

# NASA

National Aeronautics and Space Administration

Office of Inspector General

Testimony before the House of Representatives  
Committee on Science, Space, and Technology

# PROTECTING THE AMERICAN TAXPAYER: HIGHLIGHTING EFFORTS TO PROTECT AGAINST FEDERAL WASTE, FRAUD, AND MISMANAGEMENT

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Chairman Lucas, Ranking Member Lofgren, and Members of the Committee:

The Office of Inspector General (OIG) is committed to providing independent, comprehensive, and objective oversight of NASA programs and projects, and we welcome this opportunity to highlight our work to the Committee on Science, Space and Technology.

NASA stands at the forefront of aeronautics, science, and space exploration. Since its creation in 1958, NASA has made extraordinary achievements through missions including Apollo, the Space Shuttle Program, the International Space Station, and the James Webb Space Telescope (JWST). Looking forward, the Agency seeks to continue this legacy of exploration and innovation with the Artemis campaign, which intends to establish a long-term human presence on the Moon as a prelude to crewed missions to Mars.

To support every facet of its operations, the Agency uses contracts, grants, and cooperative agreements to fund research and development activities and to purchase services, supplies, and equipment. Over the past 3 years, NASA has spent over \$58.8 billion on procurements with the Agency executing over 26,000 procurement actions in fiscal year (FY) 2022 alone. NASA primarily awarded these procurements to large and small businesses, educational institutions, and nonprofit organizations, with approximately 68 percent of the funds provided to these entities through competition. NASA's FY 2022 procurement portfolio was composed of 33 percent firm fixed-price contracts, 28 percent award-fee contracts, 27 percent cost-plus-fixed-fee contracts, and the remaining 12 percent incentive contracts and other award types.

The breadth and scale of these procurements underlie the significant challenges NASA faces to ensure the Agency receives good value for its investments, and that recipients spend NASA funds appropriately to accomplish agreed-upon goals on the agreed-upon timetable. Throughout its history, NASA has faced long-standing challenges with oversight of its contracts and grants. Relatedly, the Agency has often experienced substantial growth in the cost and schedule in many of its programs, including major human space flight missions like the Space Launch System (SLS) heavy lift rocket and Orion Multi-Purpose Crew Vehicle (Orion), as well as other science and exploratory programs and projects.

For the past 16 years, the OIG has highlighted NASA's acquisition practices as a top management challenge due to persistent cost growth and schedule delays in many of the Agency's major programs and projects. Our audit work over the past decade has focused on issues critical to NASA's effort to land humans on the Moon as a prelude to a crewed Mars mission. We assessed the SLS, Orion, next-generation spacesuit development, and ground systems including Mobile Launchers I and II. We also examined supporting science projects such as the Volatiles Investigating Polar Exploration Rover (VIPER) project—a mobile rover that will survey the Moon's South Pole. Because cooperation with International Space Agencies is critical to NASA's plans to achieve a robust and sustainable presence in space, we recently examined NASA's efforts to coordinate with its international partners on the Artemis campaign.

Since FY 2020, we have issued 108 audit products with 442 recommendations, questioned over \$256 million, and identified \$4 million in funds that could be put to better use. On the investigations side of the house, during this 3-year period our work related to procurement, grant fraud, and waste resulted in 24 indictments, 22 criminal convictions, and over 60 suspensions and debarments. In addition, more than \$5.1 million in criminal restitution and over \$29 million in civil settlement fines were paid to the U.S. Treasury as a result of OIG investigations.

Our work has repeatedly identified substantial cost increases and schedule delays with NASA’s programs and projects due in part to the Agency’s contract management practices. We have reported on challenges NASA has faced in the development of reliable cost and schedule estimates, contract and project management decisions that led to increased costs, and overly generous award fees the Agency provided to contractors even during periods of poor performance.

My testimony today focuses on the top challenges facing NASA and is informed by our comprehensive audit and investigations oversight work.

## **Development of Reliable Cost and Schedule Estimates**

NASA has struggled for years to develop reliable life-cycle cost and schedule estimates for its multi-billion-dollar programs such as those supporting the Artemis missions, JWST, and other science missions.<sup>1</sup> NASA needs to better manage cost and schedule through the development of reliable and realistic estimates at both the outset of projects and during their development. For its most high-profile and costly space exploration campaign—Artemis—NASA lacks a comprehensive cost estimate that accounts for all program costs. Without an official estimate that includes all relevant costs, Congress, the public, and other stakeholders lack transparency into the funding required to sustain the Artemis campaign over the medium to long term.

