United States Government Accountability Office

Report to Congressional Requesters

June 2022

U.S. SPACE COMMAND

Air Force Should Develop Guidance for Strengthening Future Basing Decisions

GAO-22-106055

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GAO Highlights

Highlights of GAO-22-106055, a report to congressional requesters

Why GAO Did This Study

The then President directed the establishment of U.S. Space Command in December 2018. The Department of Defense (DOD) views the advent of U.S. Space Command as a critical step to accelerate the nation's ability to defend its vital interests and deter adversaries in space. U.S. Space Command is responsible for planning and executing offensive and defensive space operations with the military services, other combatant commands, DOD agencies, and other partners.

GAO was asked to review the Air Force's process and methodology to select the permanent location for U.S. Space Command headquarters. This report (1) examines how the U.S. Space Command basing process compared with the established Air Force basing process and describes the steps the Air Force took to identify a headquarters location, and (2) evaluates the extent to which the Air Force's revised selection process for determining the U.S. Space Command headquarters conformed to GAO best practices for analyzing alternatives.

GAO reviewed documentation, interviewed knowledgeable officials, and assessed related information using GAO's best practices for a high-quality AOA process. This is a public version of a sensitive report issued in May 2022. Information that DOD has deemed sensitive has been omitted.

What GAO Recommends

GAO recommends that the Air Force develop guidance for future strategic basing decisions that is consistent with GAO's AOA best practices, and determine the basing actions to which it should apply. The Air Force neither agreed nor disagreed.

View GAO-22-106055. For more information, contact Elizabeth A. Field at (202) 512-2775 or fielde1@gao.gov.

What GAO Found

From December 2018 through early March 2020, the Air Force largely followed its established strategic basing process to determine the preferred location for U.S. Space Command headquarters. From early March 2020 through January 2021, the Air Force implemented a revised, three-phased process at the direction of the then Secretary of Defense, culminating in the selection of Redstone Arsenal in Huntsville, Alabama as the preferred location. The revised process followed some elements of the established basing process, but included different steps. For example, in its revised process, the Air Force solicited nominations from all 50 states instead of beginning with a set of candidates based on their respective ability to meet defined functional requirements.

GAO found that the Air Force's revised process fully or substantially met 7 of 21 Analysis of Alternatives (AOA) best practices it assessed. These best practices are grouped into four characteristics of a high-quality AOA process. GAO found that the revised process did not fully or substantially meet 3 of 4 characteristics.

Assessment of the Air Force's Revised Process for U.S. Space Command Basing against GAO's Four Characteristics of an Analysis of Alternatives (AOA) Process

Comprehensive — ★★★★☆ Substantially met (4.2 of 5.0)

The process fully met the best practices *define mission need* and *develop a list of alternatives* by defining mission need without a predetermined solution and considering a wide range of candidate locations. It partially met the best practice *develop life-cycle cost estimates* because Air Force estimates did not address all key costs.

Well-documented — ★★★☆☆ Partially met (3.0 of 5.0)

The process fully met the best practice *describe alternatives* by describing candidate locations in detail sufficient for robust analysis. It minimally met the best practice *identify significant risks and mitigation strategies* because the Air Force did not document all risk assessments.

Credible — ★★½☆☆ Minimally met (2.3 of 5.0)

The process substantially met the best practice *define selection criteria* by defining criteria based on mission need. It minimally met the best practices *perform independent review* and *include a confidence level or range for life-cycle cost estimates* because no independent entity reviewed the process and because cost estimates did not assess the risk of costs increasing or decreasing.

Unbiased — ★★★☆☆ Partially met (3.0 of 5.0)

The process fully met the best practice *establish AOA team* by ensuring the team included members with a variety of relevant skill sets and knowledge, but partially met the best practice *weight selection criteria* because the Air Force did not document its rationale for weighting criteria.

Source: GAO analysis of Air Force and U.S. Space Command information. | GAO-22-106055

Note: Characteristic ratings are the average of individual best practice scores. For best practices, Not Met = 1, Minimally Met = 2, Partially Met =3, Substantially Met = 4, and Fully Met = 5. For characteristics, Not Met = 1.0 to 1.4, Minimally Met = 1.5 to 2.4, Partially Met = 2.5 to 3.4, Substantially Met = 3.5 to 4.4, and Fully Met = 4.5 to 5.0.

Air Force officials told GAO they did not use the AOA best practices as a guide during the revised process because the practices were not required or relevant to basing decisions. However, GAO believes that the AOA best practices are relevant and, if effectively implemented, can help ensure such basing decisions are transparent and deliberate. Developing basing guidance consistent with these best practices, and determining the basing actions to which it should apply, would better position the Air Force to substantiate future basing decisions and help prevent bias, or the appearance of bias, from undermining their credibility.

Contents

Abbreviations

AOA	Analysis of Alternatives
DOD	Department of Defense
GAO	Government Accountability Office
SBESG	Strategic Basing Executive Steering Group

U.S. GOVERNMENT ACCOUNTABILITY OFFICE
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Congressional Requesters

For more than a half century, space power has provided the U.S. with an important strategic advantage and served as a critical component of national security. In December 2018, then President Donald Trump directed the establishment of U.S. Space Command as a unified combatant command.[1] The Department of Defense (DOD) views the advent of U.S. Space Command as a critical step in accelerating the ability of the U.S. to defend vital national interests and deter adversaries in space. As the department's newest unified combatant command, U.S. Space Command is responsible for planning and executing global space operations in coordination with or in support of the military services, other combatant commands, DOD agencies, and other partners. These responsibilities include conducting offensive and defensive space operations, protecting and defending U.S. and other space operational capabilities, providing warning and assessment of attacks on space assets, and advocating for space operations capabilities.

In April 2019, DOD designated the Secretary of the Air Force as the Interim Combatant Command Support Agent for U.S. Space Command and subsequently approved the use of the Air Force's strategic basing process to select a headquarters location, needed to achieve full operational capability.[2] Subsequently, in May 2019, the Air Force

[1]Presidential Memorandum for the Secretary of Defense, *Establishment of United States Space Command as a Unified Combatant Command*, 83 Fed. Reg. 65,483 (Dec. 18, 2018). Section 161 of title 10, U.S. Code defines a unified combatant command as a military command which has broad, continuing missions and which is composed of forces from two or more military departments. 10 U.S.C. § 161(c). U.S. Space Command became the 11th unified combatant command with its activation in August 2019. U.S. Space Command consists of two subordinate commands: the Combined Force Space Component Command and the Joint Task Force–Space Defense. Space Command personnel include servicemembers, civilians, and contractors. The final size of U.S. Space Command has not yet been determined.

[2]A Combatant Command Support Agent is the Secretary of the Military Department to whom the Secretary of Defense or the Deputy Secretary of Defense assigns administrative and logistical support of the headquarters of a combatant command. See DOD Directive 5100.03, *Support of the Headquarters of Combatant and Subordinate Unified Commands* (Feb. 9, 2011) (incorporating change 1, effective Sept. 7, 2017). According to U.S. Space Command, achieving full operational capability requires ensuring the command has the right capabilities in place to fully accomplish its mission.

identified six candidate locations for U.S. Space Command headquarters.[3] In January 2020, the Air Force designated Peterson Air Force Base in Colorado Springs, Colorado, as the provisional location for its headquarters.

At the direction of then Secretary of Defense Mark Esper, the Air Force reopened its selection process in March 2020,[4] leading to the identification of a new group of candidate locations using a broadened approach intended to be more transparent and inclusive of potential candidates.[5] On January 13, 2021, the Air Force announced that it selected Army's Redstone Arsenal in Huntsville, Alabama, as its preferred location for the permanent headquarters.[6] Since then, members of Congress have raised questions regarding the revised process the Air Force used to select Redstone Arsenal as its preferred location for U.S. Space Command headquarters, as well as the selected location's potential effect on U.S. Space Command's operations and associated missions.

You asked us to examine the Air Force's process and methodology to select the permanent location for U.S. Space Command headquarters. This report (1) examines how the U.S. Space Command headquarters basing process compared with the established Air Force basing process and describes the steps the Air Force took to identify a preferred

[3]The initial six candidate locations were Redstone Arsenal (Huntsville, Alabama), Vandenberg Air Force Base (Lompoc, California), Buckley Air Force Base (Aurora, Colorado), Cheyenne Mountain Air Force Station (Colorado Springs, Colorado), Peterson Air Force Base (Colorado Springs, Colorado), and Schriever Air Force Base (Colorado Springs, Colorado).

[4]See *Hearing to Receive Testimony on the Department of Defense Budget Posture in Review of the Defense Authorization Request for Fiscal Year 2021 and the Future Years Defense Program, Before the S. Comm. on Armed Services,* 116th Cong. 53-56 (2020) (statement of Secretary of Defense Mark Esper).

[5]The final six candidate locations and supporting military installations were Albuquerque, New Mexico (Kirtland Air Force Base); Bellevue, Nebraska (Offutt Air Force Base); Brevard County, Florida (Patrick Air Force Base); Colorado Springs, Colorado (Peterson Air Force Base); Huntsville, Alabama (Redstone Arsenal); and San Antonio, Texas (Joint Base San Antonio). Hereafter, when referring to the candidate locations, we refer to the supporting military installation identified by those communities. Two of the candidate locations—Brevard County, Florida, and San Antonio, Texas—proposed locating the U.S. Space Command headquarters outside of the supporting installation.

[6]In this report, we use the term "preferred location" to refer to either the result of the Air Force's U.S. Space Command headquarters basing process generally, or Redstone Arsenal, Alabama, specifically.

headquarters location, and (2) evaluates the extent to which the Air Force's revised selection process for determining the preferred U.S. Space Command headquarters location conformed to GAO best practices for analyzing alternatives.[7]

This report is the public version of a sensitive report that we issued in May 2022.[8] DOD determined some of the information in our May report to be sensitive and subject to the deliberative process privilege, and that it must be protected from public disclosure. Therefore, this report omits such information from both of our objectives, as well as appendixes II and III. Specifically, we omit information on (1) the number and names of candidates the Air Force would have considered under an amended enterprise definition; (2) candidate scores and ranks during the Evaluation Phase; and (3) certain scoring criteria, such as *available qualified workforce*. We also omit information on (4) the Air Force's Selection Phase methodology; (5) certain input to the Selection Phase analysis and deliberations before a January 11, 2021, meeting at the White House involving high-ranking officials; and (6) the Air Force's rationale for selecting Redstone Arsenal as the preferred location for U.S. Space Command headquarters. Although the information provided in this report is more limited, the report addresses the same objectives as the sensitive report and uses the same methodology.

For our first objective, we reviewed Air Force basing guidance documents, along with briefings, meeting records, emails, and memorandums to determine the established Air Force basing process, the initial and revised processes the Air Force used to identify a preferred

[7]GAO, *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs,* GAO-20-195G (Washington, D.C.: March 2020).

[8]GAO, *U.S. Space Command: Air Force Should Develop Guidance for Strengthening Future Basing Decisions*, GAO-22-105099SU (Washington, D.C.: May 13, 2022).

location for the U.S. Space Command headquarters, and areas of consistency and difference.[9]

For our second objective, we reviewed Air Force documentation of the revised selection process, including selection criteria, analyses, scoring, briefings, candidate community submissions, and location site visit reports. We compared the Air Force's process documentation against our 22 best practices for an analysis of alternatives (AOA) process, scoring the Air Force's body of work against each of the 21 best practices we assessed.[10] We averaged the scores for the best practices to determine an overall score for the four characteristics of a reliable AOA process—well-documented, comprehensive, unbiased, and credible.[11] We shared our draft analysis with the Air Force, discussed our assessments with cognizant officials to obtain their input to clarify the basing process, and offered them an opportunity to provide additional documentation. Our best practices for an AOA process were not used to determine whether the Air Force made the correct decision on the preferred location for the U.S. Space Command headquarters, or whether the Air Force would have arrived at a different conclusion had it more fully conformed to our best practices. Rather, we used our best practices to assess the degree to which the Air Force can provide reasonable assurance that its process met each of the four characteristics of a high-quality, reliable AOA process.

[9]Air Force Policy Directive 10-5, *Basing* (Oct. 2, 2019); Air Force Instruction 10-503, *Strategic Basing* (July 28, 2017). The Air Force revised Air Force Instruction 10-503 in October 2020. We reviewed both versions, but compared the U.S. Space Command basing process against the 2017 version because it was in effect during the majority of the time the Air Force conducted the basing process for U.S. Space Command and was the process the Air Force followed prior to receiving direction from the then Secretary of Defense in March 2020. Accordingly, all references in this report to Air Force Instruction 10-503 pertain to the 2017 instruction, unless otherwise specified.

[10]GAO-20-195G. We determined the overall assessment rating by assigning each individual best practice rating a number: Not Met = 1, no evidence that satisfies any of the best practice; Minimally Met = 2, evidence that satisfies a small portion of the best practice; Partially Met = 3, evidence that satisfies about half of the best practice; Substantially Met = 4, evidence that satisfies a large portion of the best practice; and Fully Met = 5, complete evidence that satisfies the best practice. As described later in this report, we did not assess one best practice because we determined it was not applicable.

[11]The overall rating for each of the four summary characteristics was calculated as follows: Not Met = 1.0 to 1.4, Minimally Met = 1.5 to 2.4, Partially Met = 2.5 to 3.4, Substantially Met = 3.5 to 4.4, and Fully Met = 4.5 to 5.0.

In addition, we evaluated Air Force guidance for basing decisions against *Standards for Internal Control in the Federal Government*.[12] We determined that the risk assessment component of internal control was significant to this objective, along with the underlying principle that management should define objectives clearly to enable the identification of risks and define risk tolerances. Further, we determined that the control activities component of internal control was significant, along with the underlying principle that management should implement control activities through policies. We determined that the information and data we used from the Air Force's revised selection process were sufficiently reliable for the purposes of describing the Air Force's stated rationale for choosing Redstone Arsenal as the preferred location for the U.S. Space Command headquarters, and for comparing the Air Force's revised selection process to our 22 best practices for a reliable AOA process.

For all objectives, we interviewed or requested information from DOD and military service officials regarding the Air Force's initial and revised processes for identifying a preferred location for U.S. Space Command headquarters, including the overall timeline of events. Specifically, we interviewed or obtained information from current and former Air Force officials, including the former Secretary of the Air Force; the former Assistant Secretary of the Air Force for Installations, Environment and Energy; and officials with the Air Force's Strategic Basing Office.[13] We also interviewed officials with U.S. Space Command, including the Combatant Commander, as well as the Chief of Space Operations for U.S. Space Force. Additionally, we obtained information from the former Vice Chairman of the Joint Chiefs of Staff. For further details on our scope and methodology, see appendix I.

The performance audit upon which this report is based was conducted from March 2021 to May 2022 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. We

[12]GAO, *Standards for Internal Control in the Federal Government,* GAO-14-704G (Washington, D.C.: September 2014).

[13]This position has since been renamed the Assistant Secretary of the Air Force for Energy, Installations, and Environment. For purposes of this report, we generally use the title in effect at the time of the basing process—the Assistant Secretary of the Air Force for Installations, Environment and Energy.

subsequently worked with DOD from May 2022 to June 2022 to prepare this public version of the original sensitive report. This public version was also prepared in accordance with these standards.

Background

U.S. Space Command History and Organization

In July 1982, then President Ronald Reagan announced a national space policy that committed the United States to developing survivable and enduring space systems, an anti-satellite capability, and a means for detecting and reacting to threats against U.S. space systems, among other things.[14] Over the next 2 years, DOD conducted various studies, leading to the Air Force and the Joint Chiefs of Staff recommending a single unified space command. In November 1984, then President Reagan formally approved establishing the new command. The U.S. Space Command was activated on September 23, 1985, and located at Colorado Springs, Colorado. Its primary missions and responsibilities included integrating tactical warning and space operations, including the control of space, direction of space support activities, and planning for ballistic missile defense.

In the wake of the September 11, 2001, terrorist attacks and the Global War on Terrorism, the 2002 Unified Command Plan included numerous proposals for changing the nation's defense posture, as well as the creation of U.S. Northern Command for the purpose of defending the continental United States, Canada, Mexico, and Alaska. As part of that process, DOD reassigned the North American Air Defense Command mission from U.S. Space Command to U.S. Northern Command. In the process of reviewing the 2002 Unified Command Plan, DOD began exploring the possibility of merging U.S. Space Command and U.S. Strategic Command. In July 2002, then President George W. Bush approved the merger of the two commands in Change 1 to the 2002 Unified Command Plan, retaining the name U.S. Strategic Command, and locating it at Offutt Air Force Base in Bellevue, Nebraska. U.S. Strategic Command maintained its responsibility for nuclear missions and acquired

[14]Office of the Chairman of the Joint Chiefs of Staff, Joint History Office, *History of the Unified Command Plan 1946–2012* (Washington, D.C.: 2013).

responsibility for the space operations, including warning and assessment of space attack, which previously belonged to U.S. Space Command.[15]

Following the reestablishment of U.S. Space Command in August 2019, DOD assigned to it the missions of conducting operations in, from, and to space to deter conflict, and, if necessary, defeat aggression, deliver space combat power, and defend U.S. vital interests with allies and partners. In order to achieve its mission, U.S. Space Command executes operations through two subordinate commands: Joint Task Force–Space Defense and Combined Force Space Component Command.

- **Joint Task Force–Space Defense.** U.S. Space Command established Joint Task Force–Space Defense in August 2019 from the core of the National Space Defense Center.[16] It is an integrated DOD, intelligence community, and National Reconnaissance Office organization.[17] The mission of the Joint Task Force–Space Defense is to conduct space superiority operations in unified action with mission partners to deter aggression, to defend capability, and to defeat adversaries in various stages of conflict. Its responsibilities include monitoring, assessing, and executing various types and phases of space operations; providing responsive alert, warning, and assessment recommendations for attacks on space assets; and coordinating operations with, and requesting support from, other space domain awareness providers, including the intelligence community. Joint Task Force–Space Defense is located at Schriever Space Force Base, Colorado.[18]

[15]*History of the Unified Command Plan 1946–2012.* Subsequently, then President Bush signed Change 2 to the 2002 Unified Command Plan on January 10, 2003. This change maintained some elements of the merged U.S. Strategic Command at Peterson Air Force Base, Colorado.

[16]The National Space Defense Center was established in October 2015 as the Joint Interagency Combined Space Operations Center. The Department of Defense and intelligence community intended that it would create a unity of effort and facilitate information sharing across the national security space enterprise.

[17]The National Reconnaissance Office is in charge of building, launching, and maintaining U.S. intelligence satellites. DOD and the Central Intelligence Agency created the National Reconnaissance Office in September 1961, and DOD declassified the office's existence in September 1992.

[18]DOD renamed Schriever Air Force Base to Schriever Space Force Base on July 26, 2021.

- **Combined Force Space Component Command.** U.S. Space Command also established the Combined Force Space Component Command in August 2019. Its mission is to plan, integrate, conduct, and assess global space operations in order to deliver combat relevant space capabilities to combatant commanders, coalition partners, the joint force, and the nation. Its primary responsibilities include executing tactical control over space forces in support of terrestrial forces in theater, supporting missile warning, and enabling satellite and sensor capability for forces. The Combined Force Space Component Command is located at Vandenberg Space Force Base, California.[19]

U.S. Space Command also has five service components: the U.S. Space Force's Space Operations Command, the Air Force's First Air Force, the Army's Space and Missile Defense Command, the U.S. Navy Space Command, and the U.S. Marine Forces–Space.[20] While each service is responsible for providing the personnel and training for its respective component command, U.S. Space Command has operational command of these organizations.

U.S. Space Command Relationship with U.S. Space Force

The U.S. Space Force was established on December 20, 2019, with the enactment of the National Defense Authorization Act for Fiscal Year 2020, becoming the first new branch of the armed forces in 73 years.[21] Subsequently, the Secretary of the Air Force redesignated Air Force Space Command as the United States Space Force. It is a separate and distinct branch of the armed forces organized under the Department of the Air Force, similar to how the U.S. Marine Corps is organized under the Department of the Navy. The mission of U.S. Space Force is to organize, train, and equip servicemembers to conduct global space operations in support of joint and coalition forces, while also offering military options to decision-makers.

U.S. Space Force's Space Operations Command, which was established on October 21, 2020, is assigned to U.S. Space Command. The Space Operations Command is a warfighting organization that generates, presents, and sustains combat-ready space, intelligence, cyber, and

[19]DOD renamed Vandenberg Air Force Base to Vandenberg Space Force Base on May 14, 2021.

[20]The 16th Air Force also provides cyber support to U.S. Space Command.

[21]National Defense Authorization Act for Fiscal Year 2020, Pub. L. No. 116-92, §§ 951-961 (2019).

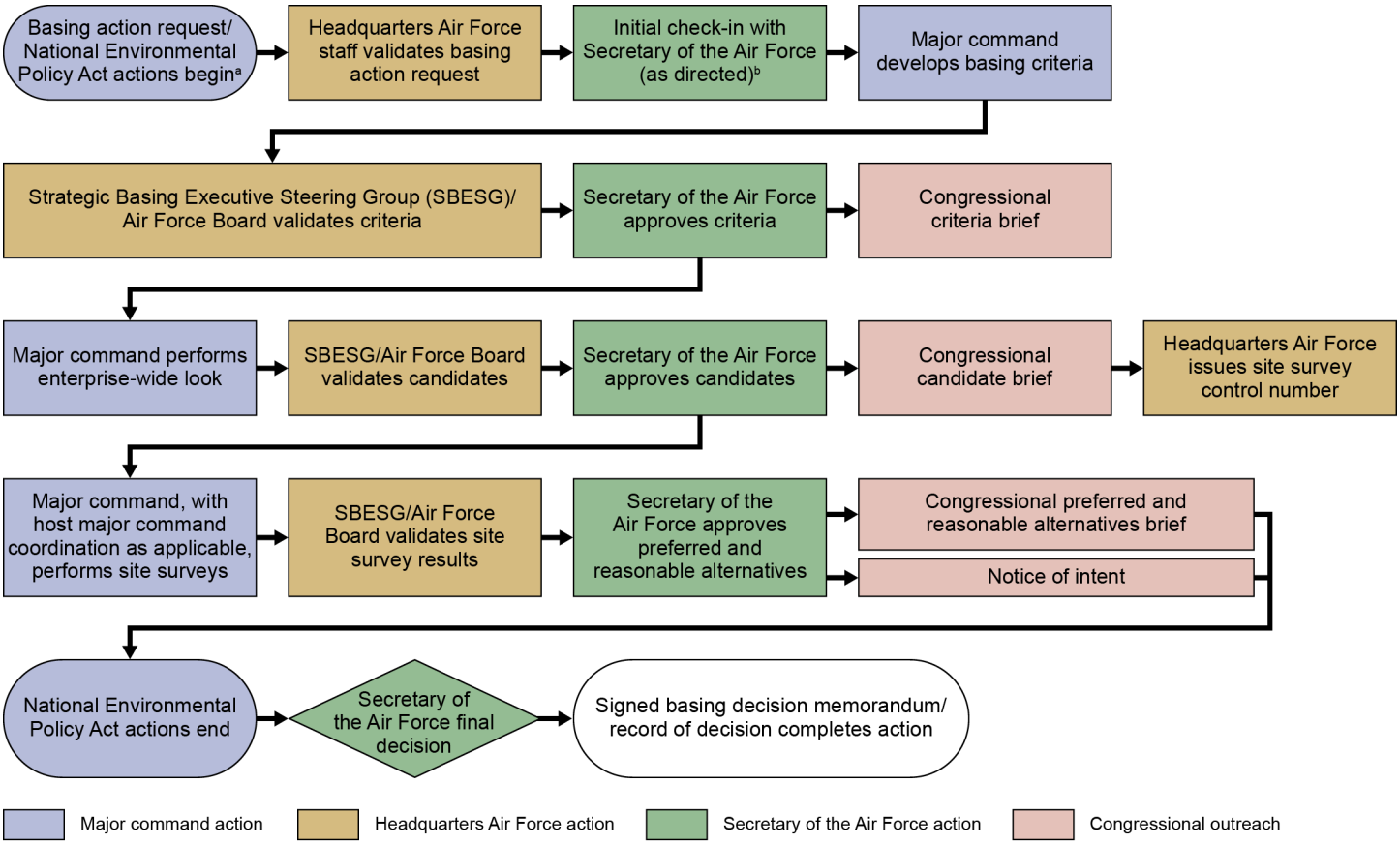
combat support forces. As the U.S. Space Force service component to U.S. Space Command, Space Operations Command provides wide-ranging warfighting expertise in the space domain. Space Operations Command comprises sub-components with functions including space electronic warfare, orbital warfare, and cyberspace operations.

