleanup outlined in the PEIR would require substantially greater soil removal than NASA estimated in its 2014 Environmental Impact Statement (EIS). The soil quantity estimates established in the DTSC's Draft PEIR have the potential to significantly increase the environmental impacts from what was evaluated in NASA's 2014 EIS, and NASA completed a Supplemental EIS (SEIS) in accordance with the National Environmental Policy Act (NEPA) to evaluate the significance of those impacts. As required by NEPA, NASA's SEIS considered a range of reasonable soil cleanup alternatives in addition to the AOC cleanup to DTSC LUT values. The Final SEIS for soil cleanup was published in the Federal Register on July 24, 2020, and identified the "Suburban Residential" risk-based cleanup as the Agency's preferred alternative, resulting in an estimated savings of over $400M and one third the project duration. NASA has issued a Record of Decision (ROD) selecting the Suburban Residential risk-based cleanup preferred alternative for soil cleanup at SSFL. NASA will continue to monitor DTSC's progress on its PEIR, corresponding Notice of Determination (California equivalent to a ROD) and final LUT for the cleanup phase.

NASA remains firmly committed to achieving a cleanup at SSFL that is protective of public health and the environment. NASA will continue to work with DTSC and all interested stakeholders to implement a cleanup that is based in science, technically achievable, protective of the surrounding community, and eliminates or greatly reduces significant damage to SSFL's habitat and cultural resources and the impacts to the community.

Key Unimplemented Recommendations:

Ensure life-cycle and milestone reviews incorporate programmatic and technical risks and are conducted with the Associate Administrator for Human Exploration and Operations Mission Directorate and other senior Agency officials (IG-20-013).

NASA agrees with this recommendation. Life-cycle and milestone reviews, that incorporate programmatic and technical risks, will be conducted with the Associate Administrator for Human Exploration and Operations and other senior Agency officials as established in NASA Procedural Requirements (NPR) 7120.5, "NASA Space Flight Program and Project Management Requirements." NASA is working to formalize the life-cycle review and independent assessment plan for the Mobile Launcher-2 and anticipate its completion by spring of 2021.

If you have any questions regarding NASA's response to the 2020 Top Management and Performance Challenges, please contact Anthony Mitchell, Audit Liaison Project Manager, on (202) 358-1758.

James F. Bridenstine

cc:
Chief Financial Officer/Mr. Shinn (Acting)
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FY 2020 INSPECTOR GENERAL ACT AMENDMENTS REPORT

Background

The Inspector General Act Amendments of 1988 (P.L. 100-504) require that Federal agencies report on the actions taken in response to Office of Inspector General (OIG) audit reports and corresponding audit recommendations. Specifically, the 1988 Amendments require agencies to report on: 1) Management Action Taken on OIG Reports containing Monetary Benefits and; 2) Management Action Not Taken on OIG Audit Reports in Excess of One-Year.

In addition, the Office of Management and Budget (OMB) outlines specific "action requirements" on Federal agencies in its Circular No. A-50, "Audit Follow-up." The Circular requires that agencies ensure final management decisions on OIG audit recommendations are reached within 180-days after the issuance of an audit report and that corresponding corrective actions begin as soon as practicable.

Key terminology specific to NASA's FY 2020 reporting under the Inspector General Act Amendments of 1988 follows:

- **Corrective Action** consists of management's planned or proposed remediation efforts intended to mitigate an audit finding.
- **Disallowed Costs** are questioned costs that management has sustained or agreed should not be charged to the Government.
- **Final Management Action** is the point in time when corrective action, taken by management in conjunction with a final management decision, is completed.
- **Final Management Decision** is reached when management evaluates the OIG's findings and recommendations and determines whether or not to implement a proposed recommendation.
- **Funds to be Put to Better Use (FPTBU)** are potential cost savings, identified by the OIG, which could be realized through the implementation of an audit recommendation.
- **Questioned Costs** are those costs identified by the OIG as being potentially unallowable because of either: a) a purported violation of law, regulation, contract, grant, cooperative agreement, or other device governing the incurrence of cost; b) a finding that, at the time of the audit, such cost is not supported by adequate documentation or; c) a finding that the cost incurred for the intended purpose is unnecessary or unreasonable.
- **Resolution** is the point at which NASA and the OIG agree on action(s) to be taken in response to an audit recommendation or, in the event of disagreement, the point at which the Audit Follow-up Official determines the matter to be resolved.

NASA's Audit Follow-up Program

NASA utilizes the results of OIG audits to improve the overall efficiency and effectiveness of the Agency's programs, projects, and functional activities. NASA is also committed to ensuring timely and responsive final management decisions, along with timely and complete final management action on all audit recommendations issued by the NASA OIG. To this end, NASA has implemented a comprehensive program of audit follow-up intended to ensure that audit recommendations issued by the OIG are resolved and implemented in a timely, responsive, and effective manner. NASA's audit follow-up program is a key element in improving the overall efficiency and effectiveness of NASA's programs, projects and operations.

NASA's Mission Support Directorate (MSD) serves as the Agency's Office of Primary Responsibility for policy formulation, oversight, and functional leadership of NASA's audit follow-up program. MSD implements audit follow-up program activities through an Agency-wide network of Audit Liaison Representatives (ALRs) who, in turn, are responsible for executing audit follow-up program activities at the Mission Directorate, Field Center, and Mission Support Office levels. In conjunction with NASA's network of ALRs, MSD provides the infrastructure to implement NASA's audit follow-up program. The program utilizes NASA's Audit and Assurance Information Reporting System (AAIRS) to track and monitor OIG audit reports and corresponding recommendations, as well as to support internal and external reporting.

Consistent with the requirements outlined in OMB Circular A-50, MSD monitors audit recommendations issued by the OIG to ensure that a final management decision is reached within 180-days of the issuance of a final audit report. A final management decision is reached when either: 1) Management agrees to implement corrective actions in response to an OIG audit recommendation; or 2) Management determines that implementing a particular audit recommendation is imprudent, impractical, or not cost beneficial. In those instances where a final management decision cannot be reached, resolution is achieved in conjunction with NASA's Audit Follow-up Official (AFO), consistent with provisions of OMB Circular A-50.

When a final management decision to implement an audit recommendation has been made, corrective action is pursued as rapidly as practicable. In some instances, the corrective actions associated with a final management decision may span multiple fiscal years due to factors such as the complexity or cost of the planned corrective actions, or unexpected delays in the formulation, review, and approval of NASA policies, procedural requirements, or regulations. In these instances, MSD engages with the OIG and respective NASA Component (e.g., Mission Directorate, Field Center, or Mission Support Office) to ensure communication and coordination regarding necessary revisions to timelines and milestones associated with the implementation of these recommendations.

FY 2020 Audit Follow-up Results

The Inspector General Act Amendments of 1988 require that heads of Federal agencies report on management action taken, or remaining to be taken, in response to OIG audit reports containing monetary benefits. For the purposes of this report, monetary benefits consist of: 1) Questioned Costs; or 2) Funds to be Put to Better Use (FPTBU), as defined above. NASA's FY 2020 results of management action on OIG reports with monetary benefits are found in Table 1.