Nevertheless, through a series of detailed audits examining individual parts of the overall Artemis campaign, the OIG developed such an estimate. In November 2021, we reported that NASA is projected to spend \$93 billion on the Artemis effort from FY 2012 through FY 2025.<sup>2</sup> Moreover, we also reported a cost of \$4.1 billion per launch of the SLS/Orion system for at least the first four Artemis missions, an expense we found unsustainable. Consequently, NASA must accelerate its efforts to identify ways to make its Artemis-related programs more affordable. Otherwise, relying on such an expensive single-use, heavy-lift rocket system will, in our judgment, inhibit if not derail NASA’s ability to sustain its long-term human exploration goals for the Moon and Mars.

The Agency has also struggled to develop reliable estimates in many of its science missions. For example, after more than 20 years of development and testing, NASA successfully launched the James Webb Space Telescope—an infrared observatory designed to help us understand the origin of the universe and the creation and evolution of the first stars and galaxies—in December 2021 after years of schedule delays and a series of significant cost increases. From its inception in 1999 when early estimates ranged from \$1 billion to \$3.5 billion, the final cost of the telescope ballooned to close to \$10 billion. The telescope is a technical and scientific marvel for sure, but also a science mission that experienced poor contract and project management at key junctures in its development.

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<sup>1</sup> 51 U.S. Code § 30104 defines life-cycle cost as the total of the direct, indirect, recurring, and nonrecurring costs, including construction of facilities and civil servant costs, and other related expenses incurred or estimated to be incurred in the design, development, verification, production, operation, maintenance, support, and retirement of a program over its planned lifespan.

<sup>2</sup> *NASA’s Management of the Artemis Missions* ([IG-22-003](#), November 15, 2021).

## Choice of Contracting Vehicles

NASA has struggled over the years to make the most appropriate contracting decisions when managing its programs, resulting in choices that have led to increased costs. Development contracts—such as those for the SLS’s core stages, boosters, and engines and the Orion capsule—were sole sourced, eliminating any potential cost benefits of competition. Moreover, competitive follow-on awards for production contracts for these items several years later were not feasible due to the high cost of a different contractor developing its own manufacturing processes and facilities. NASA continues to use a cost-plus contracting structure for the SLS, Orion, and Ground Systems even though the programs have experienced years of delays and billions of dollars in cost increases. Down the road, NASA officials intend to transition these programs to potentially less costly fixed-price contracts. For example, contracting officials are implementing a fixed-price arrangement for production of SLS boosters beginning with Artemis IV and for Orion contracts starting with Artemis IX. However, major production contracts for the SLS core stage and exploration upper stages, RS-25 engines, and Mobile Launcher-2 remain cost-plus contracts.

It should be noted that use of fixed-price contracts is not a one-size-fits-all solution to contain project cost. In a November 2020 report examining NASA’s management of the Gateway Program for Artemis Missions—the outpost that will orbit the Moon and serve as a “way station” for lunar exploration—we noted cost increases associated with awarding fixed-price contracts on projects with still-evolving requirements.<sup>3</sup> In particular, NASA awarded a fixed-price contract to develop the power and propulsion element of the Gateway because the Agency anticipated few design and development changes. However, at the time of our report, the contract value had increased by \$78.5 million since the award, with more increases expected to accommodate additional evolving requirements and technical challenges.

## Project Management

Our work over the years has identified multiple examples of project management decisions that drove up costs and caused schedule delays. In March 2020, we reported on cost increases and schedule delays the Agency experienced developing its first mobile launcher (ML-1), the ground structure to assemble, process, transport, and launch the integrated SLS/Orion system. As of January 2020, the project cost \$693 million—\$308 million more than the Agency’s initial budget estimate in March 2014—and was more than 3 years behind schedule.<sup>4</sup> We found NASA’s acquisition approach for ML-1 lacked coordination with contractors, who failed to effectively integrate their individual design changes, and the Agency lacked a comprehensive process to incorporate work from the different contractors into a single master design. Moreover, instead of using a solicitation process to identify the most qualified contractor to handle the project’s design phase, NASA used an in-house, prequalified engineering services contractor that performed a wide range of services for the Agency from laboratory maintenance to software development. These decisions, coupled with multiple other factors, resulted in design errors and integration challenges that drove the project’s cost increases and schedule delays. Similarly, NASA’s efforts to develop its Mobile Launcher 2 is also plagued by cost delays and schedule overruns, primarily due to poor contractor performance.