Air Force Strategic Basing Process

The Air Force's strategic basing policy directive states that the Air Force shall base its forces in order to most efficiently and effectively carry out its missions worldwide.[22] The strategic basing process encompasses both Air Force real property as well as non-Air Force real property that is used or leased by Air Force units. Unless otherwise delegated, the Secretary of the Air Force is the decision authority for all Air Force basing actions involving Air Force installations. Figure 1 illustrates the established Air Force strategic basing process in place from July 2017 through mid-October 2020.

[22]Air Force Policy Directive 10-5.

Figure 1: Established Air Force Strategic Basing Process, July 2017 through October 2020



Source: GAO analysis of Air Force information. | GAO-22-106055

Notes: Major commands conduct a considerable part of the Air Force's mission and are directly subordinate to the Air Force Headquarters. Major commands are organized on a functional basis in the United States, and on a geographic basis overseas. There are nine major commands in the Air Force—Air Force Global Strike Command, Air Combat Command, Air Education and Training Command, Air Force Materiel Command, Air Force Reserve Command, Air Force Special Operations Command, Air Mobility Command, Pacific Air Forces, and U.S. Air Forces in Europe-Air Forces Africa.

In the context of the Air Force strategic basing process, the "preferred alternative" is the preferred location for a basing action. The "reasonable alternatives" are locations that meet the basing criteria and could be selected if the Air Force does not choose the preferred alternative.

[a]The National Environmental Policy Act of 1969 requires federal agencies to evaluate the potential environmental effects of proposed projects on the human environment. *See generally* Pub. L. No. 91-190 (1970) (codified, as amended, at 42 U.S.C. §§ 4321 et seq.) Specifically, the Air Force's implementing regulations for this act implement the Air Force Environmental Impact Analysis Process and provide procedures for environmental impact analysis both within the United States and abroad. 32 C.F.R. § 989.1 (2022).

[b]The Air Force calls its formal check-in with the Secretary of the Air Force a "vector check." According to Air Force Strategic Basing Office officials, the vector check is an opportunity for the Secretary of the Air Force to provide guidance to basing staff, if necessary.

As described in guidance in effect at the time the Air Force began the U.S. Space Command headquarters location selection process, the purpose of the Air Force's established strategic basing process is to provide an enterprise-wide transparent, defendable, and repeatable process for decision-making to ensure all strategic basing actions support Air Force mission requirements and comply with applicable environmental guidance.[23] The process begins with an entity submitting a basing action request.[24] The Air Force then identifies a major command or other entity to act as the customer. Subsequently, that major command or entity identifies the functional requirements that candidate locations must be able to provide—which the Air Force refers to as the *enterprise definition*—and develops the proposed specific basing criteria that will be used to assess the candidates.[25]

After identifying the installations that meet the enterprise definition, the designated major command is to gather data on the installations and score them against the criteria in order to narrow down the list of candidates. Once the Secretary of the Air Force identifies the candidates for consideration, the major command conducts site surveys at each candidate location and forwards site visit reports to the Air Force Strategic Basing Office. Additionally, according to Air Force Strategic Basing Office officials, the major command or other designated entity begins compiling documentation to support the environmental analysis of the candidates in order to expedite the final decision.[26]

[23]Air Force Instruction 10-503, *Strategic Basing* (July 28, 2017). The Air Force guidance currently describes the purpose of the Air Force strategic basing process as providing an enterprise-wide standardized, repeatable, transparent, and deliberate process for making Air Force strategic basing decisions. Air Force Instruction 10-503, *Strategic Basing* (Oct. 14, 2020).

[24]Air Force Instruction 10-503 (2017).

[25]In the Air Force, major commands conduct a considerable part of the service's mission and are directly subordinate to the Air Force Headquarters. Major commands are organized on a functional basis in the United States and on a geographic basis overseas. There are nine major commands in the Air Force—Air Force Global Strike Command, Air Combat Command, Air Education and Training Command, Air Force Materiel Command, Air Force Reserve Command, Air Force Special Operations Command, Air Mobility Command, Pacific Air Forces, and U.S. Air Forces in Europe–Air Forces Africa. For purposes of this report, the term "customer" refers to the group implementing the final decision, such as the program office or agency.

[26]Major commands, as the typical proponent of the Air Force strategic basing action, are responsible for initiating, complying with, and funding environmental analyses. Air Force Instruction 10-503, *Strategic Basing* (July 28, 2017).

Various reviews and validations occur during the strategic basing process. For example, two Air Force bodies—the Strategic Basing Panel and the Strategic Basing Executive Steering Group—review and validate the process at three distinct points. Specifically, these bodies are to validate (1) the enterprise definition and criteria, (2) the final list of candidates, and (3) the site survey results.

- **Strategic Basing Panel.** This panel, comprised of Air Force colonels and civilian equivalents, supports the Strategic Basing Executive Steering Group and senior-level leadership as a forum for initial corporate review and evaluation of appropriate issues. The panel, among other things, is to perform a comprehensive review and assessment of each proposed basing action with respect to strategic planning guidance, force structure plans, and senior leader direction.
- **Strategic Basing Executive Steering Group.** This group consists of one-and two-star general officers and civilian equivalents dedicated to cross-functional consideration of Air Force strategic basing actions. The group is to review and evaluate proposed actions to ensure consistency with Air Force concepts of operations, basing objectives, criteria, legal requirements, policies, and programming and planning requirements. It also presents courses of action in the form of alternatives to the Secretary of the Air Force and Air Force Chief of Staff. Members provide inputs from their respective core areas of responsibility and ensure that proposals are fully vetted and consistent with strategic guidance, precedent, and decisions. The group also returns issues requiring additional information or work to the designated major command.

The strategic basing process also provides for the Secretary of the Air Force to review and approve the selection criteria, enterprise definition, and final candidates; and it prescribes the timing of updates to relevant congressional stakeholders.

Air Force guidance establishes certain exemptions to the strategic basing process. These include Base Realignment and Closure actions, contingency basing actions, and actions that are temporary.[27] According

[27]Air Force Policy Directive 10-5 defines temporary as less than 1 year or no more than 300 days in an 18-month period.

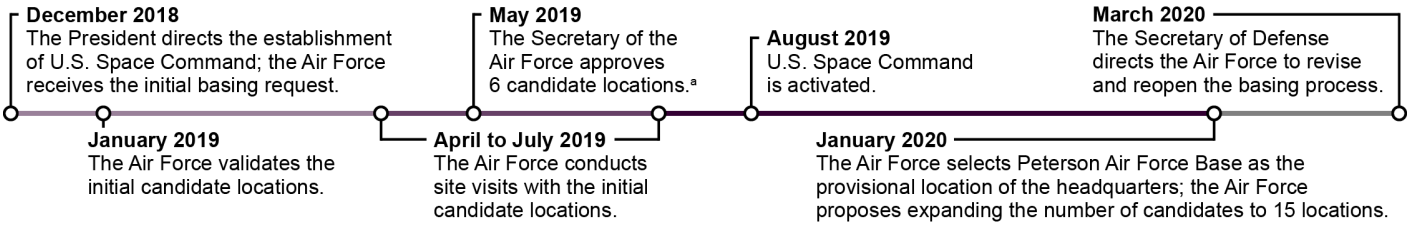
to Air Force guidance, the Secretary of the Air Force may also grant exemptions on a case-by-case basis.[28]

Air Force Used Elements of Its Established Basing Process to Identify a Location

Air Force Initially Followed Key Elements of Its Established Basing Process to Determine a Headquarters Location

From December 2018 through early March 2020, the Air Force largely followed its established strategic basing process to determine the preferred location for U.S. Space Command headquarters. Figure 2 shows the timeline of key events between December 2018 and March 2020.

Figure 2: Air Force Initial Selection Process for U.S. Space Command's Preferred Location, December 2018 through March 2020



Source: GAO analysis of Air Force information. | GAO-22-106055

[a]The six initial candidate locations were Redstone Arsenal, Alabama; Vandenberg Air Force Base, California; Buckley Air Force Base, Colorado; Cheyenne Mountain Air Force Station, Colorado; Peterson Air Force Base, Colorado; and Schriever Air Force Base, Colorado. DOD renamed Vandenberg Air Force Base to Vandenberg Space Force Base on May 14, 2021. DOD renamed Buckley Air Force Base to Buckley Space Force Base on June 4, 2021. DOD renamed Cheyenne Mountain Air Force Station, Peterson Air Force Base, and Schriever Air Force Base to Cheyenne Mountain Space Force Station, Peterson Space Force Base, and Schriever Space Force Base, respectively, on July 26, 2021.

Consistent with its established basing process, the Air Force worked with its customer—the Joint Force Space Component Command—to confirm

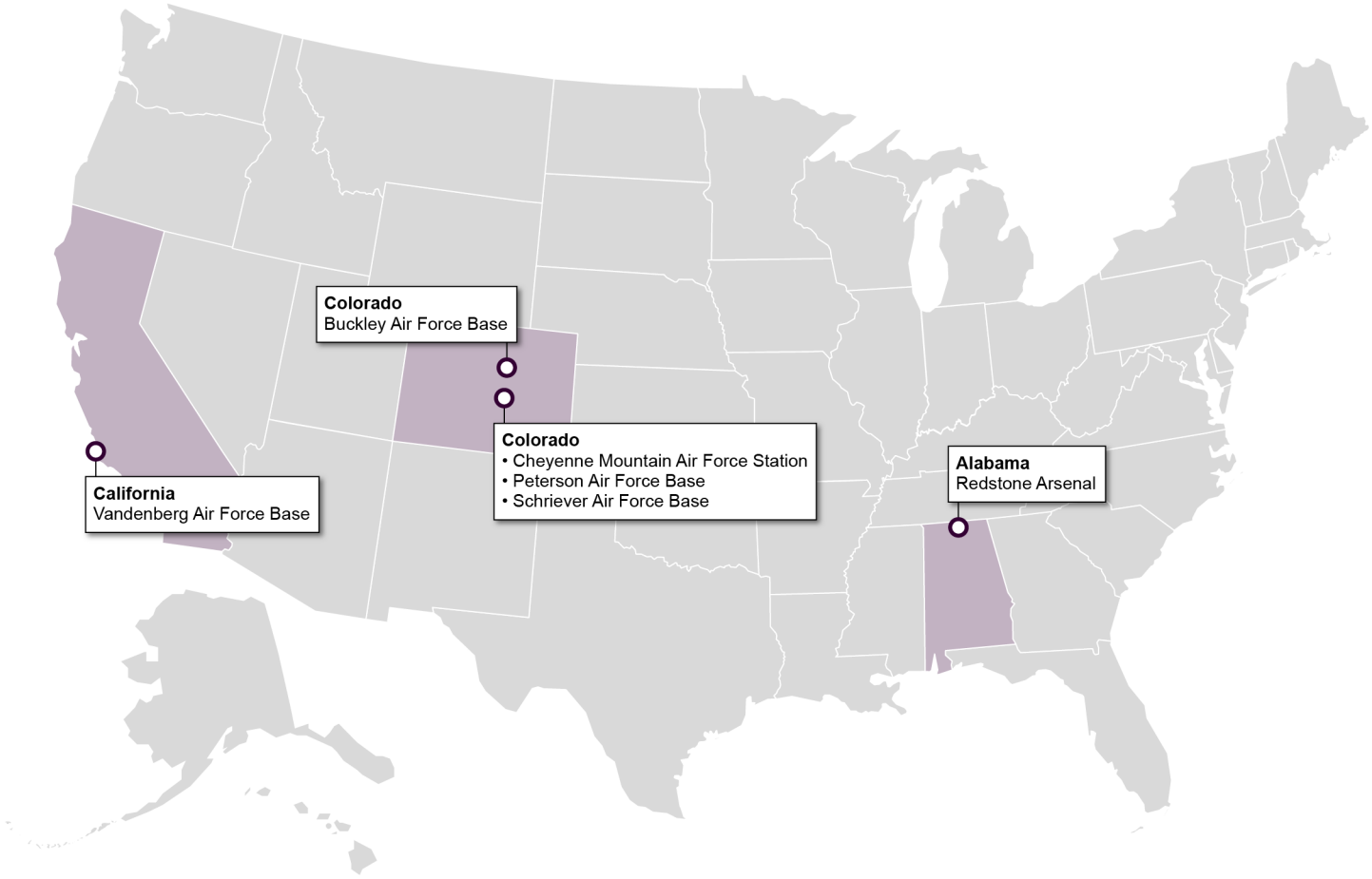
[28]Air Force Policy Directive 10-5 states that such exemptions must be evaluated with respect to the benefit to the Air Force, with consideration of life-cycle costs and overall environmental impact.

the functional requirements for the U.S. Space Command headquarters.[29] These functional requirements included building and parking square footage, security and communications capabilities, and colocation with a DOD space installation that contains a U.S. Space Command component or center. Using these requirements, in December 2018, the Joint Force Space Component Command identified six candidate installations: Redstone Arsenal, Alabama; Vandenberg Air Force Base, California; Buckley Air Force Base, Colorado; Cheyenne Mountain Air Force Station, Colorado; Peterson Air Force Base, Colorado; and Schriever Air Force Base, Colorado.[30] Subsequently, in January 2019, the Air Force validated the initial candidate locations through its Strategic Basing Panel and Strategic Basing Executive Steering Group, which provided an integrated review and evaluation of proposed basing actions. Between April and July 2019, the Air Force then conducted site visits at the bases to assess specific aspects of their proposals. Figure 3 illustrates the states and installations where the Air Force initially considered placing the U.S. Space Command headquarters.

[29]The Joint Force Space Component Command is the entity that was elevated to become the U.S. Space Command headquarters.

[30]DOD renamed Vandenberg Air Force Base to Vandenberg Space Force Base on May 14, 2021. DOD renamed Buckley Air Force Base to Buckley Space Force Base on June 4, 2021. DOD renamed Cheyenne Mountain Air Force Station, Peterson Air Force Base, and Schriever Air Force Base to Cheyenne Mountain Space Force Station, Peterson Space Force Base, and Schriever Space Force Base, respectively, on July 26, 2021.

Figure 3: States and Installations Considered for U.S. Space Command Headquarters from December 2018 through January 2020



Source: GAO analysis of Air Force information; Map Resources. | GAO-22-106055

Notes: According to Air Force officials, the Secretary of the Air Force approved the removal of Cheyenne Mountain Air Force Station as a candidate because the initial site survey process determined it did not have the physical space required for the U.S. Space Command headquarters.

DOD renamed Vandenberg Air Force Base to Vandenberg Space Force Base on May 14, 2021. DOD renamed Buckley Air Force Base to Buckley Space Force Base on June 4, 2021. DOD renamed Cheyenne Mountain Air Force Station, Peterson Air Force Base, and Schriever Air Force Base to Cheyenne Mountain Space Force Station, Peterson Space Force Base, and Schriever Space Force Base, respectively, on July 26, 2021.

While the Air Force initially followed key aspects of its established basing process, Air Force officials acknowledged that they condensed some procedural steps of the established process. We also found that some steps were eliminated. For example, according to Air Force Strategic Basing Office officials, the basing team did not hold a formal check-in with

the then Secretary of the Air Force early in the process, and the Air Force did not score the initial candidate locations because the enterprise definition for U.S. Space Command was very specific, resulting in only six possible locations. Air Force officials stated that the formal check-ins are appropriate when senior leader direction is required, but are often skipped or held at a later stage of the process once more information has been obtained.[31] These officials also stated that senior leaders provided frequent input to the Space Command basing process and that the check-in with the then Secretary of the Air Force was not necessary. Additionally, according to Air Force officials, scoring possible locations is routine in situations with large candidate pools, but it was unnecessary in this circumstance because there were only six candidates that met the enterprise definition.

In January 2020, prior to receiving direction from the then Secretary of Defense to revise and reopen its process, the Air Force proposed amending the enterprise definition in a way that would allow more locations to qualify as candidates.[32] According to Air Force officials, the proposal was spurred by feedback from senior leadership, including the then Secretary of Defense, who believed that the process was too restrictive and did not give full consideration to other potentially viable locations. The proposal would have more than doubled the original candidate pool of six locations. At the same time, the then Secretary of the Air Force designated Peterson Air Force Base, Colorado, as the provisional location for the U.S. Space Command headquarters. Air Force officials told us that at that time they had not decided on a preferred location for the U.S. Space Command headquarters. An official at DOD's Office of Cost Assessment and Program Evaluation confirmed that at that time, the office was working with U.S. Space Command and the Air Force on budget proposals for different sites because the Air Force had not

[31]The Air Force calls its formal check-in with the Secretary of the Air Force a "vector check." According to Air Force Strategic Basing Office officials, the vector check is an opportunity for the Secretary of the Air Force to provide guidance to basing staff, if necessary.

[32]The original enterprise definition was a Department of Defense space installation that contains a U.S. Space Command component or center. The Air Force proposed revising the enterprise definition to continental United States Department of Defense space installations and/or Department of Defense installations that contain a U.S. Space Command joint component/center or service component.

decided on a preferred location for the U.S. Space Command headquarters.

Air Force's Revised Process Added Steps to and Altered Elements of Its Established Process

In early March 2020, the Air Force revised its process to determine the location of the U.S. Space Command headquarters at the direction of then Secretary of Defense Esper.[33] The Air Force's revised process included soliciting nominations from candidate communities (Nomination Phase), evaluating community submissions to determine the final candidate pool (Evaluation Phase), and selecting a preferred location among the six final candidate locations (Selection Phase). This three-phased process, modeled after the 2018 Army Futures Command basing process, followed selected elements of the Air Force's established strategic basing process—such as developing and weighting evaluation criteria, providing updates to Congress, and conducting site surveys—but included different steps and altered others, as outlined below.[34]

- *The Nomination Phase* – The Air Force added this phase and its associated steps as the first phase of its revised process. In this phase, the Air Force solicited nominations from communities in all 50 states. The established strategic basing process does not provide for the solicitation of nominations. Instead, the major command or another designated entity develops the enterprise definition based on critical mission factors, and then uses available information to identify locations with the basic attributes required to support the mission.
- *Senior Level Review* – In its established strategic basing process, the selection team's process undergoes periodic reviews by the Strategic Basing Panel and Strategic Basing Executive Steering Group, composed of colonels and general officers, respectively, along with

[33]The then Secretary of Defense referenced the change in direction in March 2020 testimony before the Senate Armed Services Committee. See *Hearing to Receive Testimony on the Department of Defense Budget Posture in Review of the Defense Authorization Request for Fiscal Year 2021 and the Future Years Defense Program, Before the S. Comm. on Armed Services,* 116th Cong. 53-56 (2020) (statement of Secretary of Defense Mark Esper). We asked the Air Force whether it was still required to follow the basing process in Air Force Instruction 10-503 after the then Secretary of Defense direction. Air Force officials responded that the direction from the then Secretary of Defense to revise and reopen the process, patterned after the Army Futures Command process, superseded the Air Force strategic basing instruction.

[34]The Army's process sought to locate the Army Futures Command headquarters in an innovation hub in order for the command to establish partnerships with industry and academia. According to cognizant Army officials, the process did not follow the Army's established basing process. According to Air Force Strategic Basing Office officials, then Secretary of Defense Esper directed that they look at the Army Futures Command process as a model.

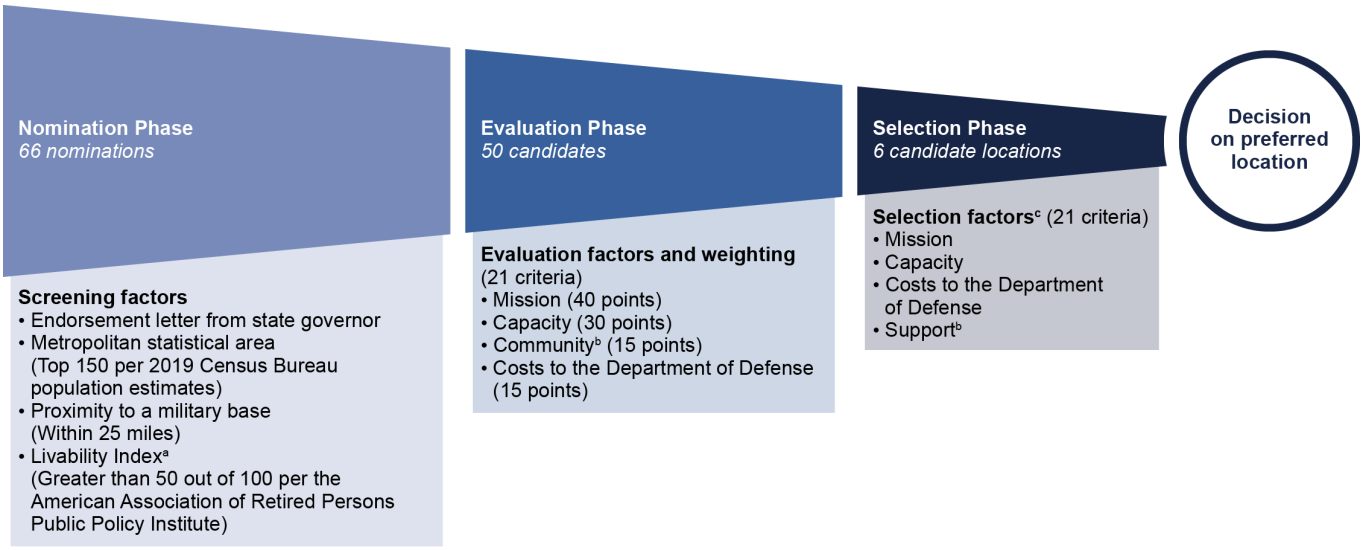
their civilian equivalents. In the revised process, the Air Force relied on reviews and validations by senior Air Force and DOD officials, including the Assistant Secretary of the Air Force for Installations, Environment and Energy; the Secretary of the Air Force; and the Secretary of Defense.