The 1988 Amendments also require that Federal agencies report on those OIG recommendations for which a final management decision had been made in a prior fiscal year, but final management action is still ongoing. NASA's FY 2020 results of management action not taken on OIG reports in excess of one-year are found in Table 2.

In addition to the statutory reporting requirements delineated in the 1988 Amendments, OMB Circular A-50 requires that final management decisions on OIG audit recommendations be made within 180-days of the issuance of a final audit report. Results of final management decisions made during FY 2020 are found in Section 3 of this report.

NASA's overall FY 2020 reporting in conjunction with the requirements of the Inspector General Act Amendments of 1988 and OMB Circular A-50, follows:

1. Management Action on OIG Reports with Monetary Benefits

The cumulative prior year carry-over amount of OIG identified monetary benefits pending final management action at the beginning of FY 2020, consisted of:

- $82,338,095 in questioned costs identified in five OIG audit reports issued in FY 2017[1], FY 2018[2] and FY 2019[3]; and
- $211,742,117 in FPTBU identified in one OIG report issued in FY 2019[4].

During the course of FY 2020, the OIG issued one audit report to NASA containing monetary benefits consisting of $186,680,000 in questioned costs; and one audit report containing $27,789,122 in funds to be put to better use (FPTBU). Also during FY 2020, final management action was taken by NASA on $65,223,086 in questioned costs; and $18,742,117 in FPTBU initially identified by the OIG in four audit reports issued in fiscal year 2018 and 2019.

Final management action remaining to be taken by NASA on current and prior-year OIG identified monetary benefits as of September 30, 2020, consists of a total of $424,584,131 which is comprised of $203,795,009 in questioned costs, and $220,789,122 in FPTBU. These monetary benefits were identified in one OIG audit report[5] issued to NASA in FY 2017; one audit report[6] issued to NASA in FY 2019, and two audit reports[7] issued in FY 2020

Table 1 summarizes NASA's actions taken with respect to monetary benefits identified in OIG audit reports issued during FY20, as well as residual (carry-over) monetary benefits identified in OIG audit reports issued in prior fiscal years, that required management action during FY 2020.

[1] "Construction of Test Stands 4693 and 4697 at Marshall Space Flight Center" (IG-17-021; May 17, 2017)
[2] "NASA's Management of GISS: The Goddard Institute for Space Studies" (IG-18-015; April 5, 2018)
[3] "NASA's Management of the Space Launch System Stages Contract" (IG-19-001; October 10, 2018); "Audit of NASA's Management of Extended Temporary Duty Travel" (IG-19-007; November 28, 2018); and "NASA's Progress with Environmental Remediation Activities at the Santa Susana Field Laboratory" (IG-19-013; March 19, 2019)
[4] "NASA's Progress with Environmental Remediation Activities at the Santa Susana Field Laboratory" (IG-19-013; March 19, 2019)
[5] "Construction of Test Stands 4693 and 4697 at Marshall Space Flight Center" (IG-17-021; May 17, 2017)
[6] "NASA's Progress with Environmental Remediation Activities at the Santa Susana Field Laboratory" (IG-19-013, March 19, 2019)
[7] "NASA's Management of Crew Transportation to the International Space Station" (IG-20-005, November 14, 2019); and "NASA's Management of the Orion Multi-Purpose Crew Vehicle Program" (IG-20-018, July 16, 2020)

Table 1 summarizes NASA's actions taken with respect to monetary benefits identified in OIG audit reports issued during FY20, as well as residual (carry-over) monetary benefits identified in OIG audit reports issued in prior fiscal years, that required management action during FY 2020.

Table 1: Management Action on OIG Audit Reports with Monetary Benefits For the Year Ended September 30, 2020

Category		Questioned Costs		Funds to be Put To Better Use		Total Monetary Benefits (Dollars)
		Number of Reports	Dollars	Number of Reports	Dollars	
Line 1	Beginning Balance: Audit reports with monetary benefits issued in prior years requiring final management action (prior year carry-over into FY 2020)	4	$82,338,095	2	$211,742,117	$294,080,212
Line 2	Plus: Audit reports with monetary benefits issued during FY 2020 requiring final management action	1	$186,680,000	1	$27,789,122	$214,469,122
Line 3	Total audit reports with monetary benefits requiring final management action during FY 2020 [line 1 + 2]	5	$269,018,095	3	$239,531,239	$508,549,334
Line 4	Audit reports with monetary benefits on which final management action was taken during FY 2020	3	$65,223,086	1	$18,742,117	$83,965,203
Line 5	Ending Balance: Audit reports with monetary benefits awaiting final management action at the end of FY 2020 [line 3 - line 4] (carry-over into FY 2021)	2	$203,795,009	2	$220,789,122	$424,584,131

2. Management Action Not Taken on OIG Reports in Excess of One-Year

As of September 30, 2020, a total of 44 recommendations in 23 OIG audit reports remain open in excess of one year since the issuance of the corresponding final audit reports. These 44 recommendations represent about 35 percent of the universe of 176 total open OIG recommendation as of September 30 2020, and fall across six broad functional areas:

- Human Explorations and Operations (10 recommendations);
- IT/Cybersecurity (10 recommendations);
- Infrastructure Management (10 recommendations);
- Earth/Space Science (7 recommendations);
- Budget/Financial Management (5 recommendations); and,
- Acquisition Management (3 recommendations).

Although these recommendations remain open in excess of one year after issuance of the corresponding audit reports, NASA management either has, or continues to, aggressively pursue those actions needed to fully implement the OIG's recommendations. NASA has completed corrective actions on 1 of the 44 recommendations (2 percent), and is currently awaiting the OIG's determination with regard to sufficiency of those actions for closure. Final management action on the remaining 43 OIG recommendations open in excess of one year since the issuance of the corresponding final audit reports are planned for completion between the first-quarter of FY2021 and second-quarter of FY2022.

By way of comparison and perspective, as of September 30, 2019, a total of 62 recommendations in 31 OIG audit reports were open, pending completion of final management action, in excess of one year since the issuance of the corresponding final audit reports.

Table 2 summarizes those OIG audit reports and associated recommendations issued prior to FY 2020 that remain open in excess of one year after the issuance of the corresponding final audit reports.