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<sup>3</sup> *NASA’s Management of the Gateway Program for Artemis Missions*, ([IG-21-004](#), November 10, 2020).

<sup>4</sup> *Audit of NASA’s Development of Its Mobile Launchers*, ([IG-20-013](#), March 17, 2020).

In July 2020, we reported that Orion was proceeding with production of crew capsules for future Artemis missions before completing key development activities, increasing the risk of cost growth beyond the \$1.4 billion already expected through 2023 and causing additional schedule delays.<sup>5</sup> Specifically, NASA made the decision to conduct qualification testing—the process that formally verifies a design meets requirements—for the Orion capsule after development of the Artemis I spacecraft was completed. Traditionally, qualification testing is completed before the vehicle’s first flight. The Orion Program plans to use the Artemis I flight vehicle and test articles to complete qualification, instead of having a dedicated test article. In addition, the Program began production of additional crew capsules before finishing development of the Artemis 1 capsule. Both decisions increase the risk of cost growth and schedule delays.

The troubled history of GeoCarb, an Earth System Science Pathfinder mission selected in 2016 to measure greenhouse gases and vegetation health from space, provides another example of a management challenge that project managers were unable to overcome. The Agency’s original plan was to fly GeoCarb as a hosted payload on a commercial communications satellite with an initial launch readiness date of 2022. In February 2020, NASA announced that it was increasing the GeoCarb life-cycle cost to reflect new estimates for completing the instrument and obtaining a host spacecraft. However, by early 2022 launching GeoCarb as a hosted payload was no longer an option, and NASA made the decision to seek alternative launch solutions. However, in November 2022 NASA cancelled the GeoCarb mission due to technical concerns, cost performance, and the availability of new alternative data sources. At the time it was cancelled, NASA estimated that continuing the mission would cost over \$600 million—about \$430 million more than the original \$170 million cost cap—a price tag that would have a detrimental impact on the rest of NASA’s Earth Science portfolio, including causing delays of other Earth Science missions. We are currently evaluating NASA’s management of the Earth System Science Pathfinder Program, including the Agency’s decision to cancel GeoCarb.

## **Contractor Performance and Use of Award Fees**

NASA has a history of paying overly generous award fees that we have found to be inconsistent with contractor performance. Award-fee contracts are designed to incentivize contractors and reward strong performance, and these fees are in addition to the amounts paid to reimburse them for actual costs incurred. We have reported on the inappropriate use of award fees during periods of poor contractor performance for multiple NASA programs, including the SLS contracts with The Boeing Company (Boeing), Orion contracts with Lockheed Martin Corporation (Lockheed), and NASA’s contract with Bechtel National, Inc. to build a second mobile launcher (ML-2).

In October 2018, we reported that management, technical, and infrastructure issues driven mostly by Boeing’s poor performance resulted in a 2½-year schedule slip and \$4 billion in cost increases for the development of two SLS core stages.<sup>6</sup> We attributed these issues to the contractor consistently underestimating the scope of the work to be performed and thus the size and skills of its required contractor workforce, which led to delays in development of hardware and software. In addition to the contractor’s poor performance, we also found flaws in NASA’s evaluation of Boeing’s performance on the contract—flaws that resulted in the Agency inflating the contractor’s scores and providing overly

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<sup>5</sup> *NASA’s Management of the Orion Multi-Purpose Crew Vehicle Program* ([IG-20-018](#), July 16, 2020).

<sup>6</sup> *NASA’s Management of the Space Launch System Stages Contract* ([IG-19-001](#), October 10, 2018).

generous award fees. Specifically, in the six evaluation periods between 2012 and 2017, NASA paid Boeing \$323 million in award, milestone, and incentive fees, of which we questioned nearly \$64 million given the SLS Program’s cost overages and schedule delays.

