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April 2019

MILITARY DEPOTS

Actions Needed to Improve Poor Conditions of Facilities and Equipment that Affect Maintenance Timeliness and Efficiency

Accessible Version

GAO-19-242

GAO Highlights

Highlights of GAO-19-242, a report to the Committee on Armed Services, U.S. Senate

April 2019

MILITARY DEPOTS

Actions Needed to Improve Poor Conditions of Facilities and Equipment That Affect Maintenance Timeliness and Efficiency

Why GAO Did This Study

The military services' 21 depots maintain the readiness of critical weapon systems such as ships, aircraft, and tanks needed for military operations. The condition of depot facilities and equipment directly affects the timeliness of maintenance and the readiness of the weapon systems they repair. The services have invested over $13 billion in the depots from fiscal year 2007 to fiscal year 2017.

Senate Report 115-125 included a provision for GAO to examine the services' investment in and performance of their depots. GAO evaluated (1) the condition of depot facilities and equipment, their relationship to depot performance, and the services' tracking of the relationship to depot performance and (2) the extent to which DOD and the services have developed an approach for guiding depot investments to address key challenges. GAO also provides an overview summary for each depot. GAO reviewed data from fiscal years 2007 through 2017 on depot investment, performance, and the age and condition of facilities and equipment; reviewed agency guidance; and interviewed DOD, service, and depot officials.

What GAO Recommends

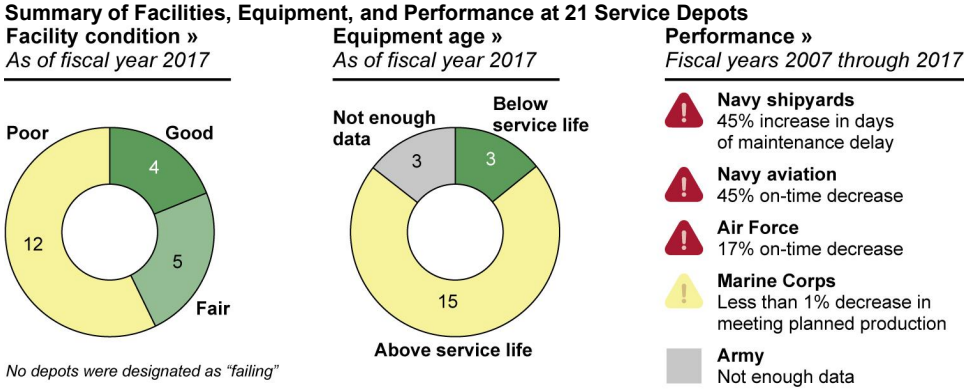
GAO is making 13 recommendations to improve data collection on the effect of facilities and equipment condition on depot performance, and develop plans that incorporate key elements to guide depot investments. DOD concurred with 12 recommendations, but did not agree to monitor and report on depot investments. We continue to believe monitoring and reporting will enhance DOD's efforts to improve its depots.

View GAO-19-242. For more information, contact Diana Maurer at (202) 512-9627 or maurerd@gao.gov.

What GAO Found

The condition of facilities at a majority of the Department of Defense's (DOD) depots is poor and the age of equipment is generally past its useful life, but the services do not consistently track the effect that these conditions have on depot performance. Twelve of the 21 depots GAO reviewed—more than half—had "poor" average facility condition ratings (see figure). Some facilities also serve functions for which they were not designed, reducing their efficiency. In addition, the average age of depot equipment exceeded its expected useful life at 15 of the 21 depots. These factors contributed, in part, to a decline in performance over the same period. From 2007 to 2017, performance at the depots generally declined, reducing the availability of the weapon systems repaired for training and operations. Optimizing facilities and equipment at the depots can improve their maintenance efficiency. For example, the Navy estimates that its shipyard optimization effort will save over 325,000 labor days per year, which would allow an additional submarine overhaul annually. However, the services lack data on the effect that facilities and equipment conditions have on maintenance delays, hindering DOD's ability to effectively target investments to the highest priorities.

Summary of Facilities, Equipment, and Performance at 21 Service Depots



Source: GAO analysis of service depot data. | GAO-19-242

DOD and the services' approach for managing investments to improve the efficiency and effectiveness of its depots lacks elements important to addressing key challenges. The services have efforts underway to complete their plans by February 2019 to address their depots' facility and equipment needs. However, GAO found that these plans are preliminary and will not include key elements, such as analytically-based goals; results-oriented metrics; a full accounting of the resources, risks, and stakeholders; and a process for reporting on progress. Addressing the poor conditions at DOD's 21 depots will cost billions and require sustained management attention over many years. However, the DOD office responsible for depot policy does not monitor or regularly report on depot improvement efforts to DOD decision makers and Congress. Until DOD and the services incorporate these key elements into the management approach for their depot investments, they risk continued deterioration of the depots, hindering their ability to meet the Secretary of Defense's goals for improving readiness and reducing operating and support costs.

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Abbreviations

ASD	Assistant Secretary of Defense
DOD	Department of Defense
FRC	Fleet Readiness Center
ALC	Air Logistics Complex
DLA	Defense Logistics Agency

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U.S. GOVERNMENT ACCOUNTABILITY OFFICE
441 G St. N.W.
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April 29, 2019

The Honorable James M. Inhofe
Chairman
The Honorable Jack Reed
Ranking Member
Committee on Armed Services
United States Senate

The Department of Defense (DOD) operates public industrial installations that maintain, overhaul, and repair its multitude of complex weapon systems and equipment. This mix of weapon systems and their maintenance needs is continually changing as new weapon systems replace older ones and systems in the field are modified with newer and better technologies. To maintain these systems and equipment, DOD uses a combination of private-sector contractors and public industrial installations that are government-owned and government-operated. These public industrial installations, known as depots, employ over 80,000 civilians, and are crucial to maintaining military readiness by ensuring that the services can regularly repair critical weapon systems and return them to the warfighter for their use in training and operations.[1] DOD annually requests appropriations from Congress for investment in these depots and, from fiscal year 2007 to fiscal year 2017, the Army, Navy, Air Force, and Marine Corps have collectively invested over $13 billion in their depots.[2]

In fiscal year 2007, Congress enacted a law requiring each military department to invest in the capital budgets of its depots no less than 6 percent of the average total dollar value of the combined maintenance, repair, and overhaul workload to its depots for the preceding 3 fiscal years.[3] In this report, we refer to the 6 percent minimum investment requirement as the "6 percent rule." The capital budget of a depot

[1]The term "depots" will refer to all 21 installations reviewed in this report, including the Army's depots and arsenals, the Navy's shipyards and fleet readiness centers (FRCs), the Air Force's air logistics complexes (ALCs), and the Marine Corps' production plants.

[2]The services have invested $13 billion in non-inflation adjusted dollars.

[3]*John Warner National Defense Authorization Act for Fiscal Year 2007*, Pub. L. No.109-364, § 332 (2006), *codified at* 10 U.S.C. § 2476.

includes funds to modernize or improve the efficiency of depot facilities, equipment, work environment, or processes in direct support of depot operations.[4] The law prohibits using funds spent for sustainment of existing facilities, infrastructure, or equipment towards meeting the 6 percent investment minimum.