Table 2: OIG Audit Reports and Recommendations Open in Excess of One-Year (As of September 30, 2020)

Report Date	Report No.	Report Title	Recommendations		
			Open	Closed	Total
8/7/2012	IG-12-017	Review of NASA's Computer Security Incident Detection and Handling Capability	2	1	3
7/22/2014	IG-14-026	Audit of the Space Network's Physical and Information Technology Security Risks	1	3	4
5/15/2015	IG-15-015	NASA's Compliance with the Improper Payments Information Act for Fiscal Year 2014	1	9	10
9/17/2015	IG-15-023	NASA's Response to Orbital's October 2014 Launch Failure: Impacts on Commercial Resupply of the International Space Station	1	6	7
3/28/2016	IG-16-015	Audit of the Spaceport Command and Control System	1	0	1
11/2/2016	IG-17-003	NASA's Earth Science Mission Portfolio	1	1	2
3/9/2017	IG-17-012	NASA's Management of Electromagnetic Spectrum	1	1	2
4/13/2017	IG-17-017	NASA's Plans for Human Exploration beyond Low Earth Orbit	1	5	6
5/17/2017	IG-17-021	Construction of Test Stands 4693 and 4697 at Marshall Space Flight Center	3	0	3
10/5/2017	IG-18-001	NASA's Management of Spare Parts for its Flight Projects	2	5	7
4/5/2018	IG-18-015	NASA's Management of GISS: The Goddard Institute for Space Studies	1	7	8
4/26/2018	IG-18-016	Audit of Commercial Resupply Services to the International Space Station	1	4	5
5/14/2018	IG-18-017	NASA's Compliance with the Improper Payments Information Act for Fiscal Year 2017	2	1	3
5/24/2018	IG-18-019	Audit of NASA's Information Technology Supply Chain Risk Management Efforts	2	5	7
5/23/2018	IG-18-020	Audit of NASA's Security Operations Center	2	4	6
7/30/2018	IG-18-021	NASA's Management and Utilization of the International Space Station	3	2	5
10/22/2018	IG-19-002	Audit of NASA's Historic Property	4	1	5
3/19/2019	IG-19-013	NASA's Progress with Environmental Remediation Activities at the Santa Susana Field Laboratory	1	1	2
3/26/2019	IG-19-014	NASA's Engineering and Technical Services Contracts	3	0	3
5/7/2019	IG-19-018	NASA's Heliophysics Portfolio	3	1	4
5/29/2019	IG-19-019	Management of NASA's Europa Mission	2	8	10
6/3/2019	IG-19-020	NASA's Compliance with the Improper Payments Information Act for Fiscal Year 2018	2	1	3
6/18/2019	IG-19-022	Cybersecurity Management and Oversight at the Jet Propulsion Laboratory	4	6	10
Totals		**23**	**44**	**72**	**116**

3. Final Management Decisions Made Within 180-Days of Report Date

During FY 2020, the OIG issued 18 audit reports containing 151 recommendations addressed to NASA which required a final management decision within six months of the respective final report dates. Final management decisions were made within six months of issuance of the corresponding final audit reports on 150 (99 percent) of the OIG recommendations issued during FY 2020.

The one remaining unresolved recommendation pertains to the OIG's July 2020 report entitled, "NASA's Management of the Orion Multi-Purpose Crew Vehicle Program" (IG-20-018). In the report, the OIG recommended that NASA ensure total development and production contract costs currently not reported as part of the ABC baseline are included in quarterly financial status reporting to the Office of the Chief Financial Officer, OMB, and Congress. NASA concurred with the recommendation but the OIG stated that the management's proposed actions were partially responsive to the recommendation as management stated it will only include costs pertaining to the current Orion Program of Record, which would exclude Constellation Program costs incurred under the same development contract. During the subsequent resolution process, NASA submitted a request for closure based on additional disclosure language in the quarterly OMB Quarterly Report. A final management decision and corresponding resolution on the recommendation is expected during the first quarter of FY 2021. The 180 day time period has not expired and the final decision is not considered late.

For the five-year period ended September 30, 2020, 734 OIG audit recommendations in 88 audit reports were issued to NASA requiring a final management decision within six months of the respective final report dates. Final management decisions were made within six months of the respective final reports dates on 733 (99 percent) of these recommendations, including the currently unresolved recommendation relating to Orion, as noted above.

4. Audit Recommendation Closure Efficiency

During the course of FY 2020, a total of 151 OIG audit recommendations (including 131 recommendations issued in prior fiscal years) were closed based on responsive management action taken by NASA. Of the OIG recommendations closed during FY 2020, 75 percent relate to OIG audit reports issued during FY 2019 and FY 2020. The remaining 25 percent of OIG recommendations closed during FY 2020, relate to audit reports issued prior to FY 2019.

Of the 151 audit recommendations closed by the OIG during FY 2020:

- 43 recommendations (28 percent) were closed within one year of issuance of the associated audit reports;
- 83 recommendations (55 percent) were closed between one and two years of issuance of the associated audit reports; and,
- 25 recommendations (17 percent) were closed in excess of two years of issuance of the associated audit reports.

For comparative purposes, during FY 2019, a total of 135 OIG audit recommendations (including 124 recommendations issued in prior years) were closed based on responsive management action taken by NASA. Of these 135 recommendations closed by the OIG during FY 2019:

- 78 recommendations (58 percent) were closed within one year of issuance of the associated audit report;
- 40 recommendations (30 percent) were closed between one and two years of issuance of the associated audit report; and,
- 17 recommendations (12 percent) were closed in excess of two years of issuance of the associated audit report.

PAYMENT INTEGRITY INFORMATION ACT (PIIA) REPORTING

Payment Integrity Information Act

Under the parameters set forth in the Payment Integrity Information Act (PIIA) of 2019 (P.L. 116-117) which reorganizes and revises the previous statues which established requirements for federal agencies to reduce improper payments set forth by the Improper Payments Information Act of 2002 (IPIA) (P.L. 107-300); the Improper Payments Elimination and Recovery Act of 2010 (IPERA) (P.L. 111-204); and the Improper Payments Elimination and Recovery Improvement Act of 2012 (IPERIA) (P.L. 112-248); agencies are required to perform a risk assessment of all programs and activities, identify programs and activities that are susceptible to significant improper payments, sample and estimate annual improper payments for susceptible programs and activities, and report the results to the President and Congress via the Agency Financial Report (AFR) or Performance and Accountability Report (PAR). Throughout this evolution, NASA has stayed committed to preventing and reducing improper payments through its Payment Integrity Improvement Program (PIIP). In FY 2020, the Agency executed the aforementioned responsibilities via the Payment Integrity Information Act Assessment. For additional details related to NASA Payment Integrity Information Act Reporting, including all information previously included in the AFR, please visit https://paymentaccuracy.gov/.

In 2013, additional improper payment legislation was ratified via the Disaster Relief Appropriations Act (Disaster Relief Act) (P.L. 113-2). The Disaster Relief Act, as signed, provided $50.5 billion in aid for Hurricane Sandy disaster victims and their communities and detailed additional stewardship requirements for agencies receiving Hurricane Sandy appropriations. In order to provide implementation guidance for the principles presented in the Disaster Relief Act, OMB issued Memorandum M-13-07, *Accountability for Funds Provided by the Disaster Relief Appropriations Act* which provided that all programs and activities receiving funds under the act shall be deemed to be "susceptible to significant improper payments" for the purposes of the IPIA (as amended).

In 2018, the Bipartisan Budget Act of 2018 (P.L. 115-123) also became law. Similar to the Disaster Relief Act, it provided $84.4 billion in emergency supplemental appropriations to respond to and recover from recent natural disasters. To provide guidance in administering and monitoring these funds, OMB released Memorandum M-18-14, *Implementation of Internal Controls and Grant Expenditures for the Disaster- Related Appropriations*. The Memorandum mandates that Agency programs that disburse more than $10,000,000 in emergency appropriations in one fiscal year shall be considered susceptible to significant improper payments for purposes of IPIA (as amended), and such programs shall report an improper payment estimate in the FY 2019 reporting cycle. NASA programs Hurricane Harvey and Hurricane Matthew (under the Institutional Construction of Facilities program) met the criteria for sampling and improper payment estimation for the FY 2019 period.