- *Environmental Analysis* – In its established strategic basing process, the Air Force's major command or other designated entity collects documentation to support the environmental analysis of locations concurrently with other data gathering and analysis. In the revised U.S. Space Command basing process, the Air Force waited to collect information for the environmental analysis until after the department had identified the six final candidate locations, according to Air Force officials. As of April 2022, environmental analyses had not been completed, according to Air Force officials.
- *Preferred Location Decision* – In the revised selection process, the then President, the then Acting Secretary of Defense, and the then Vice Chairman of the Joint Chiefs of Staff provided direct input into the preferred location decision. The established Air Force strategic basing process does not explicitly provide for the involvement of these senior-level officials in domestic basing decisions. Air Force officials stated that they were not aware of any similar situations in which the Secretary of the Air Force had solicited input from other senior officials, with the exception of overseas basing decisions. These officials also noted that this was a combatant command basing action in which the Secretary of the Air Force was designated as the Interim Combatant Command Support Agent.[35]

Figure 4 illustrates the Air Force's revised process for identifying the preferred location for the U.S. Space Command headquarters.

[35]Air Force officials stated that the President, through the Secretary of Defense, has the authority to establish a combatant command.

Figure 4: Air Force Revised Process for Identifying the Preferred Location for the U.S. Space Command Headquarters



Source: GAO analysis of Air Force information. | GAO-22-106055

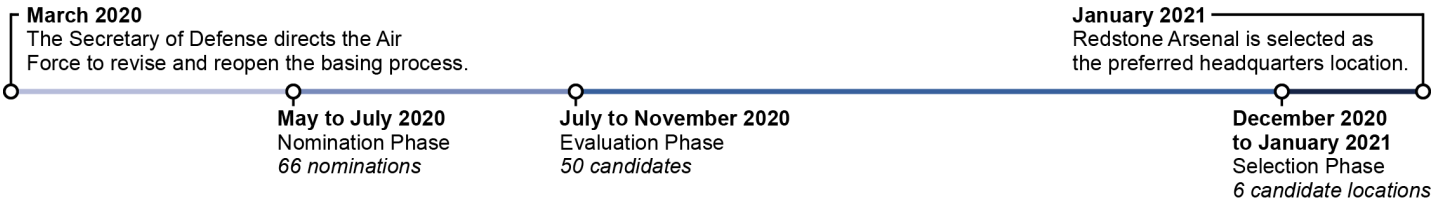
[a]The Air Force used a Livability Index score as determined by the American Association of Retired Persons Public Policy Institute to establish a minimum standard for quality of life in the Nomination Phase. Quality of life factors measured by the index include housing affordability, safe and convenient transportation, clean air and water, and quality health services.

[b]The Air Force renamed the "Community" evaluation factor to "Support" in the Selection Phase, but the criteria for those factors remained the same.

[c]The information and data during the Selection Phase were collected from questionnaires sent to the communities and associated military installations, as well as site visits to the six final candidate locations. During the Selection Phase, the Air Force did not assign scores to the candidate locations, but ranked them qualitatively into top, middle, and bottom thirds.

The Air Force executed the revised process over an 11-month period, from March 2020 through mid-January 2021. Figure 5 shows some of the key events during this period.

Figure 5: Air Force Revised Selection Process for U.S. Space Command's Preferred Headquarters Location, March 2020 through January 2021



Source: GAO analysis of Air Force information. | GAO-22-106055

Nomination Phase. In May 2020, the Air Force sent a letter and nomination package to the governors of all 50 states inviting communities to self-nominate to host the permanent U.S. Space Command headquarters. The Air Force received 66 nominations from communities across the U.S. In order to advance to the Evaluation Phase, locations had to (1) be nominated by a mayor or equivalent position and endorsed by the state governor; (2) be within one of the 150 largest metropolitan statistical areas in the United States, based on Census Bureau 2019 population estimates; (3) be within 25 miles of a military base to ensure eligible locations could support servicemembers and their families with key services including military housing, health care, childcare, commissary, and personnel and logistics support; and (4) have a Livability Index score of 50 out of 100 points or higher, as determined by the American Association of Retired Persons Public Policy Institute.[36] Out of the 66 communities that submitted a nomination, 50 advanced to the Evaluation Phase.[37]

Evaluation Phase. Between July and August 2020, the Air Force sent questionnaires to the communities and military installations that advanced past the Nomination Phase. As the Air Force received the questionnaire responses, subject matter experts scored the nominations based on 21 weighted criteria under four evaluation factors—*Mission* (40 points), *Capacity* (30 points), *Community* (15 points), and *Costs to the Department of Defense* (15 points).

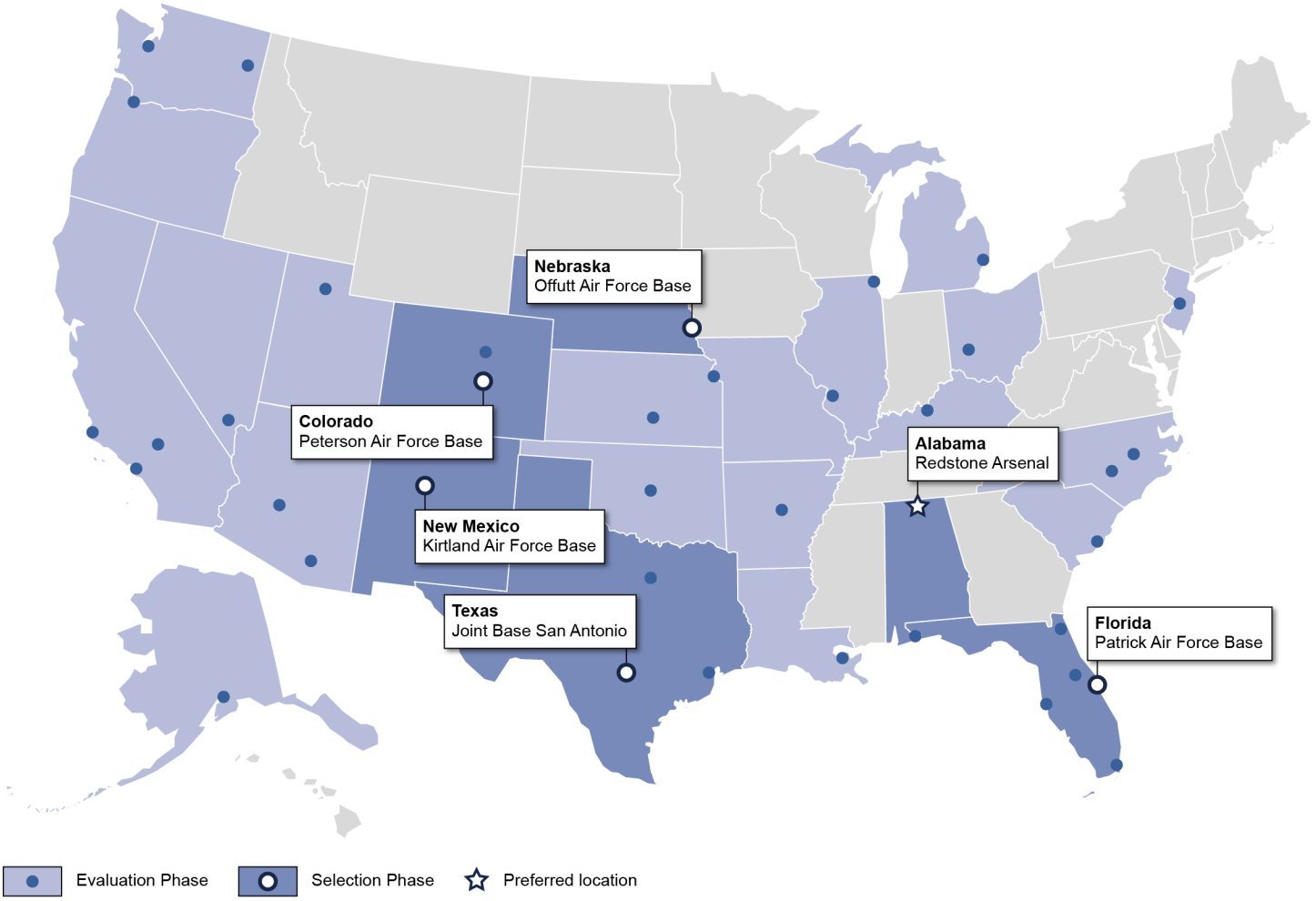
After determining aggregate, weighted scores, the Air Force identified natural breaks in the scoring, according to cognizant officials. Specifically, there was a sizeable break between the top two scoring locations and the third place location. Among the remaining candidates, breaks occurred between the sixth and the seventh highest scoring candidates, and the 15th and 16th highest scoring candidates. Specific details about candidate scores were omitted from this report because DOD designated the information as sensitive and privileged.

[36]The Air Force used the Livability Index as a proxy measure to ensure U.S. Space Command's ability to attract and retain a skilled workforce.

[37]Some communities that nominated themselves voluntarily withdrew from the process before the start of the Evaluation Phase, according to Air Force Strategic Basing Office officials. In other instances, multiple communities submitted nominations focused on the same military installation, and the officials said that they worked with those communities to consolidate the nomination around one location.

Air Force officials stated that despite a sizeable break between the second and third highest scoring candidates, they believed that selecting only the top two candidates for the Selection Phase would limit their options. Conversely, these officials stated that they did not have the resources to perform site visits at 15 locations. Accounting for these factors, the Air Force chose to advance the top six scoring locations to the Selection Phase and notified Congress in November 2020. Figure 6 shows the states and candidates that received consideration from the Air Force in the revised process; additional information on the Evaluation Phase is presented in appendix II.

Figure 6: States and Installations Considered during the Evaluation Phase of the Revised U.S. Space Command Basing Process



Source: GAO analysis of Air Force information; Map Resources. | GAO-22-106055

Note: This figure depicts the 39 support installations identified by the 50 communities considered during the Evaluation Phase, July 2020 until November 2020. Some installations were identified by multiple nearby communities.

Selection Phase. From December 2020 through mid-January 2021, the Air Force executed its Selection Phase, wherein it requested more detailed information from the final candidate locations and conducted site visits to assess the top six potential locations for U.S. Space Command headquarters. The site visits took place from December 8, 2020, through January 7, 2021, at the six candidate installations—Redstone Arsenal, Alabama; Peterson Air Force Base, Colorado; Patrick Air Force Base,

Florida; Offutt Air Force Base, Nebraska; Kirtland Air Force Base, New Mexico; and Joint Base San Antonio, Texas. Air Force and U.S. Space Command officials stated that during the site visits, they validated information that was provided by the candidates and collected additional information related to the criteria that were used during the Evaluation Phase.

Using information obtained from the questionnaires and site visits, the Air Force qualitatively ranked the six final candidate locations into top, middle, and bottom thirds for each of the 21 criteria. Air Force analysis found that Redstone Arsenal was tentatively the leading candidate, based on its relative strength in the *Mission* and *Capacity* factors and its low cost of construction. Specific details related to other candidate scores were omitted from this report because DOD designated the information as sensitive and privileged.

As the Air Force neared the completion of the Selection Phase and prepared for a meeting at the White House on January 11, 2021, it received new information from U.S. Space Force and U.S. Space Command that affected Peterson Air Force Base's candidacy. Specifically, days before the White House meeting, U.S. Space Force informed the Air Force that it could reduce personnel numbers at the Space Operations Command, currently located at Peterson Air Force Base, from approximately 1,000 individuals to about 500. U.S. Space Command indicated that it might be able to meet its mission with approximately 1,000 personnel, rather than the 1,450 that U.S. Space Command had projected.

According to Air Force and U.S. Space Command officials, as well as U.S. Space Force's Chief of Space Operations, the personnel reductions, if realized, could have allowed Peterson Air Force Base to renovate the building that housed U.S. Space Command headquarters and Space Operations Command, rather than constructing a new building as was officially proposed. U.S. Space Command officials also informed the Air Force that renovation would allow the command to reach full operational capability sooner than the 6 years projected for new military construction. A senior U.S. Space Command official similarly told us that renovating the existing building at Peterson Air Force Base would likely allow the command to reach full operational capability sooner than constructing a new headquarters building. However, according to Air Force officials, they received no documentation to support the personnel reductions. Specific details related to reaching full operational capability and estimated cost

savings were omitted from this report because DOD designated the information as sensitive and privileged.

While considering these personnel reductions and the option to renovate Peterson Air Force Base, senior Air Force and DOD officials held a teleconference the day before the meeting at the White House to discuss the basing decision. Participants included the then Secretary of the Air Force, the then Vice Chairman of the Joint Chiefs of Staff, the U.S. Space Command Combatant Commander, and the U.S. Space Force Chief of Space Operations. Emails and draft documentation—including a draft decision matrix and draft action memorandum that had been prepared for the Air Force Secretary's review—identified Peterson Air Force Base as the preferred location for the U.S. Space Command headquarters, with Redstone Arsenal as the lone reasonable alternative.[38] However, the senior Air Force officials who attended the White House meeting told us they entered the meeting prepared to discuss two options—Redstone Arsenal and Peterson Air Force Base. The then Secretary of the Air Force also stated that, going into the White House meeting, she wanted to ensure that any decision would stand up to scrutiny and not be reversed. She further stated that she viewed it as her mission to make a fair decision that was not political or based on advocacy, but rather the analytical process and publicly announced criteria.

Preferred location decision. The Selection Phase included the meeting at the White House with high-ranking officials on January 11, 2021, and culminated with the selection of Redstone Arsenal in Huntsville, Alabama, as the preferred location for the U.S. Space Command headquarters. Participants at the January 11, 2021, meeting included the then President; the then Acting Secretary of Defense; the then Vice Chairman of the Joint Chiefs of Staff; the then Secretary of the Air Force; and the then Assistant Secretary of the Air Force for Installations, Environment and Energy. Senior officials we contacted who either attended or provided input to the meeting stated the following:

[38]A draft read-ahead for the White House meeting, dated January 8, 2021, stated that the Air Force planned to request additional time to analyze the new personnel information provided by U.S. Space Command and U.S. Space Force. According to Air Force officials present at the meeting, they did not ask for the planned extension because they believed there was a desire to make a decision at the meeting and the Air Force had previously been given an extension. This same draft read-ahead acknowledged that Redstone Arsenal rated the best of the six candidate locations based on the criteria and noted that selecting Peterson Air Force Base as the preferred location would not align with the site visit results and would likely face scrutiny.

- The U.S. Space Command Combatant Commander, the U.S. Space Force Chief of Space Operations, and the former Vice Chairman of the Joint Chiefs of Staff told us that they conveyed to meeting participants their position that remaining at Peterson Air Force Base would allow U.S. Space Command to reach full operational capability as quickly as possible.

- The former officials we contacted from the Air Force and the Joint Chiefs of Staff who attended the meeting acknowledged that there were different opinions about the best location for the headquarters, but described the conversation as thoughtful, professional, robust, and informed. According to these former officials, discussion topics included the results of the Air Force's analysis and the pros and cons of the various candidates. For example, they told us that participants discussed issues including costs, the colocation of multiple combatant commands, weather at the final candidate locations, and how certain candidates could affect U.S. Space Command's ability to quickly reach full operational capability.

Although the Air Force documented the general rationale for selecting Redstone Arsenal in an action memorandum and accompanying documents,[39] there was not consensus among the officials we interviewed regarding who ultimately made the decision to name Redstone Arsenal as the preferred location for U.S. Space Command headquarters, including the role of the then President in making the decision. For example, one former official stated that the then Acting Secretary of Defense made the decision, with agreement from the President and other senior officials. A second former official told us that more clarity on who had authority to make the decision would have been helpful, but that it seemed the authority to make the decision remained with the Secretary of the Air Force and was not retracted by the President. Air Force Strategic Basing Office officials stated that the then Secretary of the Air Force retained the authority to make the decision on the preferred location, and that she made that decision on January 12, 2021, as indicated in the action memorandum.

[39]Specifically, the then Secretary of the Air Force approved recommendations for the preferred location, reasonable alternative locations, and engagement strategy proposed in an action memorandum from the then Assistant Secretary of the Air Force for Installations, Environment and Energy on January 12, 2021.

The Revised Process Fully or Substantially Met 7 of 21 AOA Best Practices We Assessed

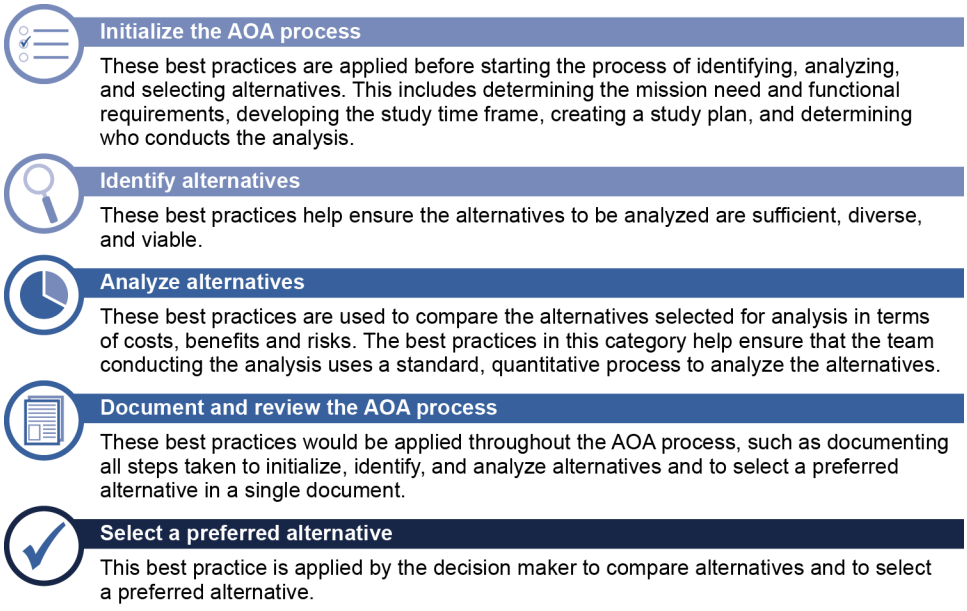
GAO Developed Best Practices That Are Relevant to All AOA Processes

In 2016, we developed AOA best practices to help agencies consistently and reliably select program alternatives that best meet their mission needs. Prior to our development of these best practices, there was no single set of practices for the AOA process that both government and private-sector entities broadly recognized.[40] We developed the practices by (1) compiling and reviewing commonly referenced AOA policies and guidance used by different government and private-sector entities, and (2) incorporating and vetting experts' comments on a draft set of best practices to develop a final set of best practices relevant to all AOA processes. The 22 best practices that we identified are grouped into five AOA phases, as shown in figure 7.[41]

[40]GAO-20-195G. The best practices to establish an AOA process listed in GAO-20-195G further refine and supersede those described in GAO, *DOE and NNSA Project Management: Analysis of Alternatives Could Be Improved by Incorporating Best Practices,* GAO-15-37 (Washington, D.C.: Dec. 11, 2014), and *Amphibious Combat Vehicle: Some Acquisition Activities Demonstrate Best Practices; Attainment of Amphibious Capability to be Determined,* GAO-16-22 (Washington, D.C.: Oct. 28, 2015). GAO-15-37 identified 24 best practices to establish an AOA process; GAO-16-22 refined and condensed the initial 24 best practices into 22 best practices.

[41]For this review, we assessed the Air Force's revised process against 21 of the 22 AOA best practices because we determined one best practice was not applicable.

Figure 7: GAO's Analysis of Alternatives (AOA) Best Practices Grouped into the Five Phases of an AOA Process



Source: GAO. | GAO-22-106055

In addition, we have grouped the 22 best practices into four characteristics that identify a high-quality, reliable AOA process—comprehensive, well-documented, credible, and unbiased, as shown in figure 8 below.

Figure 8: GAO's 22 Best Practices for Analysis of Alternatives (AOA) Grouped into Four Characteristics

Comprehensive	
The level of detail for the AOA process ensures no alternatives are omitted and that each alternative is examined thoroughly for the program's entire life cycle.	1. Define mission need 2. Define functional requirements 3. Develop AOA timeframe 8. Develop list of alternatives 11. Assess alternatives' viability 15. Develop life-cycle cost estimates
Well-documented	
The AOA process is thoroughly described, including all source data, methodologies, calculations and results, and selection criteria are explained.	9. Describe alternatives 12. Identify significant risks and mitigation strategies 14. Tie benefits/effectiveness to mission need and functional requirements 18. Document AOA process in a single document 19. Document ground rules, assumptions, and constraints
Credible	
The AOA process discusses any limitations of the analysis resulting from the uncertainty surrounding the data to assumptions made for each alternative.	5. Define selection criteria 10. Include baseline alternative 16. Include a confidence level or range for life-cycle cost estimates 17. Perform sensitivity analysis 21. Perform independent review
Unbiased	
The AOA process does not have a predisposition towards one alternative over another but is based on traceable and verified information.	4. Establish AOA team 6. Weight selection criteria 7. Develop AOA process plan 13. Determine and quantify benefits and effectiveness 20. Ensure AOA process is impartial 22. Compare alternatives

Source: GAO. | GAO-22-106055

Three key entities are directly involved in the AOA process: the customer, the decision-maker(s), and the AOA team. The customer refers to the group implementing the decision, such as the program office or agency. The decision-maker(s) sign-off on the decision and analysis documented in the AOA report and select the preferred alternative based on the

established selection criteria.[42] The AOA team is involved in the day-to-day work of the AOA process and conducts the identification and assessment of alternatives that is the foundation of the AOA process. Based on these definitions, in this review, we identified U.S. Space Command as the customer; the then Secretary of the Air Force, together with other senior officials, as the decision-makers; and the Air Force Strategic Basing Office as the AOA team.[43]

The Revised Basing Process Did Not Fully or Substantially Meet Most Characteristics of a High Quality AOA Process

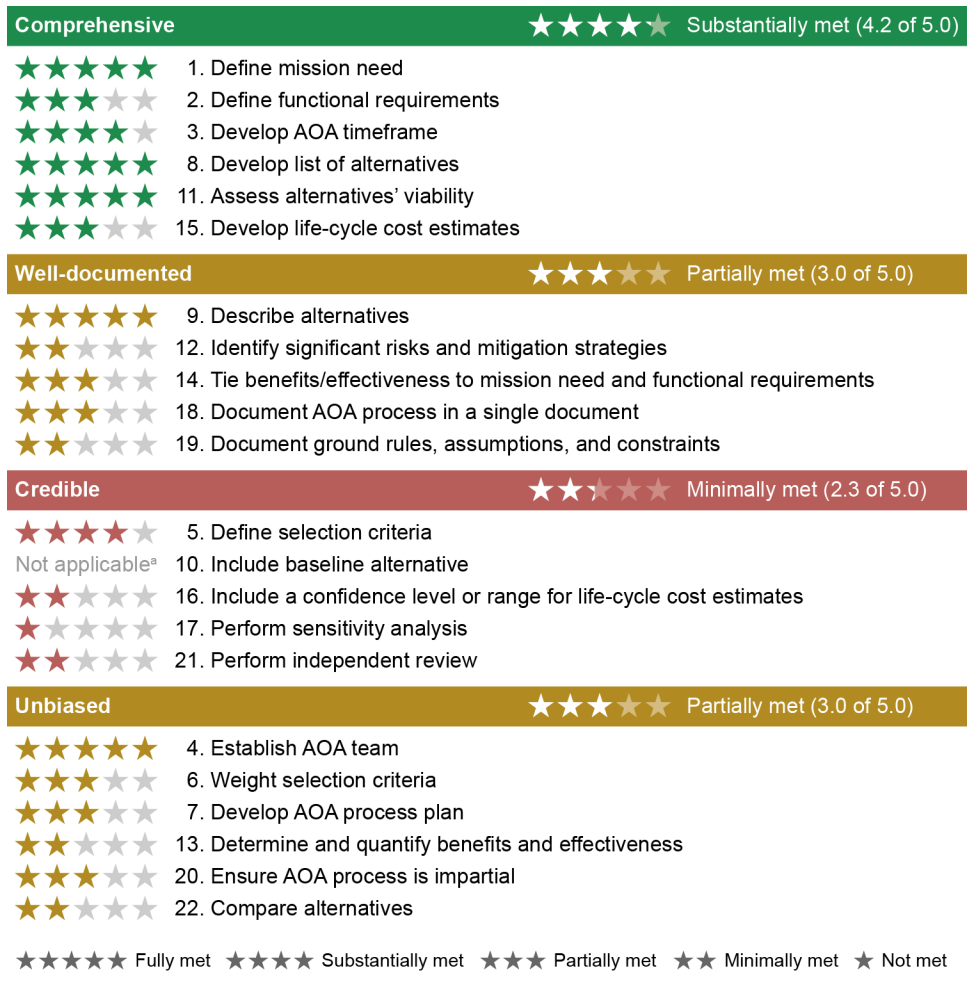
We determined that the Air Force's revised process to identify the preferred location for the U.S. Space Command headquarters did not substantially meet 3 of 4 characteristics of a high-quality, reliable AOA process. Specifically, the Air Force's revised process substantially met the comprehensive characteristic, partially met the well-documented characteristic, minimally met the credible characteristic, and partially met the unbiased characteristic. Overall, out of the 21 best practices we assessed, the Air Force's revised selection process fully or substantially met seven best practices, partially met seven best practices, and minimally met or did not meet seven best practices.[44] Figure 9 shows the scoring of our assessment of the Air Force's revised U.S. Space Command basing process against AOA best practices. Below the figure, we highlight certain best practices, providing examples from our analysis for each of the four characteristics. See appendix III for a summary of our analysis of all best practices.