Recognizing that existing depot facilities may not be ideally configured to efficiently and effectively support the services' readiness needs, Senate Report 115-262, accompanying a proposed bill for the National Defense Authorization Act for Fiscal Year 2019, included a provision directing the Secretaries of the Army, Navy and Air Force to submit an engineering master plan for optimal placement and consolidation of facilities and major equipment, as well as an investment strategy addressing the facilities, major equipment and infrastructure requirements of depots under the jurisdiction of each service.[5]

Senate Report 115-125, accompanying a proposed bill for the National Defense Authorization Act for Fiscal Year 2018, included a provision for us to examine the investment in and performance of the service depots. The objectives of this report are to evaluate: 1) the condition of depot facilities and equipment, their relationship to depot performance, and the services' tracking of the relationship to depot performance; and 2) the extent to which DOD and the services have developed an approach for guiding depot investments to address key challenges. In appendix I, we report that the services generally met their minimum depot investments under the 6 percent rule and whether they have included funds spent for sustainment of existing facilities, infrastructure, or equipment towards meeting their 6 percent requirement. Additionally, in appendixes II–XXII we provide summary overviews of each depot's performance, and the condition of their facilities and equipment. We have also provided DOD's comments in appendix XXIV.

[4]Capital budget is defined at 10 U.S.C. § 2476(b).

[5]Throughout this report, we refer to these plans as "optimization plans."

For our first objective, we analyzed service reports and performance metrics for the 21 depots from fiscal year 2007 through fiscal year 2017.[6] These metrics included facility condition ratings, facility age, facility restoration and modernization backlogs, number of facility repairs, equipment age, number of equipment repairs, and a number of depot performance metrics relating to timeliness of repairs. We also reviewed DOD and service guidance and interviewed service depot, sustainment, and budget officials to obtain an understanding of how they manage the depot investment process and identify funds spent for sustainment of existing facilities, infrastructure, or equipment. We also evaluated data on maintenance delays, including the extent to which this data identifies facilities and equipment conditions at the depots as a cause of delays. In addition, we spoke with service officials about maintenance delays and the ability of the services to collect this data.

For our second objective, we reviewed depot metrics and discussed with officials any challenges to meeting service operational needs, and analyzed service investment plans and processes to assess their use of results-oriented management elements.[7] This review included visits to three of the 21 depots (selected by resources and availability), the service materiel commands, and the Office of the Deputy Assistant Secretary of Defense for Materiel Readiness.

To determine whether the military departments are complying with the requirements of the 6 percent rule, we reviewed service reports on compliance and validated compliance through assessments of the reliability of the service data. To determine whether the funds identified

[6]Fiscal year 2007 was the first year that statutorily required summary reports on the level of investment made by each military department became available. The reports contain information regarding any impediments to achieving 6 percent investment; a description of benchmarks and measurement methods for investment at each depot; and an explanation and action plan if the 6 percent requirement was not achieved. Fiscal year 2017 is the latest year these reports are available.

[7]Our previous work has identified the following as elements of a results-oriented management approach: (1) mission statement; (2) problem definition, scope and methodology; (3) goals, objectives, activities, milestones, and performance measures; (4) resources and investments; (5) organizational roles, responsibilities, and coordination; (6) key external factors that could affect achievement of the goal; (7) demonstrating management commitment; (8) communicating performance information frequently and effectively; (9) aligning goals, objectives, and measures; and (10) developing the capacity to use performance information. For the purposes of this report, we have accounted for the overlapping nature of these 10 elements by summarizing them into six key elements relevant here.

for capital budget activities by the military departments included funds spent on sustainment of existing facilities, infrastructure, or equipment, we reviewed project investment lists to identify projects with potential for including sustainment activities and reviewed approved project proposals to identify any sustainment funds included. This list was verified by the sustainment officials as sustainment or non-sustainment. A detailed discussion of our scope and methodology is in appendix XXIII.

To assess the reliability of the data used in this report, we reviewed systems documentation and interviewed officials to understand system operating procedures, organizational roles and responsibilities, and error checking mechanisms. We also conducted our own error checks to look for inaccurate or questionable data and discussed with officials any data irregularities we found. We conducted these assessments on 13 systems, which are further discussed in appendix XXIII. We found the data that we used from these systems to be sufficiently reliable for the purposes of summarizing trends in the selected facility, equipment, and performance metrics reported.

We conducted this performance audit from August 2017 to April 2019 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.