Payment Integrity Information Act Assessment

NASA executed its FY 2020 Payment Integrity Risk Assessment Methodology under the requirements set forth in OMB Circular A-123 Appendix C, *Requirements for Payment Integrity Improvement*. On an annual basis, NASA reviews and updates its risk assessment methodology to ensure proper assessment activities are conducted and to implement modifications as appropriate with regard to, changes to improper payment legislation and guidance, changes to NASA's operating environment, recommendations from external auditors, and other circumstances. NASA performed its FY 2020 Payment Integrity Risk Assessment employing the updated risk assessment methodology. This methodology incorporates seven (7) risk conditions, each with a set of related criteria designed to account for eleven (11) OMB-designated and NASA-specific risk factors.

OMB requires that each agency assess programs or activities deemed not susceptible to significant improper payments at least once every three years. In order to meet this requirement, NASA assesses approximately one third of all programs annually, selecting each program based on the most recent year of assessment and prior year assessment results. Accordingly, in FY 2020, the Payment Integrity Risk Assessment Methodology was completed in two major phases: Identify and Select NASA Programs and Assess Improper Payment Risk.

1. Identify and Select NASA Programs

NASA extracted the population ($22.5 billion) of FY 2019 disbursements from its financial management system to develop a list of NASA programs eligible to be assessed for the FY 2020 Payment Integrity Risk Assessment. The universe of payments subject to analysis included disbursements to vendors, NASA employees, and other government agencies issued by NASA between October 1, 2018 and September 30, 2019. The disbursements were then analyzed and categorized by NASA mission and program. A review of the FY 2019 budget was performed. Within the Agency's financial management systems, programs listed within the budget were compared to the select programs identified for the assessment. Based on FY 2019 budgetary resources, materiality of disbursements, and the nature of program funding, there were 94 distinct programs. In order to implement the approach stated in the OMB Circular

A-123, NASA elected to select approximately one third of its programs for assessment in FY 2020 (40 of 94 programs), that had not been reviewed within the past 3 years.

Once selected, the programs were confirmed by NASA management. The list of programs selected for assessment in FY 2020 is included below.

Figure 1: Programs Assessed during the FY 2019 Improper Payment Risk Assessment

Program Name	
21st Century Space Launch Complex	Heliophysics Explorer Program
Advanced Cislunar and Surface Capabilities	Human Research Program
Aeronautics CoF	Human Space Flight Operations
Aeronautics Strategy and Management	Institutions and Management
Aeronautics Test Program	Launch Services
Airspace Operations and Safety Program	Lunar Discovery and Exploration
Applied Sciences	RMB-ARMD Institutional Reimbursables
Center Management and Operations	RMB-ARMD Programmatic Reimbursables
Commercial Crew and Cargo	RMB-EDUC Programmatic Program
Commercial Crew Program	RMB-ESMD Programmatic Program
Commercial LEO Development Program	RMB-SOMD Institutional Program
Constellation Systems	RMB-SOMD Programmatic Program
Cosmic Origins	RMB-SSMS Institution
Education	RMB-SSMS Programmatic Program
Enhance User Lease	Rocket Propulsion Testing (RPT)
Enhanced Use Lease Program	Safety and Mission Success
Environmental Compliance and Restoration	Space Shuttle Program
Exploration Technology Development	Space Technology
Fundamental Aeronautics	STEM Engagement
Gateway	Strategic Capabilities Asset Program

2. Assess Improper Payment Risk

NASA has designed the Payment Integrity Risk Assessment Methodology which utilizes criteria categorized by risk conditions. These risk conditions and the related criteria are intended to provide a framework for analyzing quantitative and qualitative risk factors for each of NASA's programs. The following risk conditions and risk factors comprise NASA's Payment Integrity Risk Assessment Methodology:

Risk Conditions

i. Internal Control over Payment Processing
ii. Internal Monitoring and Assessments
iii. External Monitoring and Assessments
iv. Human Capital Risk
v. Program Profile
vi. Payment Profile
vii. Dollar Materiality

Risk Factors

i. Whether the program or activity reviewed is new to the agency
ii. The complexity of the program or activity reviewed, particularly with respect to determining correct payment amounts
iii. The volume (dollar value/amount) of payments made annually
iv. Whether payments or payment eligibility decisions are made outside of the agency
v. Recent major changes in program funding, authorities, practices, or procedures

vi. The level, experience, and quality of training for personnel responsible for making program eligibility determinations or certifying that payments are accurate
vii. Significant deficiencies in the audit reports of the agency including, but not limited to, the agency OIG or the GAO audit report findings, or other relevant management findings that might hinder accurate payment certification
viii. Inherent risks of improper payments due to the nature of agency programs or operations
ix. Results from prior improper payment work
x. Other Risk Susceptible Programs determined by OMB on a case by case basis that certain programs may be subject to annual PAR/AFR reporting
xi. Disaster Relief Appropriations Legislation

In order to evaluate susceptibility of each program to improper payments, using the framework and risk factors shown above, NASA reviewed various reports and other supporting information, conducted surveys, and executed analyses related to NASA programs. Three (3) separate risk assessment questionnaires were developed and distributed to address the 11 risk factors included in the risk assessment. Specific information obtained and reviewed includes the following:

- Audit reports, findings, and recommendations (i.e. reports from the OIG, GAO, and other independent bodies)
- OMB Circular A-123 Appendix A, Internal Control over Financial Reporting Summary Reports
- NASA Budgetary Estimates and Trends from FY 2016 – FY 2019
- Payment Processing Questionnaire
- Procurement Questionnaire
- Disaster Relief Questionnaire
- Applicable OMB Memoranda
- FY 2019 and FY 2018 Program Disbursements
- NASA Quality Assurance Division (QAD) Internal Control Program
- Statement on Standards for Attestation Engagements (SSAE) 18 Reports
- IPIA Compliance Audit Results and Recommendations
- Overpayments Outside the Recapture Audit

Using the information reviewed and the risk assessment criteria, the risk conditions for each program were assigned a risk rating. A weighted average risk rating for each program based on the risk scores and weights assigned to each risk condition was derived.

As required by *Memorandum M-18-14, Implementation of Internal Controls and Grant Expenditures for the Disaster-Related Appropriations*, management conducted statistical sampling and testing on the Hurricane Harvey and Hurricane Matthew programs (under the Institutional Construction of Facilities program). No improper payments were identified as a results of the testing.

Actions Taken to Address Auditor Recovery Recommendations

As permitted by OMB Circular A-123, Appendix C, NASA has determined to exclude recapture audits from its Recapture Audit Program. NASA has performed analyses that indicate it is not cost-effective to continue conducting payment recapture audits for identifying and recovering improper payments. As a result, NASA did not receive recommendations from recapture auditors regarding actions needed to prevent overpayments. However, NASA continues to monitor and assess its payment platforms to ensure appropriate controls are in place to prevent, detect, and collect improper payments. Based upon continuous internal monitoring, NASA has an effective system of internal control in place as evidenced by the fact when recapture auditors identified potential improper payments, the majority of such payments had already been identified by NASA payment processors and funds were already collected or in the collection process.