[42]In this report, we use the term "preferred alternative" in reference to an alternative chosen on the basis of selection criteria at the end of an analysis of alternatives process—an analytical study conducted to compare the operational effectiveness, cost, and risks of a number of potential alternatives to address valid needs and shortfalls in operational capability.

[43]Towards the end of our review, Air Force officials told us they viewed the Secretary of Defense as the customer, rather than U.S. Space Command, because the Secretary of Defense directed the revised process and is responsible for combatant commands. However, we identified U.S. Space Command as the customer, consistent with the definitions in our AOA best practices, because it is responsible for implementing the basing decision, once finalized.

[44]We did not score best practice 10, *include baseline alternative,* because we determined the best practice was not applicable to the U.S. Space Command basing process. At the onset of the revised process, no permanent headquarters existed for U.S. Space Command at any location. As such, assessment of locations against an existing baseline location was not possible.

Figure 9: Assessment of the Air Force's Revised Process for U.S. Space Command Basing against GAO's 22 Analysis of Alternatives (AOA) Best Practices, Grouped into Four Characteristics



Source: GAO analysis of Air Force and U.S. Space Command information. | GAO-22-106055

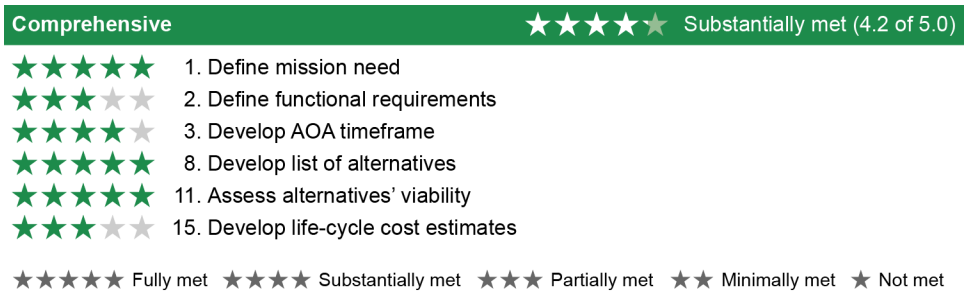
[a]We did not score best practice 10, *include baseline alternative*, because we determined the best practice was not applicable to the U.S. Space Command basing process. At the onset of the revised process, no permanent headquarters existed for U.S. Space Command at any location. As such, assessment of locations against an existing baseline location was not possible.

Note: We determined the overall assessment rating by assigning each individual rating a number: Not Met = 1, Minimally Met = 2, Partially Met = 3, Substantially Met = 4, and Fully Met = 5. Then, we took the average of the individual assessment ratings to determine the overall rating for each of the four characteristics. The resulting average became the overall assessment as follows: Not Met = 1.0 to 1.4, Minimally Met = 1.5 to 2.4, Partially Met = 2.5 to 3.4, Substantially Met = 3.5 to 4.4, and Fully Met = 4.5 to 5.0.

Air Force's Revised Process Substantially Met the Comprehensive Characteristic

Overall, we found that the Air Force's revised selection process substantially met the collection of best practices that demonstrate the comprehensiveness of an agency's AOA process. Figure 10 shows a summary of our assessment of the best practices under the comprehensive characteristic, followed by a detailed discussion of selected best practices.

Figure 10: Assessment of the Air Force's Revised Process for U.S. Space Command Basing against GAO's Analysis of Alternatives (AOA) Best Practices under the Comprehensive Characteristic



Source: GAO analysis of Air Force and U.S. Space Command information. | GAO-22-106055

Note: We determined the overall assessment rating by assigning each individual rating a number: Not Met = 1, Minimally Met = 2, Partially Met =3, Substantially Met = 4, and Fully Met = 5. Then, we took the average of the individual assessment ratings to determine the overall rating for each of the four characteristics. The resulting average became the overall assessment as follows: Not Met = 1.0 to 1.4, Minimally Met = 1.5 to 2.4, Partially Met = 2.5 to 3.4, Substantially Met = 3.5 to 4.4, and Fully Met = 4.5 to 5.0.

Define mission need. We found that the Air Force's revised selection process fully met the best practice of *define mission need*. This best practice states that the customer should identify a credible gap between current capabilities and those required to meet goals, and define a mission need without a predetermined solution. The basing action request stated that U.S. Space Command must permanently establish a headquarters in order to meet its full operational capability requirements, and that U.S. Space Command tasks include, among other things, command and control of global DOD space operations and support to other combatant commands. U.S. Space Command officials told us they clearly defined the mission need for a permanent U.S. Space Command headquarters location as a command and control facility to support the combatant commander in wartime missions and that, from the beginning, its mission has stemmed from future, planned responsibilities as outlined

in the Unified Command Plan.[45] As previously discussed, the Air Force designated Peterson Air Force Base as the provisional location for the headquarters of U.S. Space Command in January 2020. However, in doing so, the Air Force did not specify Peterson Air Force Base as a predetermined solution, and it did not express mission need with the intent to favor Peterson Air Force Base as a permanent solution over any other location. According to this best practice, it is critical to define mission in terms that are not solution-specific in order to avoid bias that could invalidate the analysis. In fully meeting the best practice, we found that the Air Force demonstrated that its definition of mission need was free of bias.

Define functional requirements. We found that the Air Force's revised selection process partially met the best practice of *define functional requirements*. This best practice states that functional requirements should outline the general parameters the selected alternative must have in order to address the mission need, and that the customer should define realistic and traceable functional requirements early in the AOA process, prior to the identification of alternatives. The Air Force established functional requirements to address the mission need for the U.S. Space Command headquarters, but several shifted over time and we found one requirement to be unrealistic.

The Air Force established requirements related to facility and parking square footage based on a projected number of personnel, as well as other infrastructure requirements connected to the mission need before beginning the revised process. However, the Air Force also changed requirements after the Evaluation Phase based on feedback from U.S. Space Command officials. Specifically, for the Evaluation Phase, the Air Force defined its *available qualified workforce* criterion based on a requirement for personnel in technical occupations, such as computer systems analysts, aerospace engineers, and others. In the Selection Phase, the Air Force defined the same criterion based on a requirement for personnel with warfighting and space warfighting experience.

Changes to certain criteria affected scoring for the final candidate locations. For example, out of the top six locations, the location that scored the lowest in the Evaluation Phase on the *available qualified*

[45]The Unified Command Plan is a document approved by the President of the United States that sets forth basic guidance to all unified combatant commanders; establishes their missions, responsibilities, and force structure; and delineates geographical areas of responsibility or specified functional responsibilities of combatant commands.

workforce criterion scored in the top third for this criterion in the Selection Phase, due to the change in desired occupations and experience. Similarly, the Air Force defined its *communications* criterion in the Evaluation Phase based on requirements for bandwidth and redundant pathways, but changed the definition for the Selection Phase to include access to specific government networks and proximity to cybersecurity infrastructure, among others.

Air Force officials stated that U.S. Space Command officials articulated more detailed requirements for workforce skillsets and communications infrastructure after the Evaluation Phase, and that the Air Force refined its criteria accordingly. The same officials also told us that the changes represented refinements necessary to compare Selection Phase locations in greater detail. However, as described above, we found that the changes to criteria after the Evaluation Phase resulted from substantive changes to underlying functional requirements and did not constitute more detailed refinements. U.S. Space Command officials stated that while U.S. Space Command further developed its requirements after the initial basing process, the command consistently communicated to the Air Force the same functional requirements throughout the revised process, including the requirement related to the *available qualified workforce*. According to the same officials, the Air Force did not fully incorporate U.S. Space Command perspectives until later in the revised process.

Further, the Commander of U.S. Space Command told us that the workforce criterion was initially too focused on a perceived requirement for science and technology skillsets and did not account for other skillsets important for any combatant command, such as warfighting, planning, and logistics. He also stated that the Air Force incorporated his feedback to some extent, but not fully. For example, the *available qualified workforce* criterion in the Selection Phase incorporated the requirement for warfighting skillsets identified by U.S. Space Command, but did not fully incorporate the identified planning and logistics skillsets requirements. Both Air Force and U.S. Space Command officials told us there was a tension between following the then Secretary of Defense's direction to broaden the revised process and fully incorporating U.S. Space Command's functional requirements earlier in the revised process.

In addition to changing functional requirements related to the workforce and communications infrastructure, we found the functional requirement for required square footage to be unrealistic. The basing action request developed in December 2018 for the initial selection process projected a square footage requirement based on an estimated number of authorized

personnel, and the revised process, which began in 2020, maintained approximately the same square footage requirement.

Air Force officials told us that in the summer of 2019, they agreed with U.S. Space Command on the authorized personnel number—to include military and civilian personnel, and contractors—based on planned staffing levels. However, a U.S. Space Command planning document dated August 2019 stated that the headquarters facility would require space for approximately 400 additional personnel. According to U.S. Space Command officials we interviewed, this number included representatives from partner organizations.

Air Force officials told us that certain additional assessments during the revised process took into account the possibility of higher square footage requirements. However, the Air Force did not document these additional assessments. These officials also stated that they maintained the same personnel number for consistency and that U.S. Space Command did not provide additional personnel numbers to consider when calculating the square footage requirement. This best practice states that the AOA team should establish functional requirements early in the process and maintain them, and that those functional requirements should be realistic based on the information available at the time. U.S. Space Command officials provided documentation of the need for a facility to support both authorized personnel and contractors, as well as additional personnel from partner organizations. In contrast, Air Force analysis relied on a square footage requirement that was based on only authorized personnel and contractors.

According to this best practice, if functional requirements are established after the AOA has begun, bias may influence the study's results. Further, functional requirements should be realistic and traceable to ensure they appropriately define the capabilities needed to meet the mission need. Because we found that several requirements changed during the revised process—with accompanying effects on locations' scores—external stakeholders, such as Congress, may not have assurance that the revised process was conducted in an unbiased manner. Moreover, ensuring that functional requirements were realistic and traceable to the mission need may have better positioned the Air Force to substantiate its results with external stakeholders.

Develop list of alternatives. We found that the Air Force's revised selection process fully met the best practice of *develop list of alternatives.* This best practice states that the AOA team should identify and consider

a wide range of alternatives to meet the mission need, and perform market research to develop as many alternative solutions as possible. According to the then Secretary of Defense, one goal of the revised process was to ensure that all states had a chance to participate so that unconventional, but potentially viable, locations were not overlooked. Accordingly, during the Nomination Phase of the revised process, the Air Force broadly defined minimum criteria for consideration as the U.S. Space Command headquarters location as proximity to a large population center and a military installation, and an average or higher score on a quality of life index.[46] These criteria allowed for the identification of 50 locations that advanced to the Evaluation Phase. Evaluation Phase locations spanned 24 states, and included sites on and off existing military installations.

Air Force officials stated that in identifying the list of alternatives, they leveraged research conducted during the initial process, during which they first considered six locations, and then expanded their criteria to ensure consideration of a larger, more varied group of locations. For example, Air Force officials stated that their research during the initial selection process made clear that certain minimum screening criteria—such as colocation with a space component or center—would limit the number of locations considered. As a result, Air Force officials identified more general minimum criteria for the revised process in the Nomination Phase. According to this best practice, the AOA team can avoid overlooking the optimal alternative, invalidating the AOA's results, and biasing the process by performing thorough research that captures many diverse alternatives. In fully meeting the best practice, we found that the Air Force identified a comprehensive list of diverse alternatives developed without bias.

Develop life-cycle cost estimates. We found that the Air Force's revised selection process partially met the best practice of *develop life-cycle cost estimates*. This best practice states that the AOA team should develop a life-cycle cost estimate for each alternative. This life-cycle cost estimate should include all costs from inception of the effort—in this case, the U.S. Space Command headquarters—through design, development, construction, operation, and maintenance. Although Air Force cost

[46]The Air Force used a Livability Index score as determined by the American Association of Retired Persons Public Policy Institute to establish a minimum standard for quality of life in the Nomination Phase. Quality of life factors measured by the index include housing affordability, safe and convenient transportation, clean air and water, and quality of health services.

estimates addressed certain costs, such as one-time infrastructure costs, they did not address all costs from inception of the program through operations and maintenance. For example, the cost estimates addressed the cost of utility upgrades and realignment, but not the cost of maintaining facility infrastructure annually. Similarly, the Air Force identified costs specific to the U.S. Space Command facility—such as costs for High Altitude Electromagnetic Pulse shielding—but did not identify others, such as costs for needed Sensitive Compartmented Information Facilities, or relocation costs.[47] Air Force officials told us that they considered capturing certain recurring costs, but omitted this analysis because it increased the required calculations and produced little impact on the overall cost estimates. These officials also told us that the costs of Sensitive Compartmented Information Facilities were included, but not documented.[48]

Further, the costs the Air Force identified are not easily traceable, especially for those elements not included in the Unified Facilities Criteria—such as the High Altitude Electromagnetic Pulse shielding.[49] According to Air Force officials, the Air Force relied on U.S. Space Command subject matter experts to provide a baseline estimate for High Altitude Electromagnetic Pulse shielding and then adjusted the baseline estimate using ratios for the area cost factor. However, the Air Force did not document how subject matter experts developed the baseline estimate or how cost estimators adjusted the baseline estimate for each of the final six locations. As a result, it is not possible for an external

[47]High Altitude Electromagnetic Pulse shielding is infrastructure that protects against the threat of a High Altitude Electromagnetic Pulse—a large scale instantaneous, intense energy field that can overload or disrupt numerous electrical systems and high technology microcircuits from a distance.

[48]Air Force officials also told us that the area cost factor accounted for many differences in the cost of Sensitive Compartmented Information Facilities by location. However, the area cost factor is not sufficient to identify variations in cost by location because, although it accounts for certain location-specific costs for the most common locations, it does not account for any site-specific variations in cost.

[49]See DOD, Unified Facilities Criteria 3-701-01, *DOD Facilities Pricing Guide* (Mar. 17, 2022). The Unified Facilities Criteria provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and the DOD Field Activities. DOD's Unified Facilities Criteria establishes area cost factors—ratios used to adjust a unit cost in order to account for location-specific costs for the most common locations. For example, area cost factors account for geographical differences in the costs of labor, materials, and equipment.

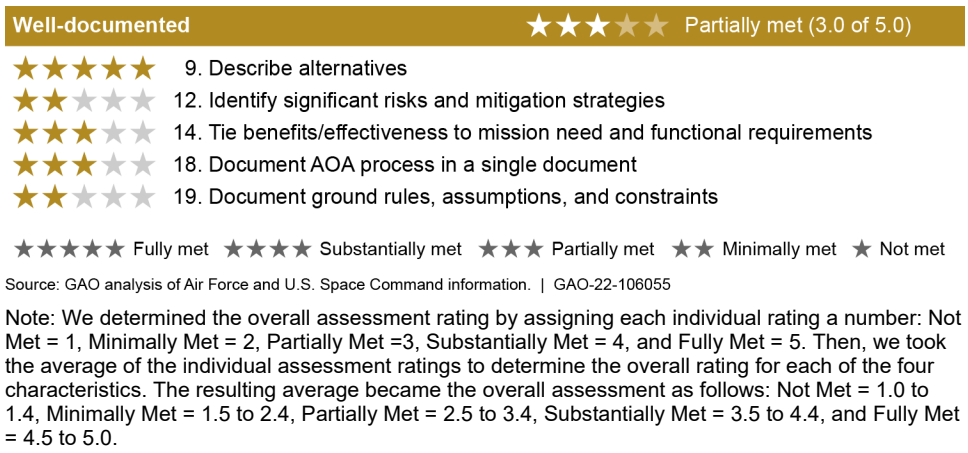
reviewer to substantiate the analysis conducted to determine cost estimates for High Altitude Electromagnetic Pulse shielding.

According to this best practice, an incomplete life-cycle cost estimate does not provide an accurate and complete view of the alternatives' costs. Without a full accounting of life-cycle costs, decision-makers will not have a comprehensive picture of the costs for each alternative and will have difficulty comparing the alternatives because comparisons may not be based on accurate information.

Air Force's Revised Process Partially Met the Well-Documented Characteristic

Overall, we found that the Air Force's revised selection process partially met the collection of best practices that address how well an agency documented its AOA process. Figure 11 shows a summary of our assessment of the best practices under the well-documented characteristic, followed by a detailed discussion of selected best practices.

Figure 11: Assessment of the Air Force's Revised Process for U.S. Space Command Basing against GAO's Analysis of Alternatives (AOA) Best Practices under the Well-Documented Characteristic



Source: GAO analysis of Air Force and U.S. Space Command information. | GAO-22-106055

Note: We determined the overall assessment rating by assigning each individual rating a number: Not Met = 1, Minimally Met = 2, Partially Met =3, Substantially Met = 4, and Fully Met = 5. Then, we took the average of the individual assessment ratings to determine the overall rating for each of the four characteristics. The resulting average became the overall assessment as follows: Not Met = 1.0 to 1.4, Minimally Met = 1.5 to 2.4, Partially Met = 2.5 to 3.4, Substantially Met = 3.5 to 4.4, and Fully Met = 4.5 to 5.0.

Describe alternatives. We found that the Air Force's revised selection process fully met the best practice of *describe alternatives*. This best practice states that the AOA team should describe alternatives in sufficient detail to allow for robust analysis, and in terms of their functional requirements. In fully meeting this best practice, the Air Force described locations in sufficient detail to allow for robust analysis in both the Evaluation and Selection Phases. For example, in the Evaluation Phase, communities and military installations described locations in areas related

to functional requirements by responding to detailed Air Force questionnaires. As a result of the descriptions and other information sources, the Air Force was able to score Evaluation Phase locations against its 21 criteria, ranking the candidates by overall viability in relation to mission, capacity, community, and cost. Selection Phase questionnaires also described locations in terms of functional requirements. For example, one questionnaire listed warfighting and space warfighting organizations and space-related education partnerships within 60 miles of the locations—descriptions relevant to the functional requirement for skillsets needed in the U.S. Space Command workforce.

A site visit report also described locations' capacity to meet square footage requirements, and documented communications infrastructure. For some criteria related to quality of life, such as *housing affordability, quality education,* and *professional licensure portability* available for military families, the Air Force included underlying analysis and statistics. According to this best practice, adequately describing and documenting the alternatives will provide sufficient detail to allow for valid cost-benefit estimates. Because of the depth and breadth of the data the Air Force analyzed for the 50 locations in the Evaluation Phase, and each of the six locations in the Selection Phase, we found that Air Force documentation provided detail sufficient for a valid cost-benefit assessment to be conducted.

Identify significant risks and mitigation strategies. We found that the Air Force's revised selection process minimally met the best practice of *identify significant risks and mitigation strategies*. This best practice states that the AOA team should identify and document the significant risks and specific mitigation strategies for each analyzed alternative and rank risk in terms of significance to the mission need and functional requirements. We found that the Air Force did not document all significant risks and mitigation strategies or assess the impact of risks to the mission need and functional requirements. Specifically, the Air Force did not clearly document and address risks associated with two issues—the colocation of two combatant commands and delays in reaching full operational capability.

First, regarding colocation, we found that the Air Force identified colocation of two combatant commands as a significant risk in terms of the mission need. Specifically, in a decision matrix outlining the rationale for the preferred location decision in early January 2021, the Air Force identified the ability to disperse combatant commands geographically as supporting its decision, and Air Force officials told us that they considered

risk related to colocating U.S. Space Command and U.S. Northern Command at Peterson Air Force Base as a military judgement issue. The Air Force considered dispersing combatant commands in different geographic areas as a strategic advantage, and a way to avoid placing two combatant commands at risk from the same threat. However, the Air Force did not identify colocation as a risk until after its Selection Phase analysis was completed in early January 2021.

Second, regarding full operational capability, the Air Force identified in its decision matrix the risk of delays in reaching full operational capability. The Commander of U.S. Space Command told us that pursuing the renovation option at Peterson Air Force base could accelerate the timeline to reach full operational capability in comparison to other locations. Further, a former senior DOD official told us the delay in reaching full operational capability at Redstone Arsenal would require additional resources not accounted for in Air Force cost estimates. According to a senior DOD official, relevant mitigation strategies could include leveraging existing component commands that would not be moving, and moving existing personnel from Peterson Air Force Base to the new location as quickly as possible.

Each of the senior military officials we interviewed stressed the importance of U.S. Space Command reaching full operational capability as soon as possible in order to counter national security threats and noted that the potential need to relocate personnel constituted an associated risk. However, we found that the Air Force did not account for risks related to colocation or reaching full operational capability in its Evaluation or Selection Phase analyses, but identified both in general terms at the end of the process. Specifically, Air Force documentation did not identify these two risks or address their associated costs and mitigation strategies, despite the reference to both risks in the decision matrix supporting the then Assistant Secretary of the Air Force for Installations, Environment and Energy's action memorandum for the then Secretary of the Air Force's selection of Redstone Arsenal as the preferred location in January 2021.