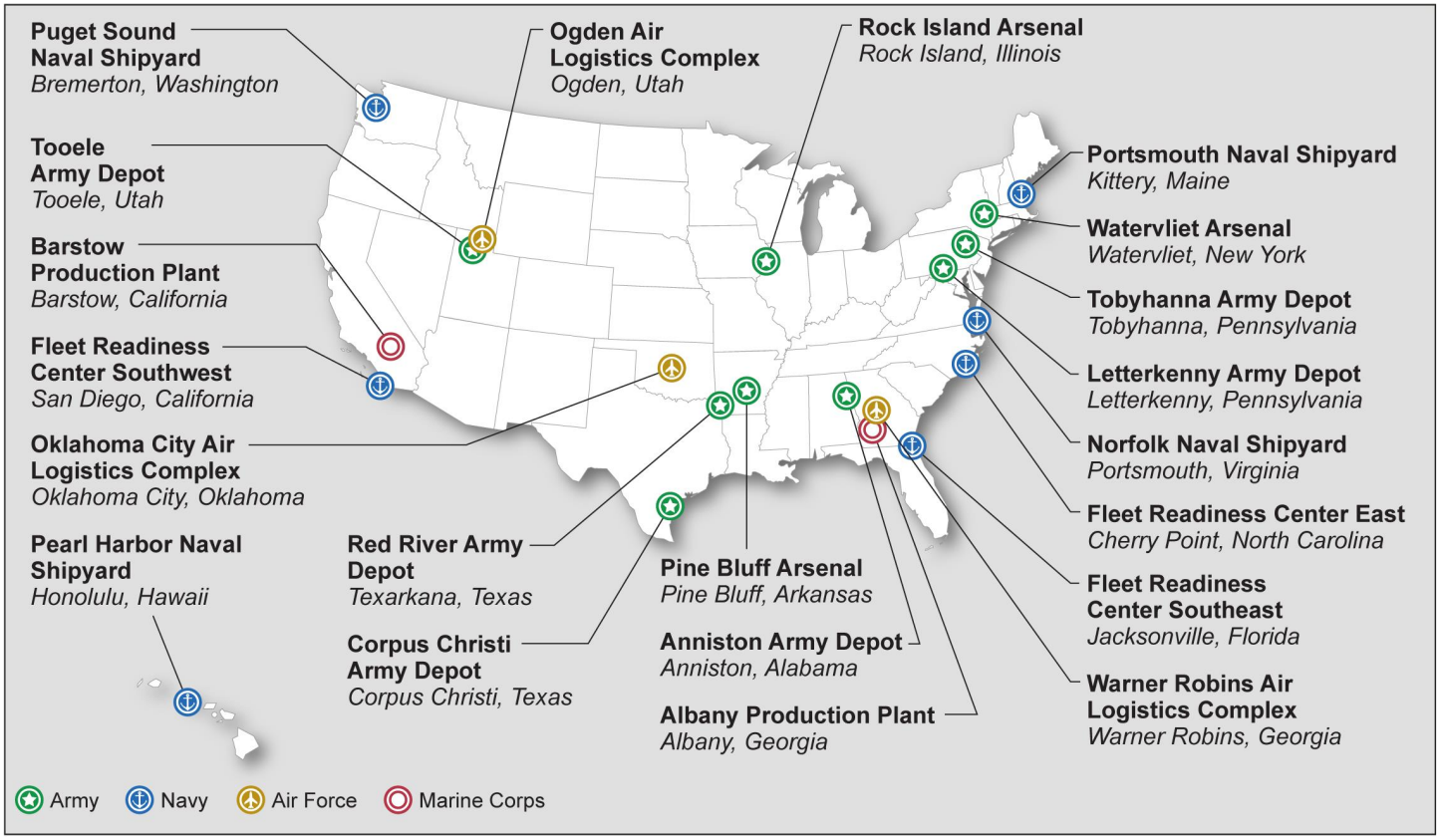
Background

Depots and Related Organizations

Depots are government-owned, government-operated industrial installations that maintain, overhaul, and repair a multitude of complex military weapons systems and equipment for the Department of Defense. These depots are essential to maintaining readiness for DOD, and they have a key role in sustaining weapon systems and equipment in both peacetime and during mobilization, contingency, or other emergency. There are 21 depots operated by the military services that are subject to the 6 percent minimum investment requirement (the “6 percent rule”)—four are Naval Shipyards, three are Navy Fleet Readiness Centers, two are Marine Corps Production Plants, three are Air Force Air

Logistics Complexes, and nine are Army Depots and Arsenals.[8] Figure 1 shows the location of these 21 depots across the United States.

Figure 1: Service Depots Covered under Title 10 U.S.C. §2476 (the "6 percent rule")



Source: GAO analysis of Department of Defense documents. | GAO-19-242

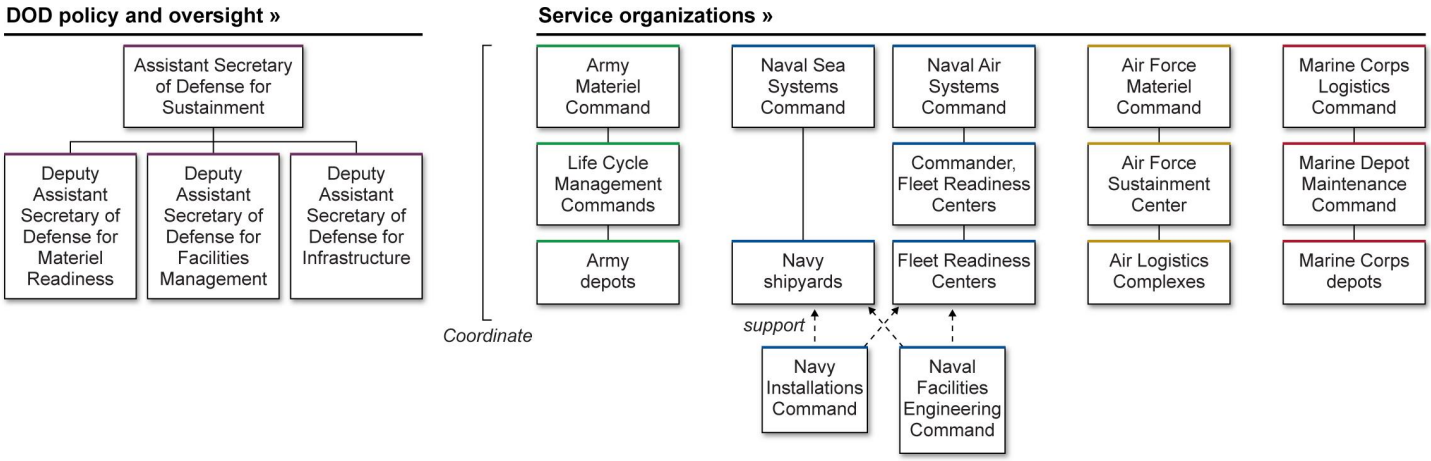
Note: In fiscal year 2007, Congress enacted a law requiring each military department to invest in the capital budgets of its depots no less than 6 percent of the average total dollar value of the combined maintenance, repair, and overhaul workload to its depots for the preceding 3 fiscal years. In this report, we refer to the 6 percent minimum investment requirement as the "6 percent rule."

The depots are part of a larger, DOD-wide logistics enterprise that involves a number of different organizations. The Office of the Under Secretary of Defense for Acquisition and Sustainment is responsible for establishing policies for access to, and maintenance of, the defense industrial base, including depots. Specifically, the office is tasked with establishing policies and procedures for the management of DOD

[8]The Navy's Fleet Readiness Centers are primarily focused on aviation-related repairs.

installations and environment to support military readiness with regard to facility construction, sustainment, and modernization. The Assistant Secretary of Defense for Sustainment serves as the principal assistant and advisor to the Under Secretary of Defense for Acquisition and Sustainment on material readiness. Among other responsibilities, the Assistant Secretary of Defense for Sustainment prescribes policies and procedures on maintenance, materiel readiness and sustainment support. DOD officials report that the Office of the Deputy Assistant Secretary of Defense for Materiel Readiness is responsible for maintenance policy along with the development of a strategic vision for DOD's organic depot base. Finally, each service has its own logistics or materiel command component, which provides day-to-day management and oversight of the services' depots (see fig. 2). In addition, service support commands such as Naval Facilities Engineering Command can provide expertise in project design or facility management.

Figure 2: Military Depots and Supporting Organizations



Source: GAO analysis of Department of Defense (DOD) and service documentation. | GAO-19-242

Depot Maintenance Process and the Effects of Maintenance Delays on Readiness and Costs

Depot maintenance across the services generally involves three primary steps: planning, disassembly, and rebuilding. During each step, the depots rely on their facilities and equipment to ensure that they can conduct the large number of activities needed to repair DOD's complex weapon systems and return them to the warfighter to be used during training and operations. Repair duration for each system varies according

to the complexity of the repair and the type of use the system has experienced since the last overhaul. Because repair times vary, demands on depot facilities and equipment also vary.