Overpayments Outside the Recapture Audit

Annually NASA performs an internal review of Overpayments Outside of Recapture Audit as a mechanism to detect and recover overpayments. The scope of the review includes cost-type and fixed priced contracts. The review includes an agency-wide data call to allow for reporting of agency identified overpayments and collections of improper payments. The data call is sent to NASA Centers, Office of Inspector General, Office of Procurement and Office of the Chief Financial Officer Policy & Grants Division. Examples of activities included in reporting are Agency post-payment review/audits, single audit and self-reported overpayments, which include OIG investigation settlements. As a result, NASA recovered $27.04 million[1], which is 93.7% of the total overpayments identified for payments outside of the recapture audit.

[1] 85.2% of the total overpayments identified and 91% of the total overpayments recovered are from one OIG investigation settled in 2019 with a contract period of performance from FY1999- FY 2014.

NASA attributes much of the positive results of its improper payment program to the centralized procurement and payment activities executed at the NASA Shared Services Center (NSSC). Centralized processing provides a sound internal control environment that mitigates the risk of improper payments across the Agency.

Fraud Reduction Report

The Fraud Reduction and Data Analytics Act (FRDA) of 2015 requires federal agencies to establish and improve financial and administrative controls and procedures to assess and mitigate fraud risks, and to improve federal agencies' development and use of data analytics for the purpose of identifying, preventing, and responding to fraud, including improper payments.

NASA has stewardship responsibility for establishing and maintaining internal controls to safeguard its assets against loss from unauthorized use or disposition, ensures that its financial statements are not materially misstated, and comply with applicable laws and regulations. As an integral part of this stewardship responsibility, management has a specific duty to design and implement programs and controls to prevent, deter, and detect fraud. In order to achieve this responsibility, NASA has the following fraud safeguarding mechanisms in place:

NASA'S FRAUD RISK MANAGEMENT INITIATIVES

Fraud Prevention & Detection Activities	Objective
Acquisition Integrity Program (AIP)	To monitor and ensure coordination of criminal, civil, contractual and administrative remedies for investigations of fraud and/or corruption related to procurement activities. To establish and maintain coordination with the Office of Inspector General (OIG) and the Department of Justice
Improper Payments Program (IPP)	To identify programs susceptible to improper payments through annual risk assessment and testing
Fraud risk assessments	To identify and prioritize fraud risks and determine scope of testing
Evaluation of fraud risk management control activities through the annual Control Environment Summary	To describe how the organization considers the potential for fraud in assessing risks to the achievement of objectives, and to rate the effectiveness of control activities
Enterprise Risk Assessment & management of Agency Risk Profile	To identify and report significant cross-cutting risks impacting the Agency that require escalation to senior management
Anti-fraud awareness and training	To establish the tone at the top, communicate employee responsibility/ accountability, and increase awareness of fraud reporting mechanisms
Coordination and collaboration with the OIG	To share information on potential fraud risks, relevant controls, identified issues, results of investigations and other reviews. To learn of emerging fraud trends and improved fraud prevention and detection techniques
OIG audits, reviews and investigations	To evaluate the adequacy and effectiveness of controls (this may include controls that address fraud risk); to investigate potential incidents of fraud, waste and abuse
Financial Statement audit	To obtain reasonable assurance that the financial statements are free from material misstatements whether due to fraud or error
Data Breach Response Program	To establish policies, procedures and practices that address federal information technology mandates including privacy and security requirements, and to reduce the risk of loss of NASA's data and technology assets
Counterfeit Parts Awareness & Inspection program	To identify counterfeit parts through components and materials investigation and to mitigate the risk of misrepresentation by a supplier or vendor

NASA aims to detect and prevent improper payments via fraud reduction through PIIP. NASA identifies, reviews, classifies, determines root causes, and develops Agency corrective actions for instances of fraud identified via the payment integrity risk assessment. Cases of fraud are also considered when determining whether NASA's programs are susceptible to significant improper payments as required by OMB Circular A-123, Appendix C, *Requirements for Payment Integrity Improvement*. When suspected instance of fraud are identified, the Agency coordinates with the appropriate parties by referring those instances for investigation and adjudication to the appropriate parties such as NASA's OIG or the Department of Justice. In addition to NASA's PIIP, the Agency has taken additional steps to ensure appropriate strategies and procedures are in place to reduce fraud. Leveraging GAO's "A Framework for Managing Fraud Risks in Federal Programs" as a guide, NASA has implemented several activities to prevent and/or detect fraud across the Agency and will continue to enhance processes to identify and mitigate fraud risks. Fraud prevention and detection activities include Acquisition Integrity and Improper Payments Programs, regular fraud risk assessments, an enhanced Statement of Assurance process to include assessment and evaluation of fraud risk management control activities, external and internal audits and investigations, and a Data Breach Response Program.

NASA has also deployed several fraud-awareness initiatives across the Agency, including mandatory fraud prevention training for all employees, anti-fraud campaigns to increase awareness of reporting mechanisms and coordination and collaboration with the OIG to further assess the Agency's risk posture. NASA has an extensive Counterfeit Parts Awareness and Inspection program that includes regular investigation and examination of parts, components and materials to mitigate the risk of misrepresentation by a supplier or vendor. As such, NASA employs many of the leading practices outlined in GAO's Framework to ensure effective fraud risk management across NASA. NASA's Mission Support Offices, Mission Directorates, and Centers participate in annual fraud assessments related to the GAO's "Standards for Internal Control in the Federal Government" (the "Green Book"); and OMB Circular A-123 with respect to the leading practices for managing fraud risk. These assessments aid in the evaluation of all aspects of fraud, including fraud prevention, fraud detection through continuous monitoring and evaluations, fraud corrective action plans, and the communication of fraud control activities across the Agency. To identify potential risk areas for fraud, NASA analyzes known fraud cases and inherent risk of errors and irregularities due to fraud that could potentially impact business cycles.

NASA's comprehensive OMB Circular A-123, Appendix A, assessment approach includes assessment of reporting risks, including fraud risk, associated with each business cycle; evaluating whether internal controls mitigate those risks to acceptable levels; and conducting risk-based internal control reviews to determine whether controls are operating as intended. In FY 2020, NASA's annual A-123 risk assessment also included a review of emerging fraud risks associated with the COVID-19 pandemic.

NASA also employs an Ethics Program that requires NASA employees to: (1) Comply with applicable ethics laws, regulations, Executive orders, and other guidance, and avoid even the appearance of impropriety; and (2) Complete annual and other periodic training as required. The Agency widely communicates and encourages employees to report instances observed or allegations of fraud, waste, abuse and mismanagement. One reporting mechanism is the Office of Inspector General's Hotline. In FY 2020, NASA introduced Agency-wide fraud risk training sponsored by the AIP. This training covers the importance of fraud awareness and acquisition integrity, types of fraud, how to identify, recognize and report fraud. The training also covers fraud remedies, and the AIP and OIG's roles and approaches to addressing fraud. NASA remains committed to combating fraud through its strong risk management and internal control structure, which allows its organizational structure to be conducive to effective fraud risk management, and continues to expand fraud awareness outreach as part of its plan to counter fraud within the Agency.