Air Force officials told us that risk assessment was embedded in certain criteria, where relevant. For example, locations with proposed headquarters sites centrally located inside military installations were ranked higher on the *anti-terrorism/force protection and security* criterion in the Selection Phase because these sites would not require improvements to existing security infrastructure. However, such risks and related assessments were not documented in relation to the locations or

corresponding criteria. According to this best practice, not documenting the risks and related mitigation strategies for each alternative prevents decision-makers from performing a meaningful trade-off analysis necessary to select a preferred alternative. More robust documentation of significant risks to the mission would have better positioned the Air Force to substantiate its selection of Redstone Arsenal as the preferred location.

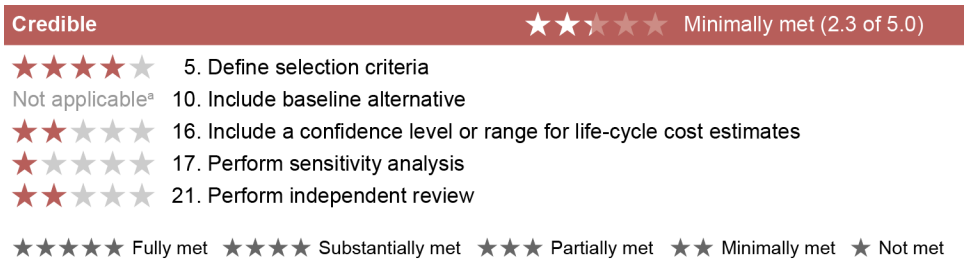
Tie benefits/effectiveness to mission need and functional requirements. We found that the Air Force's revised selection process partially met the best practice of *tie benefits/effectiveness to mission need and functional requirement*s. This best practice states that the AOA team should explain how each measure of effectiveness supports the mission need and show how the measures are tied to specific mission needs and functional requirements. The Air Force assessed locations using measures of effectiveness connected to the mission need and functional requirements, but the connection was implied rather than clearly documented. An external reviewer can connect most of the criteria in the Evaluation and Selection Phases to a functional requirement through logical reasoning. For example, the *communications bandwidth & redundancy* criterion can be connected to the functional requirement for communications infrastructure. However, Air Force documentation did not document the connection explicitly or establish how sufficient communications, bandwidth, and redundancy supports the mission need.

Similarly, multiple criteria relate to personnel quality of life issues, such as *medical support, military housing, quality of schools, cost of living*, and *access to military and veteran support.* These criteria can be linked to functional requirements for authorized personnel and an available qualified workforce. U.S. Space Command officials told us that the ability to recruit and retain personnel is important to carry out the headquarters mission. However, the connection between quality of life criteria, the personnel and workforce functional requirements, and the mission need was not clearly documented. According to this best practice, unless the AOA team thoroughly explains and documents how the measures of effectiveness relate to the specific mission need and functional requirements, decision-makers will not have proper insight into the impact of each alternative. For example, we found that more explicit documentation explaining how each benefit affects a location's ability to meet the mission need could have better prepared the Air Force to answer questions about the benefits of locating U.S Space Command at Redstone Arsenal, compared to other locations.

Air Force's Revised Process Minimally Met the Credible Characteristic

Overall, we found that the Air Force's revised selection process minimally met the collection of best practices that demonstrate the credibility of an agency's AOA process. Figure 12 shows a summary of our assessment of the best practices under the credible characteristic, followed by a detailed discussion of selected best practices.

Figure 12: Assessment of the Air Force's Revised Process for U.S. Space Command Basing against GAO's Analysis of Alternatives (AOA) Best Practices under the Credible Characteristic



Source: GAO analysis of Air Force and U.S. Space Command information. | GAO-22-106055

[a]We did not score best practice 10, *include baseline alternative*, because we determined the best practice was not applicable to the U.S. Space Command basing process. At the onset of the revised process, no permanent headquarters existed for U.S. Space Command at any location. As such, assessment of locations against an existing baseline location was not possible.

Note: We determined the overall assessment rating by assigning each individual rating a number: Not Met = 1, Minimally Met = 2, Partially Met =3, Substantially Met = 4, and Fully Met = 5. Then, we took the average of the individual assessment ratings to determine the overall rating for each of the four characteristics. The resulting average became the Overall Assessment as follows: Not Met = 1.0 to 1.4, Minimally Met = 1.5 to 2.4, Partially Met = 2.5 to 3.4, Substantially Met = 3.5 to 4.4, and Fully Met = 4.5 to 5.0.

Define selection criteria. We found that the Air Force's revised selection process substantially met the best practice of *define selection criteria*. This best practice states that the customer—with input as needed from the decision-maker and the AOA team—should define the selection criteria based on mission needs, and ensure that the criteria are independent of a particular solution. In substantially meeting this best practice, the Air Force defined criteria based on mission need. The criteria were also independent of a particular solution and they considered tradeoffs between mission, capacity, cost, and community support. Although U.S. Space Command—in this case the customer—did not itself define the criteria, U.S. Space Command did provide significant input to the Air Force's final selection criteria.

As previously discussed, the Air Force identified four selection factors—*Mission, Capacity, Support,* and *Costs to DOD*—which comprised the 21

criteria assessed in the Evaluation and Selection Phases.[50] The 21 criteria included *proximity to mutually supporting space entities, childcare, housing affordability,* and *one-time infrastructure costs*, among others. U.S. Space Command officials stated that, consistent with the 21 criteria, command priorities for the headquarters included mission success and caring for people while being fiscally responsible. Although the Air Force and U.S. Space Command coordinated in defining the 21 criteria, the role of U.S. Space Command—the customer—was to review criteria the Air Force developed, rather than to define its own criteria. For example, U.S. Space Command officials told us they reviewed the 21 criteria, certain sub-criteria, and certain methods used to score sub-criteria, but were not in a position to alter Air Force criteria or scoring methods. According to this best practice, basing selection criteria on the mission need can prevent bias from entering the AOA process and support the decision-maker in forming an impartial and credible decision. In substantially meeting this best practice, we found that the Air Force provided sufficient assurance that selection criteria weighed key trade-offs in a credible manner.

Perform sensitivity analysis. We found that the Air Force's revised selection process did not meet the best practice of *perform sensitivity analysis*. This best practice states that the AOA team should test and document the sensitivity of the cost and benefit and effectiveness estimates to risks and changes in key assumptions for each analyzed alternative's cost. A sensitivity analysis can provide important information for an analysis of alternatives that may result in the choice of a different alternative from the original recommendation. Like a cost estimate, an analysis of alternatives is based on assumptions and constraints that may change. Thus, before choosing an alternative, it is essential to test how sensitive the ranking of alternatives is to changes in factors. In an analysis of alternatives, sensitivity is determined by how much a parameter or assumption changes, and how much those changes result in an alternative that differs from the one recommended in the original analysis.

[50]In the Evaluation Phase, the Air Force referred to these as "evaluation factors." Also, in the Evaluation Phase, one of the evaluation factors was *Community*, but the Air Force renamed it to *Support* in the Selection Phase.

Air Force officials told us the cost estimates considered sensitivity for one input—the area cost factor, which drives the primary facilities cost.[51] Varying the area cost factor to determine a one-time infrastructure cost for each location does not reflect a sensitivity analysis; instead, changes to key assumptions should include a variety of input changes. For example, Air Force cost estimates included one estimated dollar amount for each line item, such as for road realignment, antiterrorism and force protection improvements, and site improvements. There are a variety of site-specific inputs to these cost estimates that could be varied to perform a sensitivity analysis. For example, a sensitivity analysis could have varied the assumptions specific to each site, such as including a low, medium, and high estimate for the length of road required for road realignment. The result would show the sensitivity of the overall estimate for each site to any specific assumption changes for each line item.

In commenting on a draft of this report, Air Force officials told us they did conduct sensitivity analyses at several points during the revised process, such as to detect errors in scoring algorithms and to identify appropriate methods of comparison for Evaluation Phase scores and Selection Phase rankings. However, we found that the purposes of these analyses were to test different methods of comparison, review results of these comparisons, and identify the appropriate method for scoring and ranking locations. The Air Force did not use these analyses to inform decision-makers about the uncertainties associated with its analysis.

According to this best practice, failing to conduct a sensitivity analysis to identify the uncertainties associated with different assumptions negatively affects the credibility of the AOA process. Specifically, the absence of a sensitivity analysis increases the chance the AOA team will recommend an alternative without understanding the full impacts of uncertainties on life-cycle costs, which could lead to cost and schedule overruns. As discussed, the Air Force received information about potential reductions to projected U.S. Space Command authorized personnel numbers in early January 2021. Air Force officials told us they were unable to substantiate the U.S. Space Command personnel reductions, and that any actual reductions were uncertain as of January 2021. Developing a sensitivity analysis that included varied personnel numbers and

[51]The Unified Facilities Criteria defines the area cost factor as a multiplier used to adjust baseline unit costs to account for location-specific costs at the most common locations. For example, the area cost factor accounts for geographical differences in the costs of labor, materials and equipment. For additional context, see DOD, Unified Facilities Criteria 3-701-01, *DOD Facilities Pricing Guide* (Mar. 17, 2022).

associated variation in square footage as a part of the cost estimate would have better positioned the Air Force to credibly assess these uncertainties, and the potential impact of such changes, should they occur in the future.

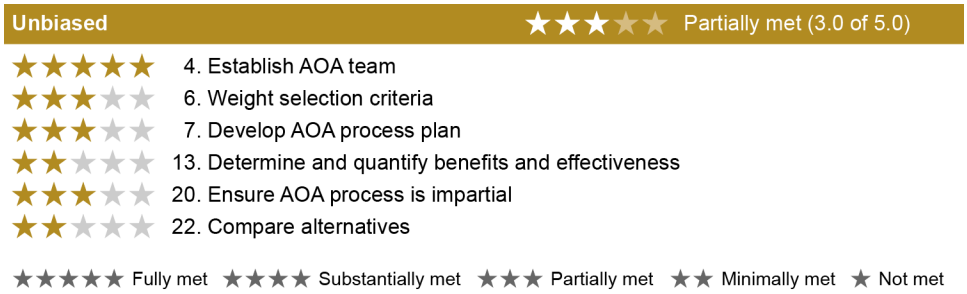
Perform independent review. We found that the Air Force's revised selection process minimally met the best practice of *perform independent review*. This best practice states that an entity independent of the AOA process and outside of the program's chain of command should review and validate the AOA process. It also states that, while not a substitute for an independent review at the end of the process, other reviews throughout the process can keep the customer and the decision-maker informed. Senior DOD and Air Force officials outside of the Air Force Strategic Basing Office conducted reviews of the revised process after key steps, such as criteria development, and the completion of Evaluation Phase results. These reviews were conducted by the then Assistant Secretary of the Air Force for Installations, Environment and Energy; the then Secretary of the Air Force; and the then Secretary of Defense, all of whom are within the chain of command. In addition, as the customer, U.S. Space Command reviewed functional requirements, the 21 criteria, certain sub-criteria and methods for scoring, and weighting at multiple stages, ensuring it had some input and awareness of key steps as the revised process progressed, according to U.S. Space Command officials.

However, Air Force officials we interviewed confirmed that no entity independent of the AOA team reviewed the revised selection process. According to this best practice, without independent reviews, the results are more likely to include organizational bias or lack the thoroughness needed to ensure that a preferred solution is chosen, rather than a favored solution. An independent review of the U.S. Space Command revised process could have better positioned the Air Force to substantiate the credibility of its preferred location selection. For example, additional vetting of functional requirements, criteria, and weighting by an independent reviewer may have provided assurances to external stakeholders that these aspects of the revised process were complete, accurate, and unbiased.

Air Force's Revised Process Partially Met the Unbiased Characteristic

Overall, we found that the Air Force's revised selection process partially met the collection of best practices that demonstrate the extent to which an agency conducted its AOA process in an unbiased fashion. Figure 13 shows a summary of our assessment of the best practices under the unbiased characteristic, followed by a detailed discussion of selected best practices.

Figure 13: Assessment of the Air Force's Revised Process for U.S. Space Command Basing against GAO's Analysis of Alternatives (AOA) Best Practices under the Unbiased Characteristic



Source: GAO analysis of Air Force and U.S. Space Command information. | GAO-22-106055

Note: We determined the overall assessment rating by assigning each individual rating a number: Not Met = 1, Minimally Met = 2, Partially Met =3, Substantially Met = 4, and Fully Met = 5. Then, we took the average of the individual assessment ratings to determine the overall rating for each of the four characteristics. The resulting average became the overall assessment as follows: Not Met = 1.0 to 1.4, Minimally Met = 1.5 to 2.4, Partially Met = 2.5 to 3.4, Substantially Met = 3.5 to 4.4, and Fully Met = 4.5 to 5.0.

Establish AOA team. We found that the Air Force's revised selection process fully met the best practice of *establish AOA team*. This best practice states that an agency should establish a diverse AOA team to develop the AOA, with members that have a variety of necessary skill sets, specific knowledge, and abilities to successfully execute the study. In fully meeting this best practice, the Air Force selected team members with subject matter expertise from organizations across relevant functional fields. For example, the site visit team included civil engineers, intelligence experts, and construction experts from military, civilian, and contractor positions. Further, individuals from organizations with cost estimation expertise—including the Air Force Installation and Mission Support Center and the Air Force Civil Engineer Center—produced the construction estimates, according to Air Force officials. The Air Force also leveraged U.S. Space Command expertise, where necessary, such as relying on a U.S. Space Command communications expert to assess each location's communications infrastructure.

According to this best practice, having appropriate expertise on the team can prevent errors in the results and gaps in the analysis. By reaching broadly across the Air Force and U.S. Space Command enterprise, the Air Force identified and built a team with professional expertise appropriate to support an unbiased process.

Weight selection criteria. We found that the Air Force's revised selection process partially met the best practice of *weight selection criteria*. This best practice states that the customer, with input from the decision-maker and the AOA team, decides on the weighting of the selection criteria to reflect the relative importance of each criterion prior to the beginning of the AOA. Further, the best practice states that, among other things, the rationale for the weighting should be documented. The Air Force determined the weighting of its evaluation factors and 21 criteria for the Evaluation Phase, with input from U.S. Space Command early in the revised process. However, U.S. Space Command officials told us they had some input, but, as the customer, they did not determine the weighting of evaluation factors or of the 21 criteria in the Evaluation Phase. The Air Force also did not document the rationale for the weighting of criteria in the Evaluation Phase.

Further, Air Force officials' statements about criteria weighting in Selection Phase analysis and in the selection of the preferred location were not reflected in documentation. Air Force officials stated they did not apply weighting to criteria in the Selection Phase, but instead qualitatively ranked the six final candidate locations into top, middle, and bottom thirds for each of the 21 criteria. However, while Air Force documentation stated that the analysis did weigh certain criteria and sub-criteria differently, the documentation did not reflect how the weighting differed in all cases. Specific details related to weighting were omitted from this report because DOD designated the information as sensitive and privileged.

According to this best practice, an unjustified weighting method can oversimplify the results and lead to an uninformed and biased decision. Clear and complete documentation of the weighting the Air Force employed across all stages of analysis, combined with the rationale for weighting decisions, would help assure the customer and external stakeholders that the selection of a preferred location stemmed from an informed, unbiased process.

Ensure AOA process is impartial. We found that the Air Force's revised selection process partially met the best practice of *ensure AOA process is impartial.* This best practice states that the AOA process should be an unbiased inquiry into the costs, benefits, and capabilities of all alternatives, which informs the decision-making process, rather than reflects the validation of a predetermined solution. Further, the best practice states that the AOA team should conduct the analysis without having a predetermined solution in mind. We found that the Air Force's revised selection process included an assessment of costs, benefits, and

capabilities of the final six candidate locations, after which the Air Force determined Redstone Arsenal, Alabama, was the preferred location. Air Force analysis identified Redstone Arsenal as the highest scoring location in the Evaluation Phase, the highest ranked location in the Selection Phase, and the location with the most advantages in the decision matrix. Air Force officials, including the then Secretary of the Air Force, stated that the decision to identify Redstone Arsenal as the preferred location stemmed from Air Force analysis showing it was the strongest candidate location.

In addition, we found that the Air Force took some steps to ensure the revised process assessed candidate locations without a predetermined solution in mind. For example, the Air Force used broad screening criteria in the Nomination Phase to allow for identification of a diverse candidate pool. In the Evaluation Phase, the Air Force designed evaluation factors to ensure all candidate locations received due consideration. Further, the Air Force clearly documented how it conducted analysis in the Nomination and Evaluation Phases, making it possible for an external stakeholder to trace how the Air Force arrived at its six Selection Phase locations. Multiple senior officials we interviewed stated that they felt the process was unbiased, including the former Assistant Secretary of the Air Force for Installations, Environment and Energy; the former Secretary of the Air Force; the former Vice Chairman of the Joint Chiefs of Staff; the U.S. Space Command Combatant Commander; and the U.S. Space Force Chief of Space Operations.

However, we found that the Air Force did not take certain steps to ensure that the decision-making process did not reflect, or appear to reflect, the validation of a predetermined solution. For example, the Air Force did not validate the basing process through the Air Force's Strategic Basing Panel and Strategic Basing Executive Steering Group, as prescribed in its established strategic basing process, instead relying on senior level reviews. Air Force officials told us that the officials who conducted senior level reviews were the same officials who would have chaired the review bodies, and that their reviews were effective. In addition, these officials told us that Air Force personnel generally staffed to the review bodies do not have the appropriate subject matter expertise to review a combatant command basing process. However, validating the U.S. Space Command basing process through the review bodies or another independent entity would have helped provide assurance that the process was not conducted with a predetermined solution in mind.

A former senior Air Force official involved in the process stated that the senior level reviews performed during the U.S. Space Command basing process were not a sufficient replacement for those review bodies, which serve to vet the requirements of the mission commander and prevent omissions and bias. In addition, although the Air Force clearly documented how it conducted analysis in the Nomination and Evaluation Phases, we found that the Air Force did not clearly document how it developed rankings for the final six candidate locations in the Selection Phase. For example, the Air Force documented how each location ranked against 21 separate criteria, but did not clearly document how this set of 21 rankings combined to determine overall rankings of each candidate location.

We also found that certain aspects of the Air Force process created the potential for bias during consideration of the costs, benefits, and capabilities of all alternatives. As previously discussed, Air Force officials told us that, in early January 2021, they received information that could have enabled U.S. Space Command to renovate an existing facility at Peterson Air Force Base, achieve cost savings, and reach full operational capability more quickly. As a result, the Air Force sought to validate the personnel reductions, and also developed a cost estimate for renovating the existing facility at Peterson Air Force Base. Air Force officials told us they were unable to substantiate the personnel numbers that would have enabled use of the renovated facility. Air Force officials also stated that they did not conduct additional cost estimates for secondary sites at the other five locations because to do so would call into question the objectivity of the process. These officials further stated that they did not develop additional cost estimates adjusting the community proposals for the five other candidate locations because they could not substantiate the reduced personnel numbers for Peterson Air Force Base.

Selection Phase analysis ranked Peterson Air Force Base lower than several other locations, but the reduced cost estimate for renovating an existing facility, if substantiated, would have made Peterson more competitive. However, Air Force officials told us that because they could not substantiate the personnel numbers, the reduced cost estimate was not reliable. In addition, reopening analysis for Peterson Air Force Base would have required the Air Force to do so for all other locations previously considered during the revised process, according to one former senior Air Force official.

However, multiple senior officials present at the January 11, 2021, White House meeting told us that the discussion focused primarily on the costs,

benefits, and capabilities of two locations—Redstone Arsenal and Peterson Air Force Base. Further, these senior officials told us there was discussion of the benefits of the renovated facility at Peterson Air Force Base, including that renovations would enable reaching full operational capability more quickly. We found that in discussing the renovated facility at the January 11, 2021, meeting, senior officials effectively considered a second option at Peterson Air Force Base based on unsubstantiated information, which might have affected the extent to which discussion focused on candidate locations ranked higher than Peterson Air Force Base in the Air Force analysis.

Relatedly, it is unclear to what extent senior officials present at the January 11, 2021, meeting considered the costs, benefits, and capabilities of the other four Selection Phase locations. Specific details related to the costs, benefits and capabilities of locations discussed during the meeting were omitted from this report because DOD designated the information as sensitive and privileged.

According to this best practice, the validity of the analysis is affected if bias is introduced to the inputs, and an AOA process is not considered valid if it is biased. If the AOA process has the appearance of being biased, the customer, decision-maker, or independent reviewers may not act on the results of the AOA, and may request additional information, extending the time before the preferred alternative is selected or enacted. In addition, performing a study with a predetermined solution distorts the results. Although the Air Force team did not conduct the revised process with a predetermined solution in mind, additional steps to ensure impartiality would have helped substantiate the selection of Redstone Arsenal to external stakeholders. Further, consideration of a new option related to Peterson Air Force Base might have affected the extent to which other Selection Phase locations were discussed in the January 11, 2021, meeting with senior officials. Clear documentation showing how the Air Force determined rankings for the six Selection Phase locations, and showing that all candidate locations received due consideration from senior officials, would have better prepared the Air Force to answer questions from external stakeholders about the decision.

Compare alternatives. We found that the Air Force's revised process minimally met the best practice of *compare alternatives*. This best practice states that the AOA team or the decision-maker should compare the alternatives in order to select a preferred alternative that best meets

the mission need using net present value, if possible.[52] If net present value is not used to differentiate among alternatives, the AOA team should, among other things, describe the other method that is used. This ensures that the rationale used to select a preferred alternative is clearly documented such that an external reviewer will be able to follow the logical reasoning.

Air Force officials stated they did not use net present value to compare alternatives broadly; instead, the Air Force scored Evaluation Phase locations and qualitatively ranked Selection Phase candidate locations into tiered groupings of top, middle, and bottom third. However, the Air Force provided limited documentation of the methods used to qualitatively compare the final six candidate locations in the Selection Phase. Air Force officials told us that they did not document the underlying analysis that led to the tiered rankings. Instead, the Air Force team reviewed data collected during the Evaluation and Selection Phases and came to a consensus on rankings across the 21 criteria during a series of business meetings, according to Air Force officials. It is possible to follow the logical reasoning of analysis for certain criteria, such as the *cost of living* criterion, which the Air Force assessed by comparing an average Cost of Living Index for each location.

For other criteria, it is not possible for an external reviewer to follow the logical reasoning, due to insufficient information. For example, in the Selection Phase, the Air Force compared childcare across the six candidate locations by ranking three sub-criteria: *locally available capacity, quantity,* and *on-base availability*. The Air Force did not describe in its documentation the method of ranking the sub-criteria or the method for combining the three to determine an overall ranking for *childcare.* In total, we determined that 11 of the 21 Selection Phase criteria included sub-criteria without sufficient explanation of the method employed to combine sub-criteria and determine each criterion's tiered ranking. Air Force officials told us that additional documentation of the underlying analysis did exist, such as descriptions of some of the source data that contributed to rankings. However, this documentation was lost after a software update, and the lost documentation was not comprehensive, according to officials. For example, the Air Force did not document all data and information used to determine rankings or document decisions

[52]Net present value is defined as the discounted value of expected benefits minus the discounted value of expected costs.

made to include or exclude from analysis certain information candidate locations provided through questionnaires.