Delays in depot maintenance can directly affect the services' readiness by hindering their ability to conduct training and operations using these weapon systems. For example:

- We reported in May 2016 that the Navy's implementation of sustainable operational schedules—and readiness recovery more broadly—is premised on adherence to deployment, training, and maintenance schedules. However, we found that the Navy was having difficulty implementing its new schedule as intended, in part because public shipyards were challenged to complete maintenance on time.[9] Specifically, we reported in December 2018 that in fiscal years 2012 through 2018, maintenance overruns on aircraft carrier repairs resulted in a total of 1,207 days of maintenance delay—days that ships were not available for operations—the equivalent of losing the use of 0.5 aircraft carriers each year.[10] Similarly, in fiscal years 2012 through 2018, maintenance overruns on submarine repairs resulted in a total of 7,321 days of maintenance delay—the equivalent of losing the use of almost three submarines each year.
- We found in September 2018 that depot maintenance delays, among other challenges, limit the Navy, Air Force, and Marine Corps' ability to keep aviation units ready by reducing the number of aircraft that are available to squadrons for conducting full spectrum training.[11]
- We reported in June 2018 that the Army's depots, which conduct reset and recapitalization to extend the life of the Patriot surface-to-air missile system, have often returned equipment to Patriot units late,

[9]GAO, *Military Readiness: Progress and Challenges in Implementing the Navy's Optimized Fleet Response Plan.* GAO-16-466R (Washington, D.C.: May 2, 2016). For other GAO work in this area, please see the Related GAO Products section at the end of this report.

[10]GAO, *Navy and Marine Corps: Rebuilding Ship, Submarine, and Aviation Readiness Will Require Time and Sustained Management Attention*, GAO-19-225T (Washington, D.C.: Dec. 12, 2018). This does not mean that the Navy is missing presence in a given area, because the Navy has other options to mitigate maintenance delays—such as extending another ship's deployment.

[11]GAO, *Weapon System Sustainment: Selected Air Force and Navy Aircraft Generally Have Not Met Availability Goals, and DOD and Navy Guidance Need to Be Clarified*, GAO-18-678 (Washington, D.C.: Sept. 10, 2018).

which has affected unit training. Specifically, we found that of the seven Patriot battalions that underwent reset from fiscal years 2014 through 2017, only one received its equipment within 180 days in accordance with Army policy.[12]

Depot maintenance delays also cause the services to incur costs for which they receive no capability. For example, we reported in November 2018 that the Navy is incurring significant costs associated with maintenance delays on attack submarines. We estimated that from fiscal years 2008 to 2018, the Navy had spent more than $1.5 billion—in fiscal year 2018 constant dollars—to crew, maintain, and support attack submarines that provided no operational capability. This was a result of the submarines sitting idle and unable to conduct normal operations while waiting to enter the shipyards, and from being delayed in completing their maintenance at the shipyard.[13]

Depot Facilities and Equipment Are Key to Efficient and Effective Depot Maintenance

Our previous work has identified multiple factors that can affect depot performance, including the size and skill of the depot workforce, the condition of weapon systems upon arrival at the depot, the availability of spare parts, and the condition of the depot's facilities and equipment, among others (see fig. 3).[14] In addition, all of these factors can be

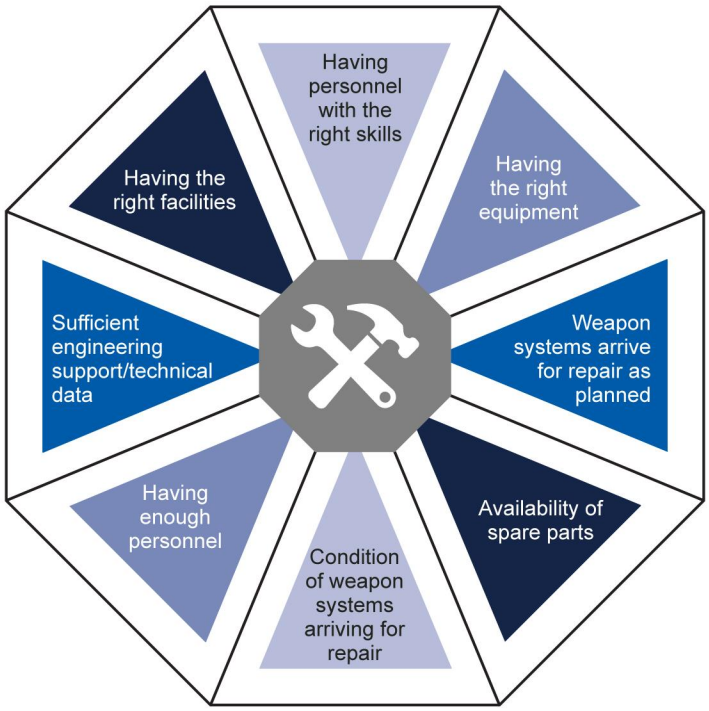
[12]GAO, *Military Readiness: Analysis of Maintenance Delays Needed to Improve Availability of Patriot Equipment for Training*, GAO-18-447 (Washington, D.C.: June 20, 2018).

[13] GAO, *Navy Readiness: Actions Needed to Address Costly Maintenance Delays Facing the Attack Submarine Fleet*, GAO-19-229 (Washington, D.C.: Nov. 19, 2018).

[14]*See* GAO, *DOD Depot Workforce: Services Need to Assess the Effectiveness of Their Initiatives to Maintain Critical Skills*, GAO-19-51 (Washington, D.C.: Dec. 14, 2018); *Military Readiness: Analysis of Maintenance Delays Needed to Improve Availability of Patriot Equipment for Training*, GAO-18-447 (Washington, D.C.: June 20, 2018); *Weapon System Sustainment: Selected Air Force and Navy Aircraft Generally Have Not Met Availability Goals, and DOD and Navy Guidance Need To be Clarified*, GAO-18-678 (Washington, D.C.: Sept. 10, 2018); *F-35 Aircraft Sustainment: DOD Needs to Address Challenges Affecting Readiness and Cost Transparency*, GAO-18-75 (Washington, D.C.: Oct., 26, 2017); *Naval Shipyards: Actions Needed to Improve Poor Conditions that Affect Operations*, GAO-17-548 (Washington, D.C.: Sept. 12, 2017); *Military Readiness: Progress and Challenges in Implementing the Navy's Optimized Fleet Response Plan*, GAO-16-466R (Washington, D.C.: May 2, 2016); *Defense Inventory: Actions Needed to Improve the Defense Logistics Agency's Inventory Management*, GAO-14-495 (Washington, D.C.: June 19, 2014).

affected by funding and operational considerations (such as unexpected accidents). DOD officials have stated that disruptions to funding, to include continuing resolutions, affect the ability to conduct depot maintenance.

Figure 3: Factors Affecting Depot Performance



Source: GAO. | GAO-19-242

Depots rely on working and efficient facilities and equipment to complete repairs and overhauls, and DOD maintenance officials have stated that any underlying conditions – such as leaks, lack of capacity, inefficient layouts, and breakdowns – require workarounds. Facilities are defined as any building, structure, or linear structure (such as a fence or railway). Equipment includes all nonexpendable items needed to outfit or equip an organization; for the depots, that includes items used by depot personnel to conduct depot-level maintenance, such as tools, test equipment, machining equipment, and test stands. We have previously noted that workarounds are additional efforts to complete the task that can delay maintenance, negatively affect productivity, and increase costs of depot maintenance. Functioning depot facilities and equipment are essential to a number of depot processes, as shown in figure 4.