Do Not Pay Initiative

OMB requires agencies to report annually on Do Not Pay (DNP) activities as it relates to the Payment Integrity Information Act of 2019.

NASA enrolled in the Department of the Treasury's DNP portal process on September 27, 2014. Its Payment Automation File is vetted against the Social Security Administration (SSA) Death Master file.

The cumulative results of these monthly reviews reported are for the period of October 1, 2019 through September 15, 2020. During this time period, there were 103,525 payments made by Treasury on behalf of NASA with a dollar value of $14.888 billion.

The review by NASA resulted in no matching improper payments for FY 2020.

UNDISBURSED BALANCES IN EXPIRED GRANT ACCOUNTS

In December 2015, Congress passed the **Commerce, Justice, Science, and Related Agencies Appropriations Act, 2016 (Division B of the Consolidated Appropriations Act, 2016, Pub. L. 114-113)**. NASA monitors and tracks grants' undisbursed balances in expired accounts through a monthly review of internal control activities designed to identify undisbursed balances in expired accounts.

"Undisbursed balances" in expired grant accounts represent the unliquidated obligation amounts that remain available for expenditure on an expired grant award before it is closed out and include budget authority that is no longer available for new obligations but is still available for disbursement. The Continuous Monitoring Program (CMP) ensures ongoing review and validation of financial data and the effectiveness of internal controls over the entire financial management process, including grants. When grants undisbursed balances in expired accounts are identified, appropriate action is taken to ensure optimum use of grant resources.

NASA generates financial management reports to aid in the tracking and monitoring of undisbursed amounts. An aging report of open obligations is generated on a monthly basis to determine the last day activity occurred. For open obligations in which no activity has occurred in a six month period and/or there is no supporting documentation, further review is performed to determine the validity of obligation balances and the existence of valid source documentation. Additionally, further analysis is performed to determine if funds can be de-obligated. If obligations are valid, the aging reports are updated to reflect that obligations have been confirmed with procurement as valid.

NASA will continue to track undisbursed balances in expired grant accounts through its monthly review of internal control activities designed to identify funds for de-obligation. This involves the continuous monitoring of undisbursed balances, identifying balances that should be de-obligated, and performing timely close-out of grants and other activities. Additionally, NASA's financial management and procurement offices will continue to collaborate in monitoring and tracking undisbursed balances.

Currently, NASA does not have undisbursed balances in expired accounts that may be returned to the Treasury of the United States. The following chart reflects the total number and dollar amount of undisbursed grants in expired appropriations. All amounts have been obligated to a specific project.

Fiscal Year	Total Number of Expired Grants with Undisbursed Balances	Total Amount of Undisbursed Balances for Expired Grants (In Dollars)
2019	56	$541,499
2018	3	$58,049
2017	5	$174,480

GRANT PROGRAMS INFORMATION

NASA monitors and tracks grants' undisbursed balances in expired accounts through a monthly review of internal control activities designed to identify undisbursed balances in expired accounts. The Continuous Monitoring Program (CMP) ensures ongoing review and validation of financial data and the effectiveness of internal controls over the entire financial management process, including grants. When grants undisbursed balances in expired accounts are identified, appropriate action is taken to ensure optimum use of grant resources.

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Additionally, further analysis is performed to determine if funds can be de-obligated. If obligations are valid, the aging reports are updated to reflect that obligations have been confirmed with procurement as valid.

NASA will continue to track undisbursed balances in expired grant accounts through its monthly review of internal control activities designed to identify funds for de-obligation. This involves the continuous monitoring of undisbursed balances, identifying balances that should be de-obligated, and performing timely close-out of grants and other activities. Additionally, NASA's financial management and procurement offices will continue to collaborate in monitoring and tracking undisbursed balances. Currently, NASA does not have undisbursed balances in expired accounts that may be returned to the Treasury of the United States.

Below is a summary table of the total number of undisbursed grants and cooperative agreements for which closeout has not yet occurred, but for which the period of performance has elapsed by two years or more prior to September 30, 2020 (i.e., on or before September 30, 2018).

Category	2-3 Years	3-5 Years	More than 5 Years
Number of Grants/Cooperative Agreements with Zero Dollar Balances	4	0	0
Number of Grants/Cooperative Agreements with Undisbursed Balances	8	2	0
Total Amount of Undisbursed Balances	$232,529	$42,182	0

REAL PROPERTY INFORMATION

NASA's real property inventory of buildings, structures and land consists of nearly 5,400 assets with an estimated replacement value of approximately $40 billion for constructed assets. The average age is over 38 years. The typical condition is fair to good. A consistent effort to dispose of obsolete and no longer needed assets combined with a modest repair/replacement program has yielded a stable condition rating. NASA is responsible for over 200,000 acres of land.

Additional information can be found at GSA FRPP (Federal Real Property Profile):
https://www.gsa.gov/policy-regulations/policy/real-property-policy/asset-management/federal-real-property-profile-frpp/federal-real-property-public-data-set

Did you know? Plum Brook Station is a remote test facility for the NASA Glenn Research Center in Cleveland, Ohio. Located on 6,400 acres in the Lake Erie community of Sandusky, Plum Brook is home to four world-class test facilities, which perform complex and innovative ground tests for the international space community.

The Space Environments Complex (SEC) houses the world's largest and most powerful space environment simulation facilities including the Space Simulation Vacuum Chamber measuring 100 ft. in diameter by 122 ft. high. The Reverberant Acoustic Test Facility is the world's most powerful spacecraft acoustic test chamber, which can simulate the noise of a spacecraft launch up to 163 decibels or as loud as the thrust of 20 jet engines. The Mechanical Vibration Facility is the world's highest capacity and most powerful spacecraft shaker system, subjecting test articles to the rigorous conditions of launch. In-Space Propulsion Facility (ISP) is the world's only facility capable of testing full-scale, upper-stage launch vehicles and rocket engines under simulated high-altitude conditions.

Photo Credit: Interior of the Space Environments Complex (SEC)

CIVIL MONETARY PENALTY ADJUSTMENT FOR INFLATION

For the Fiscal Year Ended September 30, 2020

The Federal Civil Penalties Inflation Adjustment Act of 1990, as amended, requires agencies to make regular and consistent inflationary adjustments of civil monetary penalties to maintain their deterrent effect. To improve compliance with the Act, and in response to multiple audits and recommendations, agencies should report annually in the Other Information section the most recent inflationary adjustments to civil monetary penalties to ensure penalty adjustments are both timely and accurate.

NASA reviewed each of the penalty amounts under its statutes and penalty amounts for inflation when required under law. The following table reflects the authorities imposing the penalties, the civil penalties, the adjustment years, the current penalty amount and location for penalty updates.