As previously discussed, there is also limited documentation of the rationale for selecting a preferred location from among the final six candidate locations. For example, the Air Force documented multiple potential methods for ranking the six candidate locations in the Selection Phase. However, the documentation does not describe how the Air Force implemented these approaches for potential analyses, or what approach the Air Force chose for determining overall Selection Phase rankings. Further, the Air Force did not document its rationale for the comparison method used to inform decision-makers of overall rankings for each of the six candidate locations.

In addition, the decision matrix and Air Force officials identified stronger long-term benefits as the rationale for selecting Redstone Arsenal. However, the decision matrix does not make clear how the decision-makers weighed these long-term and short-term benefits. According to this best practice, not clearly documenting the rationale used to select a preferred alternative will lower the confidence in the results of the AOA process and present the appearance of bias surrounding the selected alternative. Clear and complete documentation of the method used to compare locations, and the rationale supporting the selection of a preferred location, would better position the Air Force to substantiate its decision to external stakeholders and prevent the appearance of bias.

Air Force Officials Do Not Believe That AOA Best Practices Should Apply to the U.S. Space Command Basing Decision

When we asked Air Force officials why they did not use our AOA best practices, they told us they complied with existing documentation requirements, and were not required to follow our AOA best practices. Though not required, our AOA best practices provide a framework that could help the Air Force ensure it accomplishes the purpose of its established basing process. According to the current version of Air Force Instruction 10-503, the purpose of the established basing process is to provide an enterprise-wide standardized, repeatable, transparent, and deliberate process for strategic basing decision-making. The basing process also ensures that all strategic basing actions follow environmental guidance, consider the overall fiscal ramifications of the proposed action, and optimize use of Air Force land, facilities, infrastructure, and air space.[53]

[53]Air Force Instruction 10-503, *Strategic Basing* (Oct. 14, 2020).

Consistent with this aim, our AOA best practices provide agencies a framework for ensuring a transparent and deliberate AOA process that is comprehensive, unbiased, and credible. Officials also told us that, for many reasons, they believe our AOA best practices should not be applied to the Air Force's revised selection process for the U.S. Space Command headquarters location. However, we believe that the best practices are relevant and, if effectively implemented, can help ensure basing decisions reflect a high-quality, reliable process, as described below.

First, Air Force officials stated that the established Air Force basing process, which is the process typically used to make basing decisions, does not require the level of detailed documentation included in our AOA best practices. These officials further stated that they documented the U.S. Space Command basing process in accordance with requirements under the National Environmental Policy Act, the Administrative Procedure Act, and their implementing regulations.[54] The National Environmental Policy Act requires federal agencies to evaluate the potential environmental effects of proposed projects on the human environment.[55] The Administrative Procedure Act generally establishes procedures for rulemaking, which is the process agencies follow to develop and issue regulations. According to Air Force officials, under the Administrative Procedure Act, the Air Force is required to document the rationale for its decision through the creation of an administrative record, which must demonstrate that the agency's rationale was objective and not arbitrary or capricious. These officials told us that while the record is still being completed, as the National Environmental Policy Act process is not yet complete, they anticipate that the record will more than meet the Administrative Procedure Act standard. However, whereas both acts and their implementing regulations generally involve various actions related to documentation, neither focuses on ensuring the Air Force basing process

[54]*See generally* National Environmental Policy Act of 1969, Pub. L. No. 91-190 (1970) (codified, as amended, at 42 U.S.C. §§ 4321 et seq.); 32 C.F.R. part 989 (2022); and Administrative Procedure Act, Pub. L. No. 79-404 (1946) (codified, as amended, at 5 U.S.C. §§ 551 et seq.).

[55]Pub. L. No. 91-190 (1970) (codified, as amended, at 42 U.S.C. §§ 4321 et seq.). The act's congressional declaration of purpose states that the purposes of the act are "to declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality." 42 U.S.C. § 4321.

has clear and complete documentation sufficient for an external reviewer to understand the steps taken in a basing process.

According to our best practices, a well-documented AOA process is a key characteristic of a high-quality, reliable AOA, and helps ensure that an entity unfamiliar with the basing process will be able to understand the rationale surrounding the selection of the preferred alternative. Further, a well-documented AOA provides assurance that the AOA results are comprehensive, unbiased, and credible, and enables the agency to answer questions about the approach or data used to create the AOA.

Second, Air Force officials told us that although they see the value of our AOA best practices in certain contexts, such as for major defense acquisition programs, there are several reasons why they believe the AOA framework does not apply to Air Force strategic basing decisions, including the U.S. Space Command basing decision.

- According to Air Force officials, the professional, military judgment of senior Air Force officials played a significant role in the U.S. Space Command basing decision, and thus diminished the need to fully adhere to our AOA best practices during the Air Force's revised process. However, our AOA best practices explicitly account for the professional judgment of senior agency officials. Specifically, according to our best practices, two of the key entities involved in the AOA process—the customer and decision-maker—are expected to exercise professional judgment in making key decisions related to the mission need, functional requirements, selection criteria, and weighting, among other things. For example, in our best practice *define mission need*, the customer—in this case U.S. Space Command—defines the gap between current capabilities and those required to meet the agency's goals. Similarly, for our best practice *define selection criteria*, the customer, with input as needed from the AOA team and the decision-maker—in this case, the Secretary of the Air Force, together with other senior officials—defines selection criteria based on the mission need.
- Air Force officials stated that the conceptual nature of the U.S. Space Command basing action required the analysis of qualitative factors that relied on a high degree of technical, professional judgment. For example, officials stated that comparing proposed sites for the headquarters building required the professional judgement of engineers, security experts, and budgeting and military construction professionals, among others. However, our AOA best practices explicitly account for the need to develop an AOA team with a variety

of skill sets, specific knowledge, and abilities to successfully execute the study, such as individuals with experience in technology, budget analysis, operations, and any other relevant area of expertise. Moreover, establishing a team with the appropriate level of expertise did not preclude the Air Force from documenting analyses that experts conducted or the basis for applying professional judgement. For example, as previously discussed, the Air Force relied on subject matter experts to develop baseline cost estimates for certain cost elements not included in the Unified Facilities Criteria, such as High Altitude Electromagnetic Pulse shielding. The Air Force could have documented how its subject matter expert developed this baseline estimate, such as by reviewing the costs of installing this kind of shielding at another location or reviewing the costs to purchase required materials.

- Air Force officials told us that life-cycle cost estimates were not needed to inform the U.S. Space Command basing process because such robust cost estimates were not required to conduct a relative comparison between locations. Our best practices state that without a full accounting of all life-cycle costs, decision-makers will have difficulty comparing alternatives because comparisons may not be based on accurate information. For example, we found that Air Force cost estimates did not address relocation costs for civilian personnel currently located at Peterson Air Force Base, a key cost that may have differentiated the six candidate locations in the Selection Phase. Further, the Air Force did not address uncertainties related to cost, either through sensitivity analysis or confidence levels. According to our best practices, life-cycle cost estimates must reflect the degree of uncertainty in order to be credible. A credible cost estimate developed during the basing process would have helped DOD and the Air Force successfully plan program resource requirements and make prudent decisions related to military construction.
- Air Force officials told us that performing an independent review of a process largely directed by the Secretary of Defense would not have been appropriate. Specifically, these officials stated that it would have been inappropriate for the less senior members of the Air Force's Strategic Basing Panel and Strategic Basing Executive Steering Group to review decisions of senior Air Force and DOD officials, particularly the Secretary of Defense. However, one former senior Air Force official stated the oversight bodies would have been helpful in vetting functional requirements to ensure they were accurate and complete, and that senior level reviews of the process did not provide the same level of oversight. Further, DOD officials acknowledged that a different office outside of the Air Force Strategic Basing Office could

have conducted an independent review of the revised basing process for U.S. Space Command. For example, DOD's Office of Cost Assessment and Program Evaluation conducted an independent review of the U.S. Africa Command basing process, issued in 2013.[56]

- Air Force officials stated that some of our best practices were inapplicable because they assume the customer has a fully developed concept prior to beginning the AOA. They specifically cited the best practices *define functional requirements* and *define selection criteria,* which state that agencies should establish functional requirements and criteria prior to the analysis to prevent bias, or the appearance of bias, from entering the process. Air Force officials stated that it was not possible to establish and maintain the same requirements and criteria during the revised process because U.S. Space Command and its organizational structure evolved during the selection process and were not completely defined until after selection of the preferred location. However, multiple best practices take into account that agencies will experience a changing environment and outline ways in which decision-makers can and should anticipate variability, without changing requirements or criteria in the midst of analysis. For example, the best practice *identify significant risks and mitigation strategies* states that all risks should be documented for each alternative along with any overarching or alternative specific mitigation strategies. In addition, the best practices of *include a confidence level or range for life-cycle cost estimates* and *perform sensitivity analysis* state that agencies should identify and address uncertainties that may affect cost estimates. Developing risk and uncertainty analyses would have helped the Air Force assess the impact of new, potential personnel numbers in early January 2021.
- Air Force officials also stated that applying our AOA best practices to all basing decisions would not be practical, given the likely number of personnel and financial resources that would be needed to conduct aspects of the analysis, such as more robust documentation of the process and more detailed cost estimates. However, as we have previously reported, the Air Force could apply our AOA best practices to certain basing decisions, such as by establishing a threshold for the

[56]We previously reported that the extent to which DOD officials considered the independent review by DOD's Office of Cost Assessment and Program Evaluation during the U.S. Africa Command basing process was unclear. In addition, we found that the study was not well-documented, and did not fully explain how the operational benefits of one location weighed against cost saving benefits of another location. See GAO, *Defense Headquarters: DOD Needs to Reassess Options for Permanent Location of U.S. Africa Command*, GAO-13-646 (Washington, D.C.: Sept. 9, 2013).

use of the best practices in basing decisions that require a higher funding level or that involve basing decisions with strategic importance across DOD.[57]

Standards for Internal Control in the Federal Government states that management define objectives in specific terms so they are understood at all levels of the entity.[58] Management should also consider external requirements and internal expectations when defining objectives and, if necessary, revise defined objectives so that they are consistent with these requirements and expectations. In addition, according to the standards, management should periodically review policies, procedures, and related control activities for continued relevance and effectiveness in achieving the entity's objectives or addressing related risks. By developing guidance for future strategic basing decisions that is consistent with our AOA best practices and determining the basing actions to which it should apply, the Air Force would be better positioned to substantiate basing decisions—including those above a certain monetary threshold or those with strategic significance to DOD. Moreover, incorporating AOA best practices into Air Force guidance for certain strategic basing decisions could help prevent bias, or the appearance of bias, from undermining the perceived credibility of future, high-profile basing decisions.

Conclusions

U.S. Space Command's strategic significance underscores the importance of a transparent and deliberate headquarters basing decision. As the 11th unified combatant command, U.S. Space Command is critically important to ensuring the nation's ability to defend its vital interests and maintain its longstanding strategic advantage in space. In order to fulfill this purpose, U.S. Space Command requires a permanent headquarters capable of supporting its unique mission. In March 2020, the then Secretary of Defense directed the Air Force to broaden its initial approach to identifying a preferred location for U.S. Space Command's permanent headquarters, with the aim of being more transparent and inclusive of potential candidates. The resulting process followed selected elements of the Air Force's established basing process—such as developing and weighting evaluation criteria—while also differing in key respects, such as by soliciting location nominations from all 50 states

[57]GAO, *Joint Intelligence Analysis Complex: DOD Partially Used Best Practices for Analyzing Alternatives and Should Do So Fully for Future Military Construction Decisions,* GAO-16-853 (Washington, D.C.: Sept. 30, 2016).

[58]GAO-14-704G.

instead of beginning with a set of candidates based on their ability to meet defined functional requirements.

While the January 2021 selection of Redstone Arsenal as the preferred location for U.S. Space Command headquarters was consistent with the Air Force's analysis, our assessment of the Air Force's revised selection process and attendant analysis against our AOA best practices identified significant shortfalls in its transparency and credibility. By developing guidance for future strategic basing decisions that is consistent with our AOA best practices, and determining the basing actions to which it should apply, the Air Force would be better positioned to substantiate similar basing decisions with key stakeholders. Such decisions could include those that exceed a certain monetary threshold or hold strategic significance to DOD. Moreover, doing so could help prevent bias, or the appearance of bias, from undermining the perceived credibility of future, high-profile strategic basing decisions and better inform Congressional oversight.

Recommendation for Executive Action

The Secretary of the Air Force should ensure the Assistant Secretary of the Air Force for Energy, Installations, and Environment develops guidance for future strategic basing decisions that is consistent with GAO's Analysis of Alternatives (AOA) best practices, and determines the basing actions to which it should apply. (Recommendation 1)

Agency Comments and our Evaluation

We provided a draft of the sensitive report to the Air Force for review and comment. In its written comments, summarized below, and reproduced in their entirety in appendix IV, the Air Force neither agreed nor disagreed with our recommendation. The Air Force also provided technical comments, which we incorporated as appropriate.

In its comments, the Air Force stated that it generally concurred with our findings, and noted that its goal is to conduct a transparent and fair strategic basing process, which consistently provides optimal outcomes for the Air Force and the nation. The Air Force further stated that it is prepared to incorporate elements of our AOA framework into particular basing decisions in the future, where appropriate. While we are encouraged by the Air Force's stated commitment to incorporate elements of the framework into certain basing decisions, it is not clear which elements the Air Force would choose to adopt and which it would decline to implement. As noted in our report, we found that the Air Force's revised process for selecting the preferred location for U.S. Space Command fully or substantially met seven best practices, but did not meet one best practice, and only partially or minimally met thirteen others,

leaving shortfalls in its transparency and credibility. As a result, we continue to believe that developing guidance for future strategic basing decisions that is consistent with our best practices would better position the Air Force to substantiate similar basing decisions with key stakeholders, and help prevent bias, or the appearance of bias, from undermining the credibility of such decisions.

The Air Force also raised questions about the applicability of our AOA framework to the Air Force's established basing process, stating that while the framework is rooted in major defense acquisition programs, the objective of the Air Force's strategic basing process is to provide a relative cost comparison between options, not seek to fix a specific program cost. However, while our AOA best practices may be used for major defense acquisition programs, they are neither fully rooted in such programs nor intended exclusively for major acquisitions.[59] We developed the framework by (1) compiling and reviewing commonly mentioned AOA policies and guidance used by different government and private-sector entities, and (2) incorporating experts' comments on a draft set of practices to develop a final set of practices. We obtained this input from a wide range of public, private, academic, and trade industry representatives. As a result, we maintain that these practices can be applied to a wide range of activities and situations where a preferred alternative must be selected from a set of possible options, as well as to a broad range of capability areas, projects, and programs. Further, as noted in this report, we have applied these best practices to basing decisions in our prior work.[60]

Separately, the Air Force also stated that it complied with federal law and regulations that govern strategic basing decisions, including the National Environmental Policy Act and the White House Council on Environmental Quality regulations. We recognize that the Air Force's process for selecting the preferred location for U.S. Space Command headquarters will need to comply with the National Environmental Policy Act and related laws and regulations, and that according to the Air Force, the environmental analysis is ongoing. As stated in this report, we did not assess the Air Force's process for identifying the preferred location for

[59]GAO-20-195G.

[60]GAO, *Joint Intelligence Analysis Complex: DOD Partially Used Best Practices for Analyzing Alternatives and Should Do So Fully for Future Military Construction Decisions,* GAO-16-853 (Washington, D.C.: Sept. 30, 2016). *Intelligence Community: Analysis of Alternatives Approach for a New Site Reflects Most Characteristics of a High-Quality Process,* GAO-17-643 (Washington, D.C.: July 28, 2017).

U.S. Space Command's headquarters against laws and regulations. Rather, we compared it to the Air Force's established basing process and assessed the revised U.S. Space Command basing process against the best practices in our AOA framework. We neither state nor imply that the Air Force should apply the AOA framework in place of National Environmental Policy Act requirements or associated regulations, or that applying our AOA framework is required by law. Whereas the National Environmental Policy Act and related regulations require federal agencies to conduct environmental evaluations of proposed projects, our best practices are intended to help agencies consistently and reliably select program alternatives that best meet their needs.

The Air Force also stated that it conducted multiple sensitivity analyses on workforce and cost-related criteria throughout its process, and it requested that we adjust our analysis and corresponding assessment of the Air Force's score on the credibility characteristic. Specifically, the Air Force stated that it conducted sensitivity analyses to refine the scoring algorithm for each criterion in the Evaluation Phase, with specific attention on *available qualified workforce, one-time infrastructure costs,* and *proximity to mutually supporting space entities*. The Air Force further stated that sensitivity analyses were used to establish the results format, comparison method, and output validation, and that the process involved iterative adjustment of variables for each of the alternative locations.

We disagree that these steps constitute a sensitivity analysis. Considering different options or formats for comparing alternatives or reporting results is not the same as performing sensitivity analyses focused on changes in key assumptions, as defined in our best practices. For example, a sensitivity analysis could have varied assumptions for the length of road required for road realignment or the number of personnel a building needs to accommodate. Further, as stated in our report, we found that the Air Force did not use its analyses to inform decision-makers about the uncertainties associated with its analysis. We maintain that sensitivity analyses should be conducted on the key assumptions related to each alternative's cost.

We are providing copies of this report to the appropriate congressional committees; the Secretary of Defense; the Secretary of the Air Force; the Secretary of the Army; the Combatant Commander, U.S. Space Command; the Chief of Space Operations, U.S. Space Force; and other interested parties. In addition, this report is available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-2775 or fielde1@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix V.

Elizabeth A. Field
Director, Defense Capabilities and Management

List of Requesters

The Honorable Mike Waltz
Ranking Member
Subcommittee on Readiness
Committee on Armed Services
House of Representatives

The Honorable Michael F. Bennet
United States Senate

The Honorable Dianne Feinstein
United States Senate

The Honorable John Hickenlooper
United States Senate

The Honorable Doug Lamborn
House of Representatives

Appendix I: Objectives, Scope, and Methodology

This report (1) examines how the U.S. Space Command headquarters basing process compared with the established Air Force basing process, and describes the steps the Air Force took to identify a preferred headquarters location; and (2) evaluates the extent to which the Air Force's revised process for determining the preferred U.S. Space Command headquarters location conformed to GAO best practices for analyzing alternatives.[1]

To determine how the U.S. Space Command headquarters basing process compared with the established Air Force basing process, and the steps the Air Force took to identify a preferred headquarters location, we reviewed Air Force basing guidance documents and relevant documentation. Specifically, we reviewed Air Force Policy Directive 10-5 and Air Force Instruction 10-503, *Strategic Basing*, to determine the Air Force strategic basing process that was in place during the time the Air Force conducted the U.S. Space Command basing process.[2] We also reviewed Air Force briefing materials, meeting records, emails, and memorandums related to the initial and revised processes the Air Force used to identify a preferred location for the U.S. Space Command headquarters. Additionally, we reviewed the initial memo from the then President establishing U.S. Space Command, the initial basing action request, and testimony from the then Secretary of Defense before the Senate Armed Services Committee in March 2020.[3] Finally, we compared the process the Air Force used to identify the preferred location for U.S. Space Command headquarters against its established strategic basing process to identify areas of consistency and difference.

To determine the extent to which the Air Force's revised process for determining the preferred U.S. Space Command headquarters location

[1]GAO, *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs,* GAO-20-195G (Washington, D.C.: March 2020).

[2]Air Force Policy Directive 10-5, *Basing* (October 2, 2019); Air Force Instruction 10-503, *Strategic Basing* (July 28, 2017). The Air Force updated this instruction in October 2020. We reviewed both versions, but compared the U.S. Space Command basing process against the 2017 version because it was in effect during the majority of the time the Air Force conducted the basing process for U.S. Space Command. Accordingly, all references in this report to Air Force Instruction 10-503 pertain to the 2017 instruction, unless otherwise specified.

[3]*Hearing to Receive Testimony on the Department of Defense Budget Posture in Review of the Defense Authorization Request for Fiscal Year 2021 and the Future Years Defense Program, Before the S. Comm. on Armed Services,* 116th Cong. 53-56 (2020) (statement of Secretary of Defense Mark Esper).

conformed to best practices for analyzing alternatives, we evaluated the revised process against GAO's best practices for the analysis of alternatives (AOA) process.[4] To do so, we reviewed all data and documentation developed by the Air Force as a part of its revised process for selecting the preferred location for U.S. Space Command headquarters, along with documentation developed by U.S. Space Command in support of that process. For example, we reviewed Air Force briefings, analysis of candidate locations, and cost estimates, as well as U.S. Space Command baseline cost estimates and personnel data. In addition, we discussed the Air Force's revised process with officials from the Air Force Strategic Basing Office and U.S. Space Command in order to understand the context of documentation provided and gather their perspectives on the process. We also discussed the Air Force's revised process with senior Air Force and DOD officials who were involved in the process, including current and former officials, in order to understand the steps senior officials took to direct and support the revised process. Using all available data and documentation from the Air Force and U.S. Space Command, we evaluated the revised process against 21 of GAO's 22 AOA best practices.

First, we scored the revised process against each individual best practice. To do so, two analysts independently scored the revised process against 17 of the 21 best practices using a five-point scoring system.[5] Two AOA specialists reviewed the scores and analyses for these 17 best practices to ensure consistent application of the AOA best practices. After this review, the team adjudicated and reconciled any differences between the independent scores. Specifically, the team came to a consensus score for each best practice, consulting additional participants for any score where it did not initially reach a consensus. Separately, two AOA specialists scored the revised process on the four best practices related to developing high-quality cost estimates—*establish AOA team, develop life-cycle cost estimates, include a confidence level or range for life-cycle cost*

[4]GAO-20-195G.

[5]GAO's best practices define five different qualitative and quantitative categories for scoring. The five-point qualitative system we used is as follows. Fully Met: the Air Force provided complete evidence that satisfies the elements of the best practice; Substantially Met: the Air Force provided evidence that satisfies a large portion of the elements of the best practice; Partially Met: the Air Force provided evidence that satisfies about half of the elements of the best practice; Minimally Met: the Air Force provided evidence that satisfies a small portion of the elements of the best practice; and Did Not Meet: the Air Force provided no evidence that satisfies any of the elements of the best practice. The corresponding quantitative categories are as follows. Not Met = 1, Minimally Met = 2, Partially Met = 3, Substantially Met = 4, and Fully Met = 5.

estimates, and *perform sensitivity analysis*. We determined that one best practice, *include baseline alternative*, was not applicable because there was no existing permanent U.S. Space Command headquarters that could have served as a baseline. As such, the results of the analysis include scores for 21 of the 22 best practices. The team used the average of the scores for each of the individual best practices to determine an overall score for the four summary characteristics for a reliable AOA process—comprehensive, well-documented, credible, and unbiased.

We shared our draft analysis with the Air Force Strategic Basing Office, asking that officials provide technical comments and any additional documentation that might inform our assessment. We then incorporated these additional comments and documentation to ensure our analysis included all available information. Finally, we applied the same methodology and scoring process explained above to revise our initial analysis based on the Air Force's technical comments and any additional evidence received. For those characteristics of the AOA process that received an averaged score lower than substantially met, we discussed with Air Force officials the potential reasons why they did not conform to best practices for those parts of the revised selection process.