Figure 4: Examples of Depot Facilities and Equipment Support of Maintenance Activity

A drydock allows maintainers to work on the hull of a submarine.

A specialized paint facility allows for temperature and humidity control during the painting process.

A facility can support the power needs of specialized tools.

Facilities

Equipment

X-ray machines can allow non-destructive tests of weapon systems to determine what kinds of repairs are needed.

Industrial equipment allows maintainers to fabricate parts or perform metalworking.

Test stands allow maintainers to conduct repairs more safely and effectively.

Source: GAO site visits and interviews with service officials; U.S. Navy and Defense Visual Information Distribution Service (photos). | GAO-19-242

These facilities and equipment often require significant investment to plan, construct, install, repair, and modernize. For example, new DOD depot facilities can cost millions of dollars and are generally expected to last around 67 years, though facilities can, through restoration and modernization efforts, operate significantly longer. Equipment generally lasts for a shorter length of time, though equipment used in production can be expected to last 10 years or more and can be costly. Because these facility and equipment investments can take years to plan and require significant resources, a depot's decision to invest must often take place well in advance of the specific need the facility or equipment is intended to serve. Other factors that the depots consider when planning

investments include topography, flood plains, environmental and historic preservation needs, roads and parking, utilities, and the effect on continuing depot operations. This makes careful planning and management of these investments essential to ensuring that critical capabilities are not neglected.

In fiscal year 2007, Congress enacted the 6 percent rule, requiring each military department to invest in the capital budgets of its depots no less than 6 percent of the average total dollar value of the combined maintenance, repair, and overhaul workload funded at all the depots of that department over the preceding 3 fiscal years.[15] The departments generally met the minimum investment requirement from fiscal year 2007 through fiscal year 2017, as we discuss in more detail in appendix I.

[15]*John Warner National Defense Authorization Act for Fiscal Year 2007*, Pub. L. No. 109-364, § 332 (2006), *codified at* 10 U.S.C. § 2476.

Poor Condition of Facilities and Equipment Hinders Depot Performance, but the Services Do Not Consistently Track These Effects

Our analysis of service metrics shows that depot facilities are, on average, rated as "poor" on DOD's facility rating scale, and the age of equipment at the depots generally exceeds its expected useful life. Meanwhile, performance at the service depots has generally declined since fiscal year 2007. Our previous work has shown that facility and equipment condition can affect depot performance. However, the military services do not consistently track the extent to which the condition of facilities and equipment affect depot performance.

Majority of Depot Facilities Are in Poor Condition and Equipment Generally Exceeds Its Expected Useful Life

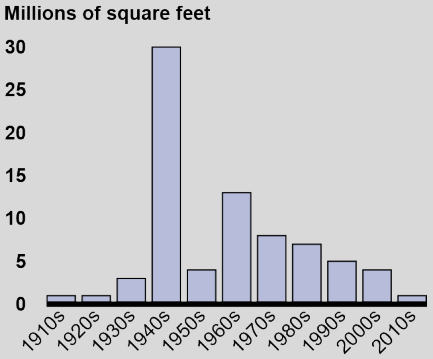
Depot Facilities

The physical condition of facilities at a majority of the military depots is poor and has been trending downward, according to facility data collected from fiscal year 2013 through fiscal year 2017. The services assess major components of a facility—such as the electrical and plumbing systems and use these assessments to develop a condition rating that summarizes the overall health of the facility.[16] In turn, these condition ratings help service officials plan investment strategies and prioritize depot projects. The condition rating does not necessarily correlate with the age of the facility (see sidebar); a relatively new facility might have a poor condition rating if it has been damaged, for example, and an old

[16]A facility's condition rating indicates the physical condition of the facility with a rating from 0 to 100, in which 0 denotes that the facility's physical condition is failing and 100 denotes that the facility is in good physical condition. Facilities with a rating between 60 and 79 are considered "poor," while those with a rating below 60 are considered "failing." The military departments are required to review each real property asset every 5 years. In September 2013, DOD components were required to adopt a standardized process for facility condition assessments to ensure consistent and reliable data. Facility condition indexes were to be recorded using the standardized process within 5 years of the date of the updated policy, which was September 2018. *See* Undersecretary of Defense for Acquisition, Technology, and Logistics Memorandum, *Standardizing Facility Condition Assessments* (Sept. 10, 2013).

Navy Aviation Depots Rely on Many Facilities from World War II Era

While service officials do not consider the age of a facility to be an ideal indicator of its overall health – since the services regularly restore and modernize older facilities rather than build new ones – the age of facilities can still offer insight into some of the depots' challenges. For example, over 30 million square feet at the Navy aviation depots was built during the 1940's – more than one-third of its existing space.



Source: GAO analysis of Navy data. | GAO-19-242

Officials note that older facilities can face additional challenges, such as electrical systems built for different weapon systems, historical preservation requirements, and suboptimal layouts. It can be difficult for a depot to maintain complex, modern weapon systems, such as the F/A-18, with facilities that were designed for less complex systems.

Source: Fleet Readinesss Center – Southwest. | GAO-19-242

Source: GAO analysis of Navy data. I GAO-19-242

facility that has recently been modernized might have a high condition rating.

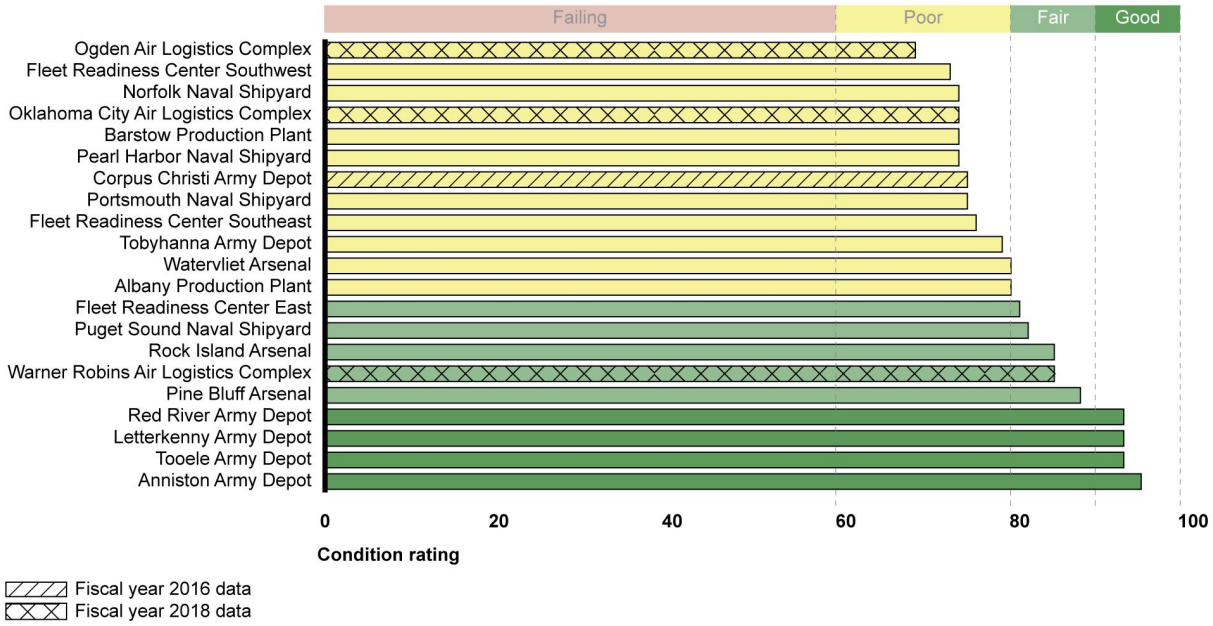
Our analysis of fiscal year 2017 depot facilities data found that the average weighted condition rating at a majority of the 21 service depots is poor.[17] Specifically, 12 of the 21 depots–more than half–have average condition ratings that are below 80, indicating that they are in "poor" condition (see fig. 5).[18] Of the remaining depots, five had an average rating in the "fair" category, and four had an average rating in the "good" category.[19]