Authority (Statute)	Penalty (Name or Description)	Year Enacted	Latest Year Adjustment	Penalty Level ($ Amount)	Location
Program Fraud Civil Remedies Act of 1986	Penalty for False Claims	1986	2020	Maximum $11,665	Federal Register Vol.85, No.57 (24 March 2020) Rules and Regulations www.federalregister.gov
Department of the Interior and Related Agencies Appropriations Act of 1989, Public Law 101-121, sec. 319	Penalty for use of appropriated funds to lobby or influence certain contracts.	1989	2020	Minimum $20,489	Federal Register Vol.85, No.57 (24 March 2020) Rules and Regulations www.federalregister.gov
Department of the Interior and Related Agencies Appropriations Act of 1989, Public Law 101-121, sec. 319	Penalty for use of appropriated funds to lobby or influence certain contracts.	1989	2020	Maximum $204,892	Federal Register Vol.85, No.57 (24 March 2020) Rules and Regulations www.federalregister.gov
Department of the Interior and Related Agencies Appropriations Act of 1989, Public Law 101-121, sec. 319	Penalty for failure to report certain lobbying transactions.	1989	2020	Minimum $20,489	Federal Register Vol.85, No.57 (24 March 2020) Rules and Regulations www.federalregister.gov
Department of the Interior and Related Agencies Appropriations Act of 1989, Public Law 101-121, sec. 319	Penalty for failure to report certain lobbying transactions	1989	2020	Maximum $204,892	Federal Register Vol.85, No.57 (24 March 2020) Rules and Regulations www.federalregister.gov

SUMMARY OF FINANCIAL STATEMENT AUDIT AND MANAGEMENT ASSURANCES

The following tables summarize the Agency's FY 2020 Financial Statement Audit and Management Assurances. **Table 1** summarizes the status of prior year material weaknesses identified, if any by the Financial Statement Auditor. **Table 2** summarizes the status of prior year material weaknesses, if any identified by NASA Management.

Table 1: Summary of Financial Statement Audit

Audit Opinion	Unmodified
Restatement	No

Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Ending Balance
None	0	0	0	0	0
Total Material Weaknesses	0	0	0	0	0

Table 2: Summary of Management Assurances

Effectiveness of Internal Control over Financial Reporting (FMFIA 2)						
Statement of Assurance	Unmodified					
Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
None	0	0	0	0	0	0
Total Material Weaknesses	0	0	0	0	0	0
Effectiveness of Internal Control over Operations (FMFIA 2)						
Statement of Assurance	Unmodified					
Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
None	0	0	0	0	0	0
Total Material Weaknesses	0	0	0	0	0	0
Conformance with Financial Management System Requirements (FMFIA 4)						
Statement of Assurance	Systems conform					
Non-Conformances	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
None	0	0	0	0	0	0
Total Non-Conformances	0	0	0	0	0	0

Compliance with Federal Financial Management Improvement Act (FFMIA)		
	Agency	Auditor
1. System Requirements	No lack of substantial compliance noted	No lack of substantial compliance noted
2. Accounting Standards	No lack of substantial compliance noted	No lack of substantial compliance noted
3. USSGL at Transaction Level	No lack of substantial compliance noted	No lack of substantial compliance noted

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APPENDIX

This artist's concept illustrates a catastrophic collision between two rocky exoplanets in the planetary system BD +20 307, turning both into dusty debris. Ten years ago, scientists speculated that the warm dust in this system was a result of a planet-to-planet collision. Now, NASA's SOFIA mission found even more warm dust, further supporting that two rocky exoplanets collided. This helps build a more complete picture of our own solar system's history. Such a collision could be similar to the type of catastrophic event that ultimately created our Moon.

Photo Credit: NASA/SOFIA/Lynette Cook

CERTIFICATE OF EXCELLENCE IN ACCOUNTABILITY REPORTING AWARD

In May 2020, during a virtual awards ceremony, the Association of Government Accountants (AGA) awarded NASA its prestigious **Certificate of Excellence in Accountability Reporting (CEAR) award**. This marks the 6th consecutive year NASA has been recognized for its excellency in financial reporting. NASA also received a Best-in-Class Award for its Motivating and Inspiring Stories. This was the first time an agency has been recognized in this category.

AGA

Certificate of Excellence in Accountability Reporting®

presented to the

National Aeronautics and Space Administration

in recognition of outstanding effort in preparing the Agency Financial Report for fiscal year 2019

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Association of Government Accountants

Diane L. Dudley, CGFM, CPA
Chair, CEAR Board

Ann M. Ebberts, MS, PMP
Chief Executive Officer, AGA

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Chair, CEAR Board

Ann M. Ebberts, MS, PMP
Chief Executive Officer, AGA

GLOSSARY OF ACRONYMS

AA	Associate Administrator
AAIRS	Audit and Assurance Information Reporting System
ABC	Agency Baseline Commitment
AFO	Audit Follow-up Official
AFR	Agency Financial Report
AFRC	Armstrong Flight Research Center
AGA	Association of Government Accountants
AICPA	American Institute of Certified Public Accountants
AIP	Acquisition Integrity Program
ALRs	Audit Liaison Representatives
AOC	Administrative Order on Consent
API	Annual Performance Indicators
APMC	Agency Program Management Council
APR	Annual Performance Report
A-PUFFER	Autonomous Pop-Up Flat-Folding Explorers
ARC	Ames Research Center
ARMD	Aeronautics Research Mission Directorate
ARMWG	Agency Risk Management Working Group
ASAP	Aerospace Safety Advisory Panel
ASC	Accounting Standards Codification
ATV	Automated Transfer Vehicle
BAA	Broad Agency Announcement
BSA	Business Services Assessment
CADRe	Cost Analysis Data Requirement
Caltech	California Institute of Technology
CAP	Corrective Action Plan
CARES Act	Coronavirus Aid, Relief, and Economic Security Act
CASIS	Center for the Advancement of Science In Space
CBR	Certification Baseline Reviews
CCAFS	Cape Canaveral Air Force Station
CCP	Commercial Crew Program
CEAR	Certificate of Excellence in Accountability Reporting
CFO Act	Chief Financial Officers Act of 1990
Challenger Trust Fund	Science, Space and Technology Education Trust Fund
CIO	Chief Information Officer
CIT	Cybersecurity Integration Team
CLA	CliftonLarsonAllen LLP
CLPS	Commercial Lunar Payload Services
CMP	Continuous Monitoring Program
COF	Construction of Facilities
COOP	Continuity of Operations Plan
COTS	Commercial Off-The-Shelf
COVID-19	Coronavirus
CRV	Current Replacement Value
CSLI	CubeSat Launch Initiative
CSRS	Civil Service Retirement System