Our best practices were not used to determine whether the Air Force made the correct decision on the preferred location for the U.S. Space Command headquarters, or whether the Air Force would have arrived at a different conclusion had it more fully conformed to our best practices. Rather, we used our best practices to assess the degree to which the Air Force can provide reasonable assurance that its process was comprehensive, well-documented, credible, and unbiased—the four characteristics of a high-quality, reliable AOA process. In addition, we evaluated Air Force guidance for basing decisions against *Standards for Internal Control in the Federal Government*.[6] We determined that the risk assessment component of internal control was significant to this objective, along with the underlying principle that management should define objectives clearly to enable the identification of risks and define risk tolerances. Further, we determined that the control activities component of internal control was significant, along with the underlying principle that management should implement control activities through policies.

[6]GAO, *Standards for Internal Control in the Federal Government,* GAO-14-704G (Washington, D.C.: September 2014).

In the course of applying our AOA best practices to information regarding the Air Force revised selection process, we assessed the reasonableness of the information we collected. To do so, we relied on the same methodology used to assess the Air Force revised selection process against 21 of our 22 AOA best practices, as described above. We determined that the information and data we used from the Air Force's revised selection process were sufficiently reliable for the purposes of describing the Air Force's rationale for choosing Redstone Arsenal as the preferred location for the U.S. Space Command headquarters, and for comparing the Air Force's revised selection process to 21 of our 22 best practices for a reliable AOA process.

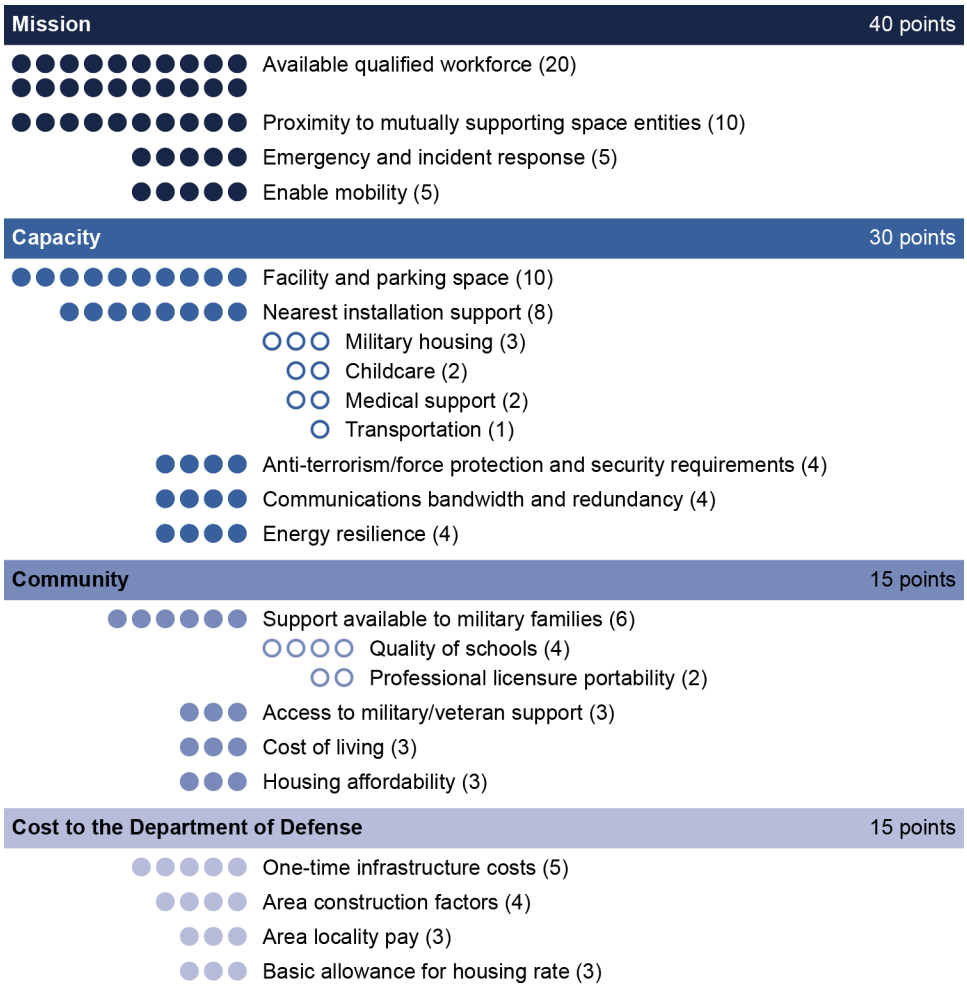
For all objectives, we interviewed or requested information from DOD and military service officials regarding the Air Force's initial and revised processes for identifying a preferred location for U.S. Space Command headquarters, including the overall timeline of events. Specifically, we interviewed or obtained information from current and former Air Force officials, including the former Secretary of the Air Force; the former Assistant Secretary of the Air Force for Installations, Environment and Energy; and officials with the Air Force's Strategic Basing Office. We also interviewed officials with U.S. Space Command, including the Combatant Commander; the Chief of Space Operations for U.S. Space Force; the Headquarters, Department of the Army, Office of the Deputy Chief of Staff G-3/5/7 (Force Management Programs); Army Installations Management Command; and the office of the Assistant Secretary of the Army (Installations, Energy and Environment); DOD's Office of Cost Assessment and Program Evaluation; and the Office of the Assistant Secretary of Defense for Sustainment – Real Property. Additionally, we obtained input from the former Vice Chairman of the Joint Chiefs of Staff.

The performance audit upon which this report is based was conducted from March 2021 to May 2022 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. We subsequently worked with DOD from May 2022 to June 2022 to prepare this public version of the original sensitive report. This public version was also prepared in accordance with these standards.

Appendix II: Evaluation Phase Scoring

From March 2020 until January of 2021, the Air Force executed a three-phased process, at the direction of the then Secretary of Defense, in order to identify the preferred basing location for U.S. Space Command. The Air Force's revised process included soliciting nominations from candidate communities (Nomination Phase), evaluating community submissions to determine the final candidate pool (Evaluation Phase), and selecting a preferred location among the six final candidate locations (Selection Phase). In the Evaluation Phase, the Air Force sent questionnaires to the 50 communities and the military installations that advanced past the Nomination Phase and scored the candidates based on 21 weighted criteria. These 21 criteria were scored and weighted under four evaluation factors—*Mission* (40 points), *Capacity* (30 points), *Community* (15 points), and *Costs to the Department of Defense* (15 points). The breakdown of the criteria within each evaluation factor is depicted in figure 14.

Figure 14: Evaluation Factors and Associated Criteria with Weighting



Source: GAO analysis of Air Force information. | GAO-22-106055

Within each criterion, the Air Force set scoring ranges and scored the final candidate locations, assigning points based on the alignment of candidate attributes therein. For example, the Air Force defined the *enable mobility* criterion based on the distance from the proposed location for U.S. Space Command headquarters to the nearest domestic regional airport and whether the airport operates 24 hours per day. Installations less than or equal to a 30-minute drive to the nearest airport received the highest number of points, whereas installations with longer drives to the nearest airport received fewer points or no points. Candidates could also score higher if the airport operates 24 hours a day. Specific details on

candidate scores were omitted from this report because DOD designated the information as sensitive and privileged.

From December 2018 through mid-January 2020, the Air Force considered six candidates for the preferred location of U.S. Space Command headquarters: Redstone Arsenal, Alabama; Vandenberg Air Force Base, California; Buckley Air Force Base, Colorado; Cheyenne Mountain Air Force Station, Colorado; Peterson Air Force Base, Colorado; and Schriever Air Force Base, Colorado.[1] At the start of the revised process, four of the initial candidates submitted nominations—Redstone Arsenal, Vandenberg Air Force Base, Buckley Air Force Base, and Peterson Air Force Base. According to Air Force officials, Cheyenne Mountain Air Force Station and Schriever Air Force Base decided to join Peterson's nomination given the close proximity of those three installations in Colorado Springs, Colorado. Redstone Arsenal and Peterson Air Force Base advanced to the Selection Phase, while Buckley Air Force Base and Vandenberg Air Force Base did not receive enough points to advance from the Evaluation Phase. Specific details as to how other locations compared to one another and the reasons that two installations did not advance to the Selection Phase were omitted from this report because DOD designated the information as sensitive and privileged.

[1]DOD renamed Vandenberg Air Force Base to Vandenberg Space Force Base on May 14, 2021. DOD renamed Buckley Air Force Base to Buckley Space Force Base on June 4, 2021. DOD renamed Cheyenne Mountain Air Force Station, Peterson Air Force Base, and Schriever Air Force Base to Cheyenne Mountain Space Force Station, Peterson Space Force Base, and Schriever Space Force Base, respectively, on July 26, 2021.

Appendix III: Analysis of U.S. Space Command Revised Basing Process against AOA Best Practices

Table 1 summarizes our analysis of the extent to which the Air Force's revised process for identifying a preferred location for U.S. Space Command headquarters conformed to our 22 Analysis of Alternatives (AOA) best practices.

Table 1: GAO Analysis of the Revised Air Force Process for Selecting a U.S. Space Command Headquarters against 22 Best Practices of a High-Quality, Reliable Analysis of Alternatives (AOA)

AOA best practices, definitions, and associated AOA characteristics[a]	Summary analysis and score[b]
1. **Define Mission Need:** The customer defines the mission need (i.e., a credible gap between current capabilities and those required to meet the goals articulated in the strategic plan) without favoring a predetermined solution. To ensure that the AOA process does not favor one solution over another, the AOA is conducted before the design and development of the required capabilities. The customer decides when in a program's design an AOA should be performed, with the understanding that the more complete the design, the more information is available to support a robust analysis and to select a preferred alternative that best meets the mission need. AOA Characteristic: Comprehensive	The basing action request for the Air Force process stated that U.S. Space Command must permanently establish a headquarters in order to meet its full operational capability requirements, and that U.S. Space Command tasks include, among other things, command and control of global Department of Defense (DOD) space operations and support to other combatant commands. U.S. Space Command officials told us they clearly defined the mission need for a permanent U.S. Space Command headquarters location as a command and control facility to support the combatant commander in wartime missions, and that from the beginning, its mission has stemmed from future, planned responsibilities, as outlined in the Unified Command Plan. The Air Force did not express mission need with the intent to favor the provisional headquarters, Peterson Air Force Base, as a permanent solution over any other location. Score 5 – Fully Met
2. **Define Functional Requirements**: The customer defines functional requirements (i.e., the general parameters that the selected alternative must have in order to address the mission need) based on the mission need without a predetermined solution. The customer defines the capabilities that the AOA process seeks to refine through characterized gaps between capabilities in the current environment and the capabilities required to meet the stated objectives for the future environment. These functional requirements are realistic, organized, clear, prioritized, and traceable. It is advisable that functional requirements be set early in the AOA process, prior to the identification of alternatives, and agreed upon by all stakeholders. AOA Characteristic: Comprehensive	The Air Force established functional requirements to address the mission need for the U.S. Space Command headquarters, but several shifted over time and we found one requirement to be unrealistic. For example, the Air Force changed its functional requirements related to the available qualified workforce and communications infrastructure after the Evaluation Phase based on feedback from U.S. Space Command officials. In addition, we found that the square footage requirements were based on an unrealistic overall number of personnel likely to require space in the headquarters building. Specifically, the Air Force based its required square footage on the number of U.S. Space Command authorized personnel, but did not account for additional personnel to be located at the headquarters, such as representatives from partner organizations. Score 3 – Partially Met

AOA best practices, definitions, and associated AOA characteristics[a]	Summary analysis and score[b]
3. Develop AOA Timeframe: The customer provides the team conducting the analysis enough time to conduct a robust and complete analysis. Since the AOA process requires a large team with diverse resources and expertise, the process needs sufficient time to be accomplished thoroughly. A detailed schedule to conduct the AOA is developed prior to starting the process. The duration of the AOA process depends on the number of viable alternatives and availability of the team members. The timeframe is tailored for the type of system to be analyzed and ensures that there is adequate time to properly accomplish all of the AOA process steps. AOA Characteristic: Comprehensive	The Air Force developed a timeline at the beginning of the revised selection process, followed by an updated timeline several months later. At the beginning of the revised process, the Air Force determined that 1 year was a reasonable timeframe to complete the process. Specifically, in March 2020, the Air Force submitted a timeline for the revised process to the then Secretary of Defense. This timeline projected a completion date of March 2021 for identifying a preferred location. However, on May 20, 2020, the Air Force revised its timeframe to include an earlier completion date in January 2021. Air Force officials stated there were concerns about a potential multi-month delay resulting from a likely change in Air Force leadership. In addition, the January 2021 completion date reflected a need to identify a preferred location without further delays to mitigate any mission impacts, according to Air Force officials. The Air Force responded to the constrained timeline by adding resources to the team to ensure the schedule could be met. Score 4 – Substantially Met
4. Establish AOA team: After the customer establishes the need for the AOA in steps 1 through 3, a diverse AOA team is established to develop the AOA. This team consists of members with a variety of necessary skill sets, specific knowledge, and abilities to successfully execute the study. For example, the AOA team includes individuals with skills and experience in the following areas: program management, federal contracting, cost estimating, risk management, sustainability, scheduling, operations, technology, earned value management, budget analysis, and any other relevant area of expertise. The AOA team can consist of both government and contractor support personnel, and the AOA team lead should be qualified and experienced to lead the AOA. AOA Characteristic: Unbiased	The Air Force selected team members with subject matter expertise from organizations across relevant functional fields. For example, the site visit team included civil engineers, intelligence experts, and construction experts from military, civilian, and contractor positions. Further, individuals from organizations with cost estimation expertise—including the Air Force Installation and Mission Support Center and the Air Force Civil Engineer Center—produced the construction estimates, according to Air Force officials. The Air Force also leveraged U.S. Space Command expertise, where necessary, such as by relying on a U.S. Space Command communications expert to assess each location's communications infrastructure. Score 5 – Fully Met
5. Define selection criteria: The customer, with input as needed from the decision-maker and the AOA team, and prior to the analysis, defines selection criteria based on the mission need. The selection criteria are independent of a particular solution. For example, the selection criteria could consider trade-offs between costs and capabilities, schedule flexibility of the alternatives, analysis of risks for each alternative, and other factors identified by the customer or the AOA team. AOA Characteristic: Credible	The Air Force defined criteria based on mission need. The criteria were also independent of a particular solution, and they considered tradeoffs between mission, capacity, cost, and community support. Specifically, the Air Force identified four factors—*Mission, Capacity, Community/Support,* and *Costs to DOD*—which comprised the 21 criteria assessed in the Evaluation and Selection Phases. The 21 criteria included *proximity to mutually supporting space entities, childcare, housing affordability,* and *one-time infrastructure costs*, among others. U.S. Space Command officials stated that, consistent with the 21 criteria, command priorities for the headquarters included mission success and caring for people while being fiscally responsible. Although U.S. Space Command—in this case the customer—did not itself define the criteria, U.S. Space Command did provide significant input to the Air Force's final selection criteria. Score 4 – Substantially Met

AOA best practices, definitions, and associated AOA characteristics[a]	Summary analysis and score[b]
6. Weight selection criteria: The customer, with input as needed from the decision-maker and the AOA team, decides on the weighting of the selection criteria to reflect the relative importance of each criterion prior to the beginning of the AOA. The rationale for the weighting of the selection criteria should be documented and explained in the AOA report. The AOA team applies the selection criteria during the analysis phase to inform the decision-maker. AOA Characteristic: Unbiased	The Air Force determined the weighting of its evaluation factors and 21 criteria for the Evaluation Phase, with input from its customer—U.S. Space Command—early in the revised process. However, the Air Force did not document the rationale for the weighting of criteria in the Evaluation Phase. In addition, Air Force statements about criteria weighting in Selection Phase analysis and in the selection of the preferred location were not reflected in documentation. Air Force officials stated they did not apply weighting to criteria in the Selection Phase, but instead qualitatively ranked the six final candidate locations into top, middle, and bottom thirds for each of the 21 criteria. However, Air Force documentation states that certain sub-criteria were weighted differently. Further, the Air Force rationale for selecting the preferred location states that the most important criteria used in the selection were two mission-related criteria. However, the locations identified as having advantages in terms of mission were assigned one point—the same number of points assigned to other, lesser weighted categories, including capacity, community support, cost, and impact to full operational capability. As a result, the points assigned to select a preferred location did not reflect the stated weighting across categories. Score 3 – Partially Met
7. Develop AOA process plan: The AOA team creates a process plan, including proposed methodologies for identifying, analyzing, and selecting alternatives prior to beginning the AOA process. This plan establishes the critical questions to be explored, the selection criteria, the basis of estimates, and measures that are used to rate, rank, and decide among the alternatives. Additionally, the plan includes the criteria used to determine each alternative's viability. A road map and standard work breakdown structure are used to compare the alternatives with the baseline and with each other. The AOA process plan is captured in a document that will ultimately be included in the final AOA document described in best practice 18. AOA Characteristic: Unbiased	The Air Force created a process plan with a proposed methodology for identifying, analyzing, and selecting alternatives. However, much of the methodology was determined as the process unfolded, and some aspects of the methodology were not clearly documented. In May 2020, the Air Force established the Nomination Phase screening criteria and Evaluation Phase scoring criteria and weighting. In July 2020, the Air Force established further details of the Evaluation Phase methodology, including research objectives, data sources, and evaluation methods for each of the 21 criteria. In contrast, documentation of the proposed methodology for the Selection Phase did not include the same level of detail as for the previous phases. Air Force officials stated that they did not document the Selection Phase methodology in detail because they instead relied on subject matter experts on site visit teams to conduct a qualitative assessment of the top six locations and share their observations through a site visit report and through verbal discussions with the larger team. Score 3 – Partially Met
8. Develop list of alternatives: The AOA team identifies and considers a diverse range of alternatives to meet the mission need. To fully address the capability gaps between the current environment and the stated objectives for the future environment, market surveillance and market research are performed to develop as many alternative solutions as possible for examination. Alternatives are mutually exclusive, that is, the success of one alternative does not rely upon the success of another. AOA Characteristic: Comprehensive	According to the then Secretary of Defense, one goal of the revised process was to increase transparency by ensuring that all states had a chance to participate so that unconventional, but potentially viable, locations were not overlooked. Accordingly, during the Nomination Phase of the revised process, the Air Force broadly defined minimum criteria that allowed for the identification of 50 locations that advanced to the Evaluation Phase. Evaluation Phase locations spanned 24 states, and included sites on and off military installations. Air Force officials stated that in identifying the list of alternatives, they leveraged research conducted during the initial process, during which they first considered six locations, and then expanded their criteria to ensure consideration of a larger, more varied group of locations. Score 5 – Fully Met

AOA best practices, definitions, and associated AOA characteristics[a]	Summary analysis and score[b]
9. Describe alternatives: The AOA team describes alternatives in sufficient detail to allow for robust analysis. All scopes of identified alternatives are described in terms of functional requirements. This description is documented in enough detail to support the viability, cost, and benefit/effectiveness analyses. AOA Characteristic: Well-documented	We found that the Air Force described locations in sufficient detail to allow for robust analysis in both the Evaluation and Selection Phases. For example, in the Evaluation Phase, communities and military installations described locations in areas relevant to functional requirements by responding to detailed Air Force questionnaires. Selection Phase questionnaires also described locations in terms of functional requirements, such as available qualified workforce. Finally, a site visit report described locations' capacity to meet square footage requirements, and documented communications infrastructure. For some criteria related to quality of life, such as *housing affordability, quality education,* and *professional licensure portability* available for military families, the Air Force included underlying analysis and statistics. Score 5 – Fully Met
10. Include baseline alternative: The AOA team includes one alternative to represent the status quo to provide a basis of comparison among alternatives. It is critical for the AOA team to first understand the status quo, which represents the existing capability's baseline where no action is taken, before comparing alternatives. The baseline is well documented as an alternative in the study and is used to represent the current capabilities and also for explicit comparison later in the study. AOA Characteristic: Credible	At the onset of the revised process, DOD had not established a permanent U.S. Space Command headquarters. U.S. Space Command, as a new combatant command, required a permanent headquarters in order to reach full operational capability, and no permanent headquarters existed. No Score – Not Applicable
11. Assess alternatives' viability: The AOA team screens the list of alternatives to eliminate those alternatives that are not viable, and it documents the reasons for eliminating any alternatives. All alternatives are examined using predetermined qualitative technical and operational factors to determine their viability. Only those alternatives found viable are examined fully during the analysis phase. However, all assumptions regarding the alternatives' viable and nonviable status are fully documented, including reasons why an alternative is not viable, in order to justify the recommendation. Additionally, if program budgets are known, viable alternatives that are not affordable within the projections are dropped from final consideration. AOA Characteristic: Comprehensive	The Air Force screened its list of alternative locations and clearly documented reasons for eliminating each location. In the Nomination Phase, Air Force officials assessed the viability of the locations against three screening criteria, eliminating those locations that did not meet the criteria. In the Evaluation Phase, the Air Force assessed the viability of locations by scoring them against 21 criteria. After reviewing total scores, the Air Force identified and documented a cut line below the top six locations. In the Selection Phase, the Air Force examined only those locations it found viable—locations that scored above the established cut line in the Evaluation Phase. Officials stated that they confirmed the top six locations were viable because site visit teams did not identify any significant challenges, such as significant environmental concerns that would prevent new construction, or insufficient space for the required size of the facility. Score 5 – Fully Met

AOA best practices, definitions, and associated AOA characteristics[a]	Summary analysis and score[b]
12. Identify significant risks and mitigation strategies: The AOA team identifies and documents the significant risks and mitigation strategies for each analyzed alternative. Risks are ranked in terms of significance to the mission need and functional requirements. All risks are documented for each alternative along with any overarching or alternative specific mitigation strategies. Schedule risk, cost risk, technical feasibility, risk of technical obsolescence, dependencies between a new program and other projects or systems, procurement and contract risk, resource risks, and other risks are examined. AOA Characteristic: Well-documented	We found that the Air Force did not document all significant risks and mitigation strategies or assess the impact of risks to the mission need and functional requirements. Specifically, the Air Force did not clearly document and address in its analysis the risk of two issues—the colocation of two combatant commands and delays in reaching full operational capability. However, the Air Force did identify both risks in general terms after completion of Selection Phase analysis when documenting the rationale for selecting Redstone Arsenal as the preferred location. Air Force officials told us that risk assessment was embedded in certain criteria, such as in the *anti-terrorism/force protection and security* criterion in the Selection Phase. However, such risks and related assessments were not documented in relation to the locations or corresponding criteria. Score 2 – Minimally Met
13. Determine and quantify benefits and effectiveness: The AOA team uses a standard process to identify and document the benefits and effectiveness of each analyzed alternative. The AOA team drafts a metric framework that details the methods used to evaluate and quantify the measures of effectiveness and measures of performance for the whole mission need. The AOA team quantifies the benefits and effectiveness of each alternative over the alternative's full life cycle, if possible. Just as costs cover the entire life cycle for each alternative, the benefits and effectiveness measures cover each alternative's life cycle, if possible, in order to determine each alternative's net present value, defined as the discounted value of expected benefits minus the discounted value of expected costs. In cases where the means to monetize a benefit are too vague (for example, intangibles like scientific knowledge), the AOA team treats those benefits as strategic technical benefits and uses scalability assessments to quantify those benefits so that they are compared across all viable alternatives. In situations where benefits cannot be quantified, the AOA team explains why this is the case as part of their analysis and documentation. AOA Characteristic: Unbiased	While it is possible to identify or infer certain benefits for each location and the ways in which each location could be effective as the U.S. Space Command headquarters, the Air Force's method of identifying these benefits was not standardized or well-documented, particularly in the Selection Phase. The Air Force did not use net present value to quantify benefits and effectiveness, but did use a scalability framework to quantify intangible benefits and effectiveness through scoring of criteria in the Evaluation Phase, as allowed for under the best practice. For example, the Air Force assessed Evaluation Phase locations on their available qualified workforces on a 0-20 point scale based on an established definition of relevant professionals across a specific geographic region. In the Selection Phase, the Air Force did not quantify benefits or compare them across all alternatives in a way that makes the analysis traceable and clear. Specifically, the method the Air Force initially used to document benefits and effectiveness in the Selection Phase—a qualitative ranking of the top six locations into top, middle, and bottom thirds—was deemed insufficient by the Air Force, according to a former senior Air Force official. Specifically, this official told us that the Selection Phase rankings did not provide sufficient clarity to effectively communicate the Secretary of the Air Force's rationale for the decision. As a result, the Air Force pivoted to a new method in early January 2021—the decision matrix. However, this new method was neither standardized nor well-documented. The Air Force did make efforts to quantify benefits related to cost in its analysis, but these cost estimates were not reliable. For example, the initial baseline construction analysis that informed the cost estimates provided rough order of magnitude square footage requirements and capabilities. As such, the baseline analysis was associated with a 2 percent confidence level, a number that represents a low level of confidence in the accuracy of the estimate. Score 2 – Minimally Met