[17]For this analysis, we weighted the condition ratings by the replacement cost of the facility, also known as the plant replacement value. This is to ensure that costlier facilities are weighted more heavily in the condition ratings, so that, for example, an expensive shop plant is weighted as more important than an inexpensive guard shack. For facility condition data on specific depots, including available trends, please see appendixes II through XXII.

[18]The Undersecretary of Defense for Acquisition, Technology, and Logistics set a goal in 2014 for each component to have an inventory-wide facility rating of 80 by fiscal year 2016. However, this goal means that a component can meet the target if some facilities are below 80 as long as enough facilities are rated higher to balance those out. Since this review only looked at depot facilities and not any additional service facilities, we cannot state whether the services are or are not meeting this goal.

[19]Four depots were unable to provide condition ratings for FY 2017. However, they were able to provide fiscal year 2016 and fiscal year 2018 data, respectively, which generally show their average ratings also in the poor category.

Figure 5: Average Weighted Facility Condition Ratings at the 21 Military Depots, Fiscal Year 2017



Source: GAO analysis of service facility condition data. | GAO-19-242

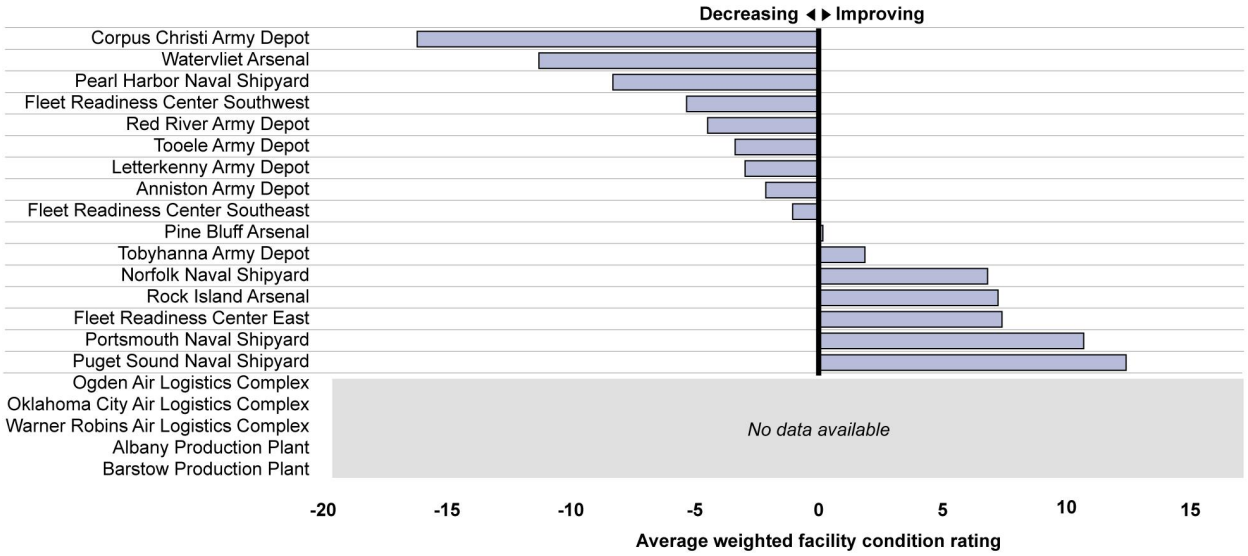
Notes: For this analysis, we weighted the condition ratings by the replacement cost of the facility, also known as the plant replacement value. This is to ensure that costlier facilities are weighted more heavily in the condition ratings, so that, for example, an expensive shop plant is weighted as more important than an inexpensive guard shack. This is the same method used by the Navy to calculate their condition averages.

Because fiscal year 2017 data was not available for Corpus Christi Army Depot, we present their most recent data instead, that of fiscal year 2016. Similarly, fiscal year 2017 data was not available for the three Air Force depots, so we present their fiscal year 2018 data for them.

While none of the depots had a failing average, facility condition could be worse than the data indicate. Some service depot officials stated that they believe their ratings may not reflect the actual state of the facilities, thereby making the physical condition of facilities appear better than they are.

Furthermore, facility condition ratings show a general downward trend. Out of the 16 depots that had available condition rating data from fiscal year 2013 through fiscal year 2017, nine depots show a downward trend in their average condition rating (see fig. 6). For more information on specific depot metrics, see appendixes II through XXII.

Figure 6: Change in Average Weighted Facility Condition Rating for the 21 Military Depots, Fiscal Years 2013 – 2017



Source: GAO analysis of service facility condition data. | GAO-19-242

Note: Five depots only provided condition data for a single fiscal year, which means that no change could be determined for those depots.