CTT	Cyber Task Team
DATA Act	Digital Accountability and Transparency Act
DCIA	Debt Collection Improvement Act
Disaster Relief Act	Disaster Relief Appropriations Act
DM Method	Deferred Maintenance Parametric Estimating Method
DM&R	Deferred Maintenance and Repairs
DNP	Do Not Pay
DTO	Detailed Test Objective
DTSC	Department of Toxic Substance Control
DVT	Development Vertification Test
EC	Executive Council
EDAR	Emissions Detection and Reporting
EGS	Exploration Ground Systems
EIS	Environmental Impact Statement
Endeavor Trust Fund	Endeavor Teacher Fellowship Trust Fund
ERM	Enterprise Risk Management
ERMWG	Enterprise Risk Management Working Group
ERP	Enterprise Resource Planning
ESD/AES	Exploration System Development, Advance Exploration Systems
ESPC	Energy Savings Performance Contract
FAA	Federal Aviation Administration
FAR	Federal Acquisition Regulation
FASAB	Federal Accounting Standards Advisory Board
FASB	Financial Accounting Standards Board
FBWT	Fund Balance with Treasury
FCB	Functional Cargo Block
FCI	Facility Condition Index
FECA	Federal Employees' Compensation Act
FEGLI	Federal Employees Group Life Insurance
FEHB	Federal Employee Health Benefits
FERS	Federal Employees Retirement System
FEVS	Federal Employee Viewpoint Survey
FFMIA	Federal Financial Management Improvement Act
FFRDC	Federally Funded Research and Development Center
FISMA	Federal Information Security Modernization Act
FITARA	Federal Information Technology Acquisition Reform Act
FMFIA	Federal Managers' Financial Integrity Act
FPA	Federal Program Agencies
FPTBU	Funds to be Put to Better Use
FR	Financial Report
FRDA	Fraud Reduction and Data Analytics Act
FRPP	Federal Real Property Profile
FY	Fiscal Year
GAAP	Generally Accepted Accounting Principles
GAO	Government Accountability Office
Gateway	Lunar Gateway
GISS	Goddard Institute for Space Studies
G-PP&E	General Property, Plant and Equipment
GPRAMA	Government Performance and Results Act Modernization Act of 2010

GRC	Glenn Research Center
GSFC	Goddard Space Flight Center
GTAS	Governmentwide Treasury Account Symbol
HALE	High-Altitude Long-Endurance
HALO	Habitation and Logistics Outpost
HEAT	Hager Environmental and Atmospheric Technologies
HEOMD	Human Exploration & Operations Mission Directorate
HQ	Headquarters
HLS	Human Landing System
HTV	H-II Transfer Vehicle
HVA	High-Value Assets
HVAC	Heating, Ventilating and Air Conditioning
IADS	Integrated Arrival, Departure, and Surface
IBNR	Incurred But Not Reported
ICPS	Interim Cryogenic Propulsion Stage
ICS-CERT	Industrial Control Systems Cyber Emergency Response Team
IGT	Intragovernmental
IPERA	Improper Payments Elimination and Recovery Act
IPERIA	Improper Payments Elimination and Recovery Improvements Act
IPP	Improper Payments Program
IRT	Independent Reviews Team
ISO	Information System Owner
ISP	In-Space Propulsion Facility
ISRO	Indian Space Research Organization
ISS	International Space Station
IT	Information Technology
ITS-HBK	IT Security Handbook
JCL	Joint Confidence Level
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
KDP	Key Decision Points
KSC	Kennedy Space Center
LaRC	Langley Research Center
LaRC - SI	Langley Research Center - Soluble Imide
LBFD	Low-Boom Flight Demonstrator
LEO	Low Earth Orbit
LUT	Lookup Table
M&R	Maintenance and repairs
MAIA	Multi-Angle Imager for Aerosols
MAP	Mission Support Future Architecture Program
MDI	Mission Dependency Index
MDMs	Multiplexer-Demultiplexers
MIRI	Mid-Infrared Instrument
MSC	Mission Support Council
MSD	Mission Support Directorate
MSFC	Marshall Space Flight Center
MSWG	Management System Working Group
NAC	NASA Advisory Council
NASA	National Aeronautics and Space Administration

NEPA	National Environmental Policy Act
NEX	NASA Expected
NextSTEP	Next Space Technologies for Exploration Partnerships
NFS	NASA FAR Supplement
NHPA	National Historic Preservation Act
NICE	National Initiative for Cybersecurity Education
NISAR	NASA-Indian Synthetic Aperture Radar
NIST	National Institute of Standards and Technology
NMO	NASA Management Office
NPR	NASA Procedural Requirements
NSSC	NASA Shared Services Center
OCE	Office of the Chief Engineer
OCFO	Office of the Chief Financial Officer
OCHCO	Office of the Chief Human Capital Officer
OCIO	Office of the Chief Information Officer
OIG	Office of Inspector General
OIP	Operations Interface Procedure
OMB	Office of Management and Budget
OP	Office of Procurement
OPM	Office of Personnel Management
OPS	Office of Protective Services
Orion	Orion Multi-Purpose Crew
OSMA	Office of Safety and Mission Assurance
P.L.	Public Law
P3	Public-Private Partnerships
PACE	Plankton, Aerosol, Cloud and Ocean Ecosystem
PAR	Performance and Accountability Report
PEIR	Programmatic Environmental Impact Report
PG	Performance Goals
PIIA	Payment Integrity Information Act
PIIP	Payment Integrity Improvement Program
PIV	Personal Identity Verification
PM	Program Management
PMC	Program Management Council
PMIAA	Program Management Improvement and Accountability Act
PMIO	Program Management Improvement Officer
PPE	Power and Propulsion Element
President's Budget	Budget of the United States Government
PSE	Program Support Equipment
QAD	Quality Assurance Division
QueSST	Quiet SuperSonic Technology
R&D	Research and Development
RISCA	Risk Information Security Compliance System
ROD	Record of Decision
RMB	Reimbursable
RPT	Rocket Propulsion Testing
SAP ECC	Systems, Applications & Products ERP Central Component
SAT	Senior Assessment Team
SBIR/STTR	Small Business Innovation Research/ Small Business Technology Transfer

SBR	Statement of Budgetary Resources
SEC	Space Environments Complex
SFFAS	Statement of Federal Financial Accounting Standards
SLS	Space Launch System
SM	Service Module
SMC	Senior Management Council
SMD	Science Mission Directorate
SNC	Statement of Net Cost
SOFIA	Stratospheric Observatory for Infrared Astronomy
SOA	State of Assurance
SOC	Security Operations Center
SOP	Standard Operating Procedure
SSA	Social Security Administration
SSAE	Statement on Standards for Attestation Engagements
SSC	Stennis Space Center
SSFL	Santa Susana Field Laboratory
STEM	Science, Technology, Engineering, and Mathematical
STMD	Space Technology Mission Directorate
STSci	Space Telescope Science Institute
SWOT	Surface Water and Ocean Topography
TAG	Touch-And-Go
TBCM	Time-Based Conformance Monitoring
TCAT	Technical Capabilities Assessment Team
Treasury	U.S. Department of the Treasury
U.S.	United States
UAS	Unmanned Aircraft System
UNICORN	Unified Comprehensive Operational Risk Network
VIPer	Volume of Integrated Performance
Webb	James Webb Space Telescope

THANK YOU

The Agency Financial Report (AFR) was produced with the energies, time, and talents of the National Aeronautics and Space Administration employees in Washington, D.C. We offer our sincerest thanks and acknowledgments. In particular, we recognize the following individuals and organizations.

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We offer special thanks to our graphic designer, Darren Fuller.

A SpaceX Falcon 9 rocket carrying the company's Crew Dragon spacecraft is launched on NASA's SpaceX Demo-2 mission to the International Space Station with NASA astronauts Robert Behnken and Douglas Hurley onboard, Saturday, May 30, 2020, at NASA's Kennedy Space Center in Florida.

Photo Credit: NASA/Bill Ingalls

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