With regards to Orion, in July 2020 we reported that Lockheed received nearly all available award fees over a 9-year period due to a variety of factors including the use of a contract clause that, in our judgement, disincentivizes performance by offering the contractor the opportunity to earn previously unearned award fees during the final award fee period.<sup>7</sup> We calculated that, at a minimum, NASA paid at least \$27.8 million in excess award fees throughout Orion’s development based on several “Excellent” performance ratings even though the Program was experiencing \$900 million in cost increases and schedule delays of more than 3 years.

Finally, the ML-2 project has experienced extreme cost growth and schedule delays. Our June 2022 report found that NASA is estimated to spend approximately a billion dollars—or at least 2½ times more than initially planned—for the ML-2 contract with final delivery of the launcher to NASA expected at least 2½ years later than initially planned.<sup>8</sup> We determined that the ML-2’s substantial cost increases and schedule delays can be attributed primarily to Bechtel’s poor performance on the contract, with more than 70 percent (\$421.1 million) of the contract’s cost increases and over 1½ years of delays related to the company’s poor performance. Bechtel’s performance notwithstanding, NASA’s management practices also contributed to the project’s cost increases and schedule delays. While NASA withheld award fees for a 6-month performance period due to Bechtel’s performance, from our perspective the Agency inappropriately paid the company award fees in the subsequent period despite the contractor’s continued poor performance. Consequently, we questioned nearly \$3 million in award fees NASA awarded to Bechtel. Subsequent to our audit, NASA decided not to issue Bechtel award fees for the following rating period.

## Procurement and Grant Fraud

In addition to the mismanagement and waste we have identified in our audits, the NASA OIG’s Office of Investigations examines allegations of fraud, waste, abuse, and misconduct affecting NASA programs, personnel, and resources. As of March 2023, over half of the office’s ongoing investigations relate to procurement fraud. Additionally, multiple cases closed in the last 3 years have resulted in civil settlements, criminal convictions, and debarments of NASA contractors, grantees, and individuals. For example, in December 2021 as the result of a multi-year OIG investigation, an Arlington, Virginia, company entered into a civil settlement of \$1.4 million, of which \$578,591 was returned to NASA, to resolve allegations that it submitted inflated labor and indirect costs for information technology services contract at Goddard Space Flight Center.

Additionally, following a joint investigation with the Defense Criminal Investigative Service, a Florida company signed a \$7.8-million civil settlement to resolve allegations that it fraudulently obtained contracts from NASA and other federal agencies. The company allegedly submitted materially false statements or omissions to obtain and maintain eligibility for federal contract awards under the U.S. Small Business Administration’s 8(a) business development program.

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<sup>7</sup> [IG-20-018](#).

<sup>8</sup> *NASA’s Management of the Mobile Launcher 2 Contract* ([IG-22-012](#), June 9, 2022).

In another joint investigation with the National Science Foundation and Department of Commerce, a NASA grant recipient paid a civil settlement for improper use of grant funds and retaining interest on funds that should not have been received. Principals of the entity also paid a civil settlement for receiving excessive monthly rent and improperly paying personal expenses with grant funds. Over \$2.4 million was recovered from this case in October 2021, with approximately \$450,000 returned to NASA.

Finally, in a joint investigation with the Federal Bureau of Investigation, Defense Criminal Investigative Service, Department of Transportation Office of Inspector General, and the Office of Export Enforcement, a parts supplier in Riverside, California, was arrested for violations of fraud involving aircraft or space vehicle parts. The individual engaged in fraudulent transactions resulting in suspect parts being supplied to both the North Atlantic Treaty Organization and NASA, among other entities. The subject pled guilty and was sentenced to 46 months' imprisonment and ordered to pay \$1.5 million in restitution.

## Other Management Issues

Project management issues at NASA extend beyond large undertakings such as JWST and the Artemis campaign with our oversight work identifying instances where Agency resources could have been used more effectively.

We reported in March of this year that NASA has not produced a viable new radioisotope power system technology since its program began in 2010 despite an average investment of \$40 million per year.<sup>9</sup> Radioisotope power systems will be critical to future exploration as nuclear power enables missions in environments where solar panels are infeasible. Moreover, nuclear power can enhance mission capability by reducing spacecraft size and mass while providing constant power output.