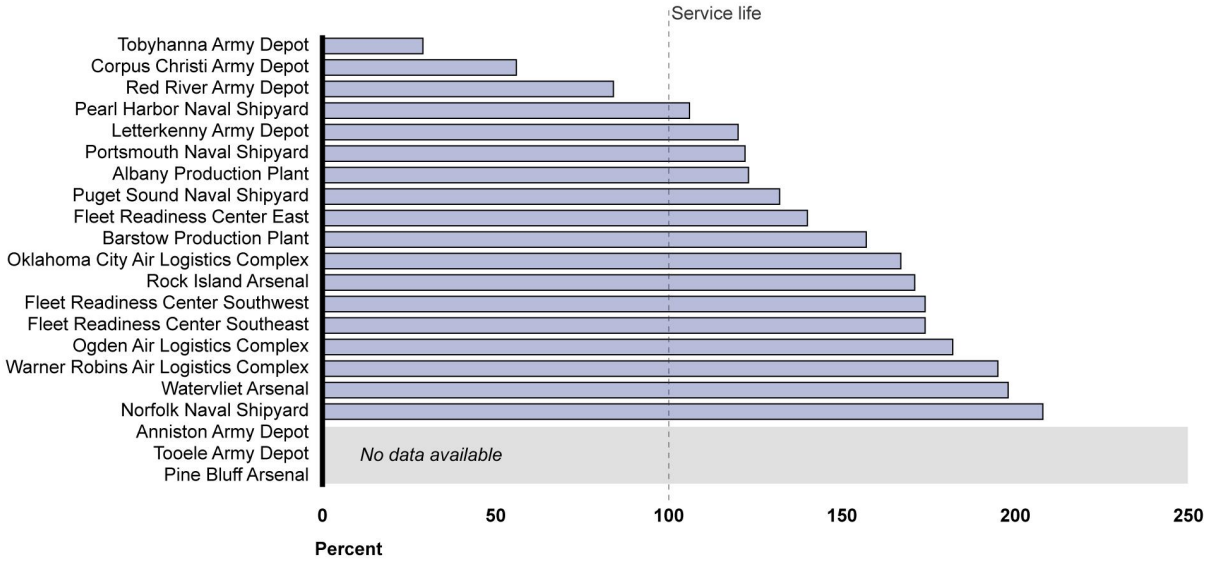
Moreover, facility requirements have evolved since many of the depots were established, further affecting the facilities' ability to support maintenance efficiently and effectively. Modern facilities must meet stringent safety and building standards, such as, for example, anti-terror standards for protecting DOD facilities or historic preservation standards. In addition, the introduction of newer weapon systems and their repair equipment can change the types of facilities that are required. Modern weapon systems may also have special coatings that trigger the need for additional facilities. Further, modern weapon systems may place larger demands on the facility's underlying power and utility systems, which may not have been designed to meet these demands. For example, Navy officials stated that at Fleet Readiness Center Southwest, an aging hangar loses power if maintainers attempt work on more than one Super Hornet aircraft at a time because the facility's electrical system, initially built in the 1930's, was not designed to support this aircraft.

Depot Equipment

Equipment is generally past its expected useful life at most military depots. Each piece of capital equipment has an expected service life, which indicates the number of years that the equipment is expected to operate. Equipment can be operated past its expected service life.

However, equipment that is past its expected service life can pose an increased risk for maintenance delays or higher maintenance costs, affecting the depots' ability to conduct work. As we have previously reported, aging equipment can present a number of challenges, such as more frequent breakdowns, less effective or efficient operation, and safety hazards.[20] Our analysis shows that most of the 21 depots reviewed rely on equipment that is past its expected useful life (see fig. 7). As Figure 7 shows, only three depots rely on equipment that is, on average, within its useful life. Three other depots were unable to provide data.

Figure 7: Average Age of Equipment as a Percentage of Its Expected Service Life, by Depot, as of Fiscal Year 2017



Source: GAO analysis of service equipment age data. | GAO-19-242

Note: Three depots were unable to provide data on the age of their depot equipment or its expected service life.

For more detailed information about equipment age and equipment repairs at individual depots, see appendixes II through XXII.

[20]GAO-17-548.

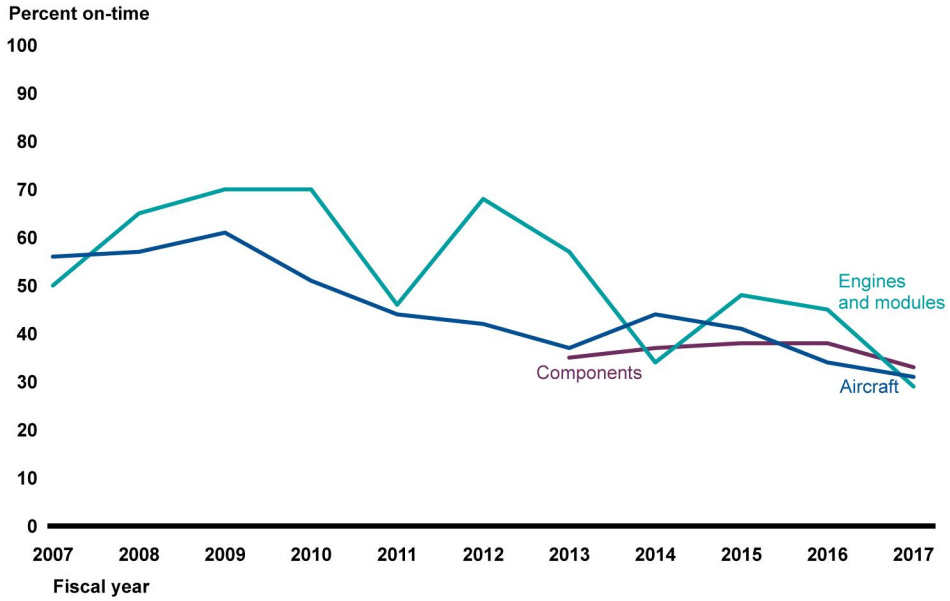
Poor Condition of Depot Facilities and Equipment Contributes to Worsening Performance

The service depots have generally experienced worsening performance in terms of completing maintenance on time or in the required amount over the past decade.[21] The Navy aviation depots have seen decreases in their timely completion of maintenance for aircraft, engines and modules, and components.[22] For example, on-time performance for aircraft completed at the Navy's three aviation depots has decreased from about 56 percent in fiscal year 2007 to about 31 percent in fiscal year 2017 (see fig. 8). This occurred even though the number of aircraft scheduled for repair over that same time period declined by about 26 percent.

[21]We assessed depot performance data for fiscal years 2007 through 2017, where available. Most of the Army depots we reviewed were unable to provide performance data prior to fiscal year 2014. As a result, we assessed Army depot performance from fiscal year 2014 through fiscal year 2017. Depot performance metrics tied to output are generally measured in terms of timeliness, though the specific manner may vary. For example, some depots measure whether an individual repair was completed when expected and measure the number of days past the expected date when the repair was actually completed. Other depots set a target for the number of repairs to complete in a certain period of time and track how many are actually completed each month.

[22]The services do not use the same performance metrics in managing their depots. The different performance metrics used in this analysis were: Percent Completed On-Time (Navy aviation and Air Force), Days of Maintenance Delay (Navy shipyards), and Production to Plan (Marine Corps). The Army depots use various schedule performance terms, though the most common is Performance to Promise. Other performance metrics are collected by the depots, such as cost and labor hours. However, for the purposes of this review, we solicited the performance metrics from each service that they used to assess their own depot performance. These are the metrics we present in this section.