AOA best practices, definitions, and associated AOA characteristics[a]	Summary analysis and score[b]
14. Tie benefits/effectiveness to mission need and functional requirements: The AOA team explains and documents how each measure of effectiveness supports the mission need and functional requirements. The AOA team explains how the measures of effectiveness describe the way the current environment is expected to evolve to meet the desired environment; the team also explains how the measures are tied to the specific mission need and functional requirements. This is the hierarchy that connects the overarching requirements to the data that are needed. AOA Characteristic: Well-documented	The Air Force assessed locations using measures of effectiveness connected to the mission need and functional requirements, but the connection was implied rather than clearly documented. An external reviewer can connect most of the criteria in the Evaluation and Selection Phases to a functional requirement through logical reasoning. For example, the *communications bandwidth & redundancy* criterion can be connected to the functional requirement for communications infrastructure. However, Air Force documentation did not document the connection explicitly or establish how sufficient communications, bandwidth and redundancy supports the mission need. Similarly, multiple criteria relate to personnel quality of life issues, such as *medical support, military housing, quality of schools, cost of living,* and *access to military and veteran support*. These criteria can be linked to functional requirements for 1,450 authorized personnel and having an available qualified workforce. However, the connection between quality of life criteria, the personnel and workforce functional requirements, and the mission need was not clearly documented. Score 3 – Partially Met
15. Develop life-cycle cost estimates: The AOA team develops a life-cycle cost estimate for each analyzed alternative, including all costs from inception of the program through design, development, deployment, operation, maintenance, and disposal. The AOA team includes a cost expert who is responsible for development of a comprehensive, well-documented, accurate, and credible cost estimate for each viable alternative in the study. The life-cycle cost estimate for each alternative follows the cost estimating process described in the GAO Cost Estimating and Assessment Guide, as appropriate for an early acquisition cost estimate, and uses a common cost element structure for all alternatives and includes all costs for each alternative. Costs that are the same across the alternatives (for example, training costs) are included so that decision-makers can compare the total cost rather than just the portion of costs that varies across all viable alternatives. The level of detail included in the life-cycle cost estimate should be consistent with the maturity of the alternatives. The AOA team expresses the life-cycle cost estimate in present value terms and explains why it chose the specific discount rate used. The AOA team ensures that economic changes, such as inflation and the discount rate, are properly applied, realistically reflected, and documented in the life-cycle cost estimate for all alternatives. AOA Characteristic: Comprehensive	Although Air Force cost estimates addressed certain costs, such as one-time infrastructure costs, they did not address all costs from inception of the program through operations and maintenance. For example, the cost estimates addressed the cost of utility upgrades and realignment, but not the cost of maintaining facility infrastructure annually. Similarly, the Air Force identified certain costs specific to the U.S. Space Command facility—such as costs for High Altitude Electromagnetic Pulse shielding—but did not identify others, such as costs for needed Sensitive Compartmented Information Facilities, or relocation costs. Further, the costs the Air Force identified were not easily traceable, including because the Air Force did not document how subject matter experts developed baseline estimates for all cost elements. Score 3 – Partially Met

AOA best practices, definitions, and associated AOA characteristics[a]	Summary analysis and score[b]
16. Include a confidence level or range for life-cycle cost estimates: The AOA team presents the life-cycle cost estimate for each alternative with a confidence level or range, and not solely as a point estimate. Having a range of costs around a point estimate is useful because it conveys a level of confidence for each alternative to achieve a most likely cost. To document the level of risk associated with the point estimate for each analyzed alternative, the confidence level is included as part of the life-cycle cost estimate as part of the cost estimating Step 9, risk and uncertainty analysis. Decision-makers must have access to the confidence level associated with the point estimates for all viable alternatives in order to make informed decisions. Additionally, the AOA team uses a consistent method of comparing alternatives in order to present a comparable view of the risk associated with each alternative. For example, the comparison can be based on an established dollar value across alternatives (in order to observe the confidence level for each alternative at that dollar value). Alternatively, the comparison can be based on a predetermined confidence level across alternatives (in order to observe the dollar value associated with that confidence level for each alternative). AOA Characteristic: Credible	Air Force cost estimates for the final six locations did not include confidence levels or ranges. All cost estimates developed in the revised process were point estimates that included one number for each cost element assessed. The Air Force addressed risk for each alternative location by multiplying a baseline number for each cost element by a contingency factor and other scalable multipliers. Other multipliers included a technology factor, historical adjustment, and design complexity contingency. However, there was no analysis assessing the risk of cost increasing or decreasing. Similarly, there was no uncertainty analysis showing the range across which each cost element and the total cost might vary. Score 2 – Minimally Met
17. Perform sensitivity analysis: The AOA team tests and documents the sensitivity of the cost and benefit and effectiveness estimates for each analyzed alternative to risks and changes in key assumptions. Major outcomes and assumptions are varied in order to determine each alternative's sensitivity to changes in key assumptions. This analysis is performed in order to rank the key drivers that could influence the cost and benefit estimates based on how they affect the final results for each alternative. Each alternative includes both a sensitivity analysis and a risk and uncertainty analysis that identifies a range of possible costs based on varying key assumptions, parameters, and data inputs. As explained in best practice 16 (include a confidence level or range for life-cycle cost estimates), life cycle cost estimates are adjusted to account for risk and sensitivity analyses. AOA Characteristic: Credible	The Air Force did not perform a sensitivity analysis to vary key assumptions and examine the alternatives' sensitivity to such changes. There are a variety of site-specific inputs to the cost estimates that could be varied to perform a sensitivity analysis, such as the length of road required for road realignment. However, the Air Force cost estimates considered sensitivity for only one input—the area cost factor, which drives the primary facilities cost.[c] Varying the area cost factor to determine a one-time infrastructure cost for each location does not reflect a sensitivity analysis; instead, changes to key assumptions should include a variety of input changes. For example, Air Force cost estimates included one estimated dollar amount for each line item, such as for road realignment, antiterrorism and force protection improvements, and site improvements. A sensitivity analysis could have varied the assumptions specific to each site, such as including a low, medium, and high estimate for the length of road required for road realignment. Score 1 – Did Not Meet

AOA best practices, definitions, and associated AOA characteristics[a]	Summary analysis and score[b]
18. Document AOA process in a single document: The AOA team documents in a single document all steps taken to initialize, identify, analyze, and select alternatives. This document, which usually is a final report, describes all actions taken for all best practices of the AOA process. For example, the document clearly describes the preferred alternative and provides the detailed rationale for the recommendation based on analytic results. This document also includes, among all other things, the overall selection criteria and rationale for their weighting; the rationale for nonviable or viable ratings for alternatives; a thorough description of alternatives; the ground rules, assumptions, and constraints for each alternative; the risk drivers and mitigation techniques; an analysis of the costs and benefits associated with each alternative; the trade-offs between costs, benefits, and risks; a description of the sensitivity analysis conducted and its results; the final rationale supporting the alternative selected by the AOA team or decision-makers; and the results and recommendations of the final independent review and any other reviews that took place throughout the AOA process. AOA Characteristic: Well-documented	The Air Force partially documented the steps taken to initialize, identify, analyze, and select alternatives across multiple documents, including through formal briefings shared with stakeholders, internal briefings, and internal working documents. Three briefings the Air Force identified as comprehensive summary documents outlined multiple steps taken to initialize, identify, analyze, and select alternatives, but did not cover these steps comprehensively. Additional Air Force documents addressed several of these steps in more detail. For example, each location was thoroughly described in a series of questionnaires that communities and installations filled out during the Evaluation and Selection Phases. However, summary documents did not include thorough descriptions of locations or the underlying analysis used to develop cost estimates for each location. Score 3 – Partially Met
19. Document ground rules, assumptions and constraints: The AOA team documents and justifies all ground rules, assumptions, and constraints used in the AOA process. Assumptions and constraints help to scope the AOA. Ground rules represent a common set of agreed upon standards that provide guidance and minimize conflicts in definitions. Assumptions are explicit statements used to specify precisely the environment to which the analysis applies, while constraints are requirements or other factors that cannot be changed to achieve a more beneficial approach. Ground rules, assumptions and constraints are detailed and justified for each alternative in the AOA plan. AOA Characteristic: Well-documented	It was possible, through reviewing documentation and applying judgment, to identify some factors in the Air Force process that could qualify as ground rules, assumptions, and constraints. However, these were not clearly documented in all cases. For example, then Secretary of Defense Mark Esper established ground rules for the revised process as a whole in a March 2020 hearing before the Senate Armed Services Committee, but Air Force documentation did not clearly outline all ground rules. In addition, the Air Force did not clearly document all key assumptions, such as the assumptions that no civilian personnel would relocate to the permanent location, and that U.S. Space Command would hire civilian personnel from the local community. In addition, although the Air Force documented its initial assumption that all candidate locations would reach full operational capability within 6 years, its documentation of the rationale for selecting Redstone Arsenal as the preferred location included discussion of a different assumption—that Peterson Air Force Base could reach full operational capability within different, though unstated, timeframes. Last, the Air Force documented certain constraints, but not comprehensively. For example, the site visit report did not comprehensively document constraints that might affect the building site, such as whether each location was in or near a floodplain. Score 2 – Minimally Met

AOA best practices, definitions, and associated AOA characteristics[a]	Summary analysis and score[b]
20. Ensure AOA process is impartial: The AOA team conducts the analysis without having a predetermined solution in mind. The AOA process is an unbiased inquiry into the costs, benefits, and capabilities of all alternatives which informs the decision-making process rather than reflecting the validation of a predetermined solution. AOA Characteristic: Unbiased	We found that the Air Force's revised selection process included an assessment of costs, benefits, and capabilities of the final six locations, after which it was determined that Redstone Arsenal was the preferred location. Air Force analysis identified Redstone Arsenal as the highest scoring location in the Evaluation Phase, the highest ranked location in the Selection Phase, and the location with the most advantages in the decision matrix. Air Force officials, including the then Secretary of the Air Force, stated that the decision to identify Redstone Arsenal as the preferred location stemmed from Air Force analysis showing it was the strongest candidate location. In addition, we found that the Air Force took some steps to ensure the revised process assessed candidate locations without a predetermined solution in mind. For example, the Air Force designed evaluation factors to ensure candidate locations received due consideration, and clearly documented analysis in the Nomination and Evaluation Phases. However, we found that the Air Force did not take certain steps to ensure that the decision-making process did not reflect, or appear to reflect, the validation of a predetermined solution. For example, the Air Force did not validate the basing process through the Air Force's Strategic Basing Panel and Strategic Basing Executive Steering Group, as prescribed in its established strategic basing process. In addition, we found that the Air Force did not clearly document how it developed rankings for the final six locations in the Selection Phase. We also found that certain aspects of the Air Force process created the potential for bias during consideration of the costs, benefits, and capabilities of all alternatives. Specifically, senior officials considered a second option at Peterson Air Force Base that was based on unsubstantiated information, which might have affected the extent to which discussion focused on candidate locations ranked higher than Peterson in the Air Force analysis. Multiple officials present at the January 11, 2021, White House meeting told us that discussion focused primarily on Redstone Arsenal and Peterson Air Force Base. It is unclear to what extent senior officials present at the January 11, 2021, meeting considered the costs, benefits and capabilities of the other four Selection Phase locations. Score 3 – Partially Met

AOA best practices, definitions, and associated AOA characteristics[a]	Summary analysis and score[b]
21. Perform independent review: An entity independent of the AOA process reviews the extent to which all best practices are followed. An independent review is one of the most reliable means to validate an AOA process. The AOA process is completed and documented with enough thoroughness to ensure that an independent organization outside of the program's chain of command can review the AOA documentation and clearly understand the process and rationale that led to the selection of the preferred alternative. Part of the documentation includes approval and review from an office outside of the one that asked for or performed the AOA process. Recommendations provided by the review(s) throughout the AOA process should be followed by the AOA team. In the exceptional case that the AOA team does not follow a recommendation, the AOA team documents the reasons why those recommendations were not adopted. For certain projects, in addition to an independent review at the end of the AOA process, additional reviews are necessary at earlier stages of the process. Such reviews may be conducted after key steps are performed in the AOA process, for example the selection of the AOA team (Step 4), the development of the AOA process plan (Step 7), or the identification of viable alternatives (Step 11). While early reviews are not a substitute for the independent review conducted at the end of the AOA process, they help ensure that bias is not added throughout the course of the AOA process. Reviews throughout the AOA process can also keep the customer and the decision-maker informed of the process. Any issues with the AOA work conducted prior to the review can be corrected immediately, if necessary, rather than wait until the independent review at the end and redoing the work then. AOA Characteristic: Credible	Senior DOD and Air Force officials outside of the Air Force Strategic Basing Office conducted reviews of the revised process after key steps, such as criteria development, and the completion of Evaluation Phase results. These reviews were conducted by the then Assistant Secretary of the Air Force for Installations, Environment and Energy; the then Secretary of the Air Force; and the then Secretary of Defense, all of whom are within the chain of command. In addition, as the customer, U.S. Space Command reviewed functional requirements, selection criteria, and weighting at multiple stages, ensuring it had input and awareness of key steps as the revised process progressed, according to U.S. Space Command officials. However, Air Force officials we interviewed confirmed that no entity independent of the AOA team reviewed the revised selection process. Score 2 – Minimally Met

AOA best practices, definitions, and associated AOA characteristics[a]	Summary analysis and score[b]
22. Compare alternatives: The AOA team or the decision-maker compares the alternatives in order to select a preferred alternative that best meets the mission need. This should be done using net present value, if possible. Net present value can be negative if discounted costs are greater than discounted benefits. Net present value is the standard criteria used when deciding whether an alternative can be justified based on economic principles. In some cases, net present value cannot be used, such as when quantifying benefits is not possible. In these cases, the AOA team documents why net present value cannot be used. Furthermore, if net present value is not used to differentiate among alternatives, the AOA team should explain why another method has been applied, describe the other method that is used to differentiate, and ensure that the rationale used to select a preferred alternative is clearly documented so that a reviewer outside of the AOA process will be able to follow the logical reasoning. AOA Characteristic: Unbiased	Air Force officials stated they did not use net present value to compare alternatives; instead, the Air Force scored Evaluation Phase locations on a weighted 100-point scale and qualitatively ranked Selection Phase locations into tiered groupings of top, middle, and bottom thirds. However, the Air Force provided limited documentation of the methods used to qualitatively compare the final six locations in the Selection Phase. Air Force officials told us that they did not document the underlying analysis that led to the tiered rankings. Instead, the Air Force team reviewed data collected during the Evaluation and Selection Phases and came to a consensus on rankings across the 21 criteria during a series of business meetings, according to officials. It is possible to follow the logical reasoning of analysis for certain criteria, such as the *cost of living* criterion, which the Air Force assessed by comparing an average cost of living index for each location. For other criteria, it is not possible for an external reviewer to follow the logical reasoning due to insufficient information. For example, for the *childcare* criterion, the Air Force did not describe in its documentation the method of ranking the three sub-criteria, or the method for combining these to determine an overall ranking for childcare. There is also limited documentation of the rationale for selecting a preferred location from among the final six candidates. For example, the decision matrix and Air Force officials identified stronger long-term benefits as the rationale for selecting Redstone Arsenal. However, the decision matrix does not make clear how the decision-makers weighed these long-term benefits against delays in reaching full operational capability. Score 2 – Minimally Met

Source: GAO analysis of Department of Defense information. I GAO-22-106055

[a]GAO, *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs*, GAO-20-195G (Washington, D.C., March 2020).

[b]GAO-20-195G, We determined the overall assessment rating by assigning each individual best practice rating a number: Not Met = 1, no evidence that satisfies any of the best practice; Minimally Met = 2, evidence that satisfies a small portion of the best practice; Partially Met =3, evidence that satisfies about half of the best practice; Substantially Met = 4, evidence that satisfies a large portion of the best practice; and Fully Met = 5, complete evidence that satisfies the best practice.

[c]The Unified Facilities Criteria defines the area cost factor as a multiplier used to adjust baseline unit costs to account for location-specific costs at the most common locations. For example, the area cost factor accounts for geographical differences in the costs of labor, materials and equipment. For additional context, see DOD, Unified Facilities Criteria 3-701-01, *DOD Facilities Pricing Guide* (Mar. 17, 2022).

Appendix IV: Comments from the Department of Defense

DEPARTMENT OF THE AIR FORCE
WASHINGTON, DC 20330-1665

OFFICE OF THE ASSISTANT SECRETARY

May 12, 2022

Mr. Edwin H. Oshiba
Acting Assistant Secretary of the Air Force
Energy, Installations, & Environment (SAF/IE)
1665 Air Force Pentagon
Washington, DC 20330-1665

Mrs. Elizabeth A. Field
Director, Defense Capabilities Management
U.S. Government Accountability Office
441 G Street, NW
Washington DC 20548

Dear Mrs. Field,

This is the Department of the Air Force (DAF) response to the GAO Draft Report GAO-22-105099SU, "U.S. SPACE COMMAND: Air Force Should Develop Guidance for Strengthening Future Basing Decisions," dated March 23, 2022 (GAO Code 105099).

We want to thank you and your colleagues for the professional manner in which the GAO conducted its review of this complex matter. With several important caveats, we generally concur with the GAO's preliminary findings and appreciate the amount of work that went into your analysis.

We want to emphasize three overarching points:

(1) federal law governs the strategic basing process and the DAF complied with applicable law;

(2) given the GAO's preference for its "Analysis of Alternatives" ("AoA") methodology, the DAF will agree to incorporate elements of this framework into select basing decisions in the future; and

(3) contrary to the suggestion in the GAO's draft report, multiple sensitivity analyses were conducted. We ask that this point, and its impact on the GAO's assessment of "credibility," be corrected.

I. Federal Law Governs the Department's Strategic Basing Process

Strategic basing decisions at the DAF are governed by federal law. In the selection of the preferred alternative for the headquarters of the U.S. Space Command (USSPACECOM), the Department complied with the requirements of federal law contained in the National Environmental Policy Act (NEPA) and the White House Council on Environmental Quality (CEQ) regulations.

II. The DAF Will Agree to Incorporate Elements of the GAO's "Analysis of Alternatives" Methodology into Select Basing Decisions in the Future

Rather than assess the actions of the DAF under applicable federal law, the GAO opted instead to conduct its review by relying on an alternative framework that it prefers called the Analysis of Alternatives ("AoA"). The GAO acknowledges on page 48 of the draft report that the use of its AoA framework is "not required" by federal law or regulation. In 2017, the GAO previously recommended "that DoD develop guidance that requires the use of AoA best practices" but "DoD did not concur with this recommendation."[1]

Our goal at the DAF is to conduct a strategic basing process that is transparent, fair and consistently provides optimal outcomes for the DAF and the nation. As we continually look to bolster and strengthen our processes to meet that objective, we are prepared to incorporate elements of this AoA framework into particular basing decisions in the future where it is appropriate to do so.

We note that the AoA methodology is fundamentally rooted in Major Defense Acquisition Programs. The objective of the DAF strategic basing process is to provide a relative cost comparison between options, but the Department does not seek to fix a specific "program cost." Rather, the goal of the strategic basing process is to determine the best location for a given mission.

III. Contrary to the GAO's Suggestion, Multiple "Sensitivity" Analyses Were Conducted

While acknowledging that the DAF incorporated cost estimates into its analysis, the GAO contends on page 38 of the draft report that the DAF should have run sensitivity analyses to test those estimates under different assumptions: "for example, a sensitivity analysis could have varied assumptions specific to each site, such as including a low, medium and high estimate for the amount of road required for road realignment."

[1] GAO, *Intelligence Community; Analysis of Alternatives Approach for a New Site Reflects Most Characteristics of a High-Quality Process*, GAO-17-643 (Washington, D.C.: Jul. 28, 2017) at page 7.

In fact, the DAF conducted multiple sensitivity analyses on workforce and cost-related criteria at several points in the process. For example, when developing the methodology used in the evaluation phases, sensitivity analyses were used to refine the scoring algorithm for each criteria. Specific attention was directed at the criteria for: Available Qualified Workforce, One-Time Infrastructure Costs and Proximity to Mutually Supporting Space Entities. During the selection phase, sensitivity analyses were used to establish the results format, comparison method and output validation. This process involved iterative adjustment of variables for each of the alternative locations.

We emphasize this point because an artificially low score based on the purported absence of "sensitivity" analyses (1 out of 5) negatively impacted the GAO's preliminary assessment of the "credibility" of the basing process. We respectfully request that the GAO correct this point and its impact on the "credibility" assessment.

Conclusion

The federal requirements of NEPA provide the relevant legal standard for assessing strategic basing decisions. Consistent with federal law, no final basing decision has been made. The next step in the process is for the Department to proceed with an environmental assessment using the best available data which analyzes all six reasonable locations. As part of that process, there will be an opportunity for public review.

Thank you again for the opportunity to provide comment on your draft report. Per your request, we have provided additional technical corrections under separate cover.

Sincerely,

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Date: 2022.05.12 21:58:28 -04'00'

EDWIN H. OSHIBA, SES, DAF
Acting Assistant Secretary of the Air Force
Energy, Installations and Environment (SAF/IE)

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact:

Elizabeth A. Field, (202) 512-2775 or fielde1@gao.gov.

Staff Acknowledgments:

In addition to the contact named above, Ryan D'Amore (Assistant Director), Matthew Spiers (Analyst-in-Charge), Miranda Cohen, Pedro Almoguera, Jennifer Echard, Christopher Gezon, Anna Irvine, Jennie Leotta, Clarice Ransom, Michael Shaughnessy, Michael Silver, and Carter Stevens made key contributions to this report.