In a January 2023 audit, we reported that NASA's lack of a centralized software asset management tool exposes the Agency to unnecessary operational, financial, and cybersecurity risks.<sup>10</sup> Currently, the Agency's management of its software life cycle is largely decentralized and ad hoc. Efforts to implement an enterprise-wide Software Asset Management program have been hindered by both budget and staffing issues and the complexity and volume of the Agency's software licensing agreements. We found that over the past 5 years the Agency has spent more than \$20 million on software fines and penalties. Additionally, during this same period NASA procured \$15 million worth of software licenses that ultimately were not used.

Finally, our oversight has found that NASA continues to face challenges in appropriately using its enhanced use lease authority to manage property it no longer needs. In our 2022 Ames Research Center's Lease Management Practices audit, we identified instances where NASA did not use its enhanced use lease authority in a manner that was in the best interest of the Agency.<sup>11</sup> Moreover, controls over Ames' lease process are inadequate to ensure accountability and compliance with federal laws and NASA policies. Our analysis determined that due to an inadequate application of fair market

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<sup>9</sup> *NASA's Management of Its Radioisotope Power Systems Program*, ([IG-23-010](#), March 20, 2023).

<sup>10</sup> *NASA's Software Asset Management*, ([IG-23-008](#), January 12, 2023).

<sup>11</sup> *Ames Research Center's Lease Management Practices*, ([IG-22-015-R](#), August 4, 2022).

value principles, the Agency has forgone millions of dollars of revenue and bound the Agency to disadvantageous lease terms for up to 90 years.

## Next Steps

NASA is making progress in its efforts to improve management of its major programs and projects. In fact, the Government Accountability Office's 2022 High-Risk Series report listed NASA's acquisition management as one of only six high-risk areas throughout the entire federal government that showed progress toward meeting criteria for removal from the list.<sup>12</sup> In August 2022, NASA updated its 2020 Corrective Action Plan to create initiatives that address the causes of cost and schedule overruns highlighted in OIG audits and GAO's High-Risk List.

To its credit, NASA has acknowledged the high costs of its lunar and Mars goals and is exploring ways to make the missions sustainable by transitioning several programs to fixed-price contracts. In addition, NASA is increasingly utilizing public-private partnerships and alternative acquisition approaches to achieve cost savings and accelerate development of new technologies, including several key systems for its Artemis missions. However, these alternative acquisition approaches do not diminish the Agency's long-standing challenge to develop more realistic cost and schedule estimates and practice more effective contract oversight.

NASA has also implemented modifications to its routine procurement and program management practices to reduce costs and accelerate mission schedule. For example, NASA is procuring the Gateway's space flight hardware and the Human Landing System transportation service using research and development contracts that leverage commercial capabilities and state-of-the-art innovation but require a Federal Acquisition Regulation deviation. Although these modified approaches have the potential to decrease costs and encourage innovation, they correspondingly raise schedule and performance risks on these critical human-rated systems.

Additionally, NASA has taken other steps to improve contract management practices. For example, the Agency has decreased the use of award-fee contracts over recent years from 42 percent in 2020 to 28 percent in 2022. Further, in alignment with the Federal Acquisition Regulation requirement for contracting officers to ensure prospective contractors have adequate financial resources to perform the contract, NASA has implemented a new policy requiring a comprehensive financial capability assessment during the procurement process for NASA's most significant contracts. Specifically, for design and development programs and projects with a life-cycle cost of \$500 million or more, NASA now requires an evaluation of the financial health, stability, and outlook of the organizations under consideration prior to selection and contract award.

Finally, NASA has also made several enterprise-wide changes over the past 2 years to address acquisition and other management and oversight concerns. For example, the Agency has developed a Strategic Workforce Plan for Procurement to maintain a workforce capable of responding to current and future contracting needs and a team to assess all Agency contracts and identify redundant contracts managed at the Center level. In addition, NASA realigned its grant and cooperative agreement management, oversight, and execution functions under the Office of Procurement.

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<sup>12</sup> GAO first cited the Agency's acquisition management as a high-risk area in 1990. GAO, *High-Risk Series: Dedicated Leadership Needed to Address Limited Progress in Most High-Risk Areas* (GAO-21-119SP, March 2, 2021).



We look forward to continuing to share the results of our oversight work of NASA's human exploration and science missions and contracting and grant activities with this Committee to ensure Agency funds are spent effectively and taxpayer dollars are protected from fraud, waste, abuse, and mismanagement.