Figure 8: On-Time Performance at the Navy's Three Aviation Depots, Fiscal Years 2007 – 2017

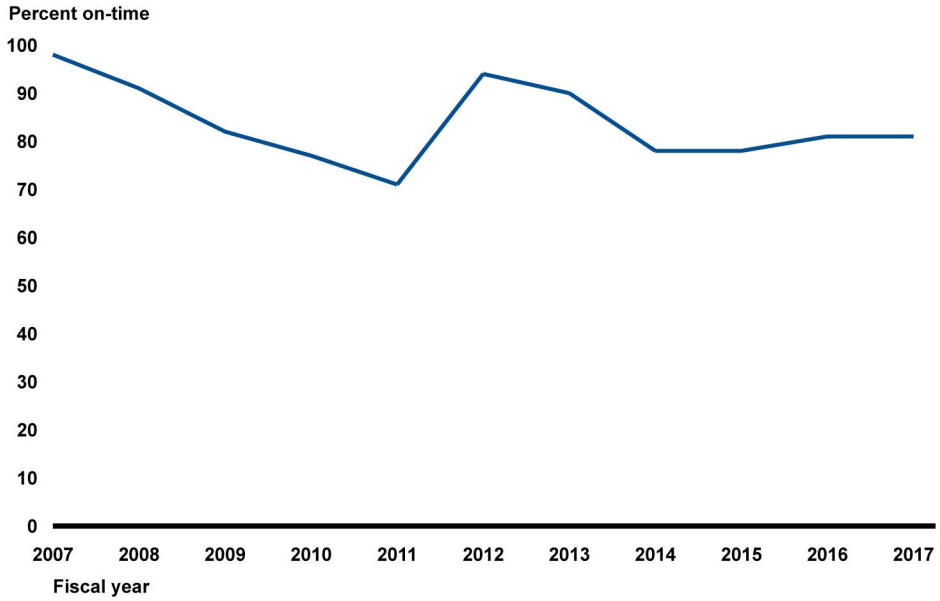


Source: GAO analysis of performance data from the three Navy aviation depots. | GAO-19-242

Note: A Navy official described components as any aircraft assembly or subassembly, such as valves, gearboxes, and rotor heads. Similarly, modules were described as major subassemblies of an engine that other locations can use to complete engine repairs. Navy aviation officials stated that they began tracking on-time performance of components in fiscal year 2013.

Similarly, the three Air Force aviation depots' on-time performance has decreased over this same time period from about 98 percent on-time aircraft completions in fiscal year 2007 to about 81 percent on-time aircraft completions in fiscal year 2017 (see fig. 9). This decrease occurred even though the number of aircraft scheduled for repair declined by approximately 15 percent.

Figure 9: On-Time Performance at the Three Air Force Aviation Depots, Fiscal Years 2007 – 2017



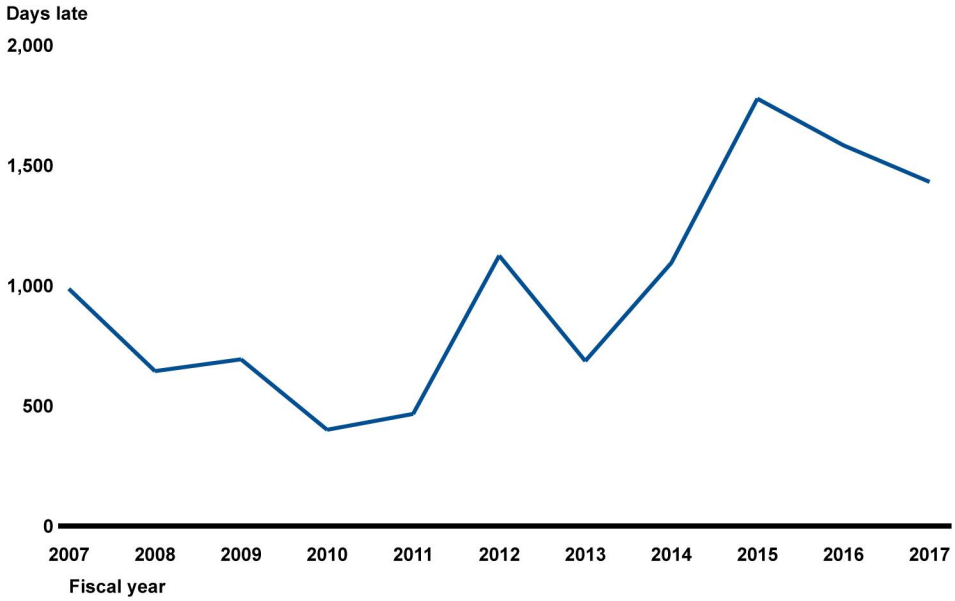
Source: GAO analysis of performance data from the three Air Force aviation depots. | GAO-19-242

Naval shipyards have also experienced performance challenges, such as an increase in maintenance delays (see fig. 10).[23] Our analysis shows that the number of days of maintenance delay at the four Navy shipyards has increased by about 45 percent from fiscal year 2007 through 2017, from 986 days in fiscal year 2007 to 1,431 days in fiscal year 2017. We have previously reported that from fiscal year 2008 through fiscal year 2018, the Navy incurred $1.5 billion in fiscal year 2018 constant dollars to crew, maintain, and support attack submarines that provided no operational capability as a result of the submarines sitting idle while waiting to enter the shipyards and from being delayed in completing their maintenance at the shipyards.[24]

[23]Previous GAO reporting has described these as lost operational days, but more recent reporting uses the term days of maintenance delay. *See* GAO-17-548 and GAO-19-229.

[24]GAO-19-229.

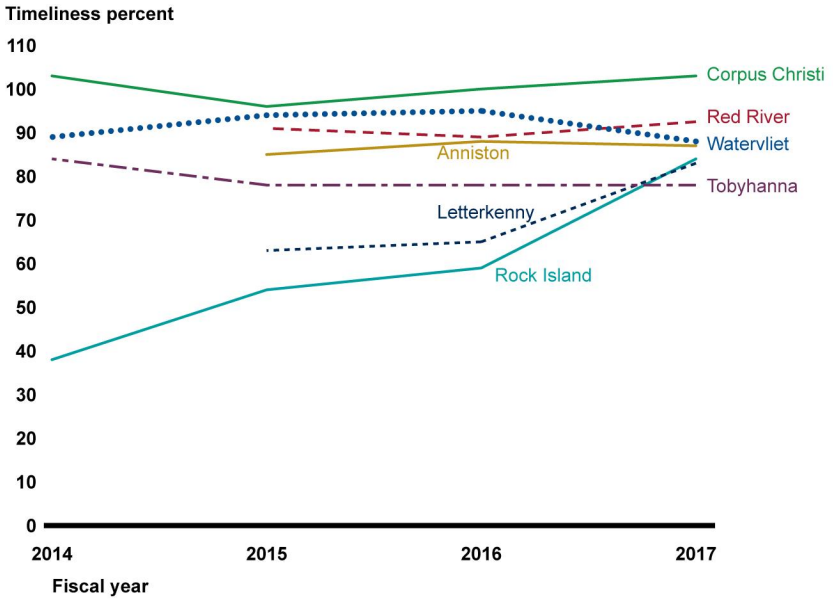
Figure 10: Days of Maintenance Delay at the Four Navy Shipyards, Fiscal Years 2007 – 2017



Source: GAO analysis of performance data from the four Navy shipyards. | GAO-19-242

Army depot data is mixed—our analysis shows that the performance at two depots has decreased, but for others it has held steady or improved. See figure 11 below for changes over time in performance.

Figure 11: Depot Performance Measures at Seven Army Depots, Fiscal Years 2014 – 2017



Source: GAO analysis of performance data from seven of the Army's nine depots. | GAO-19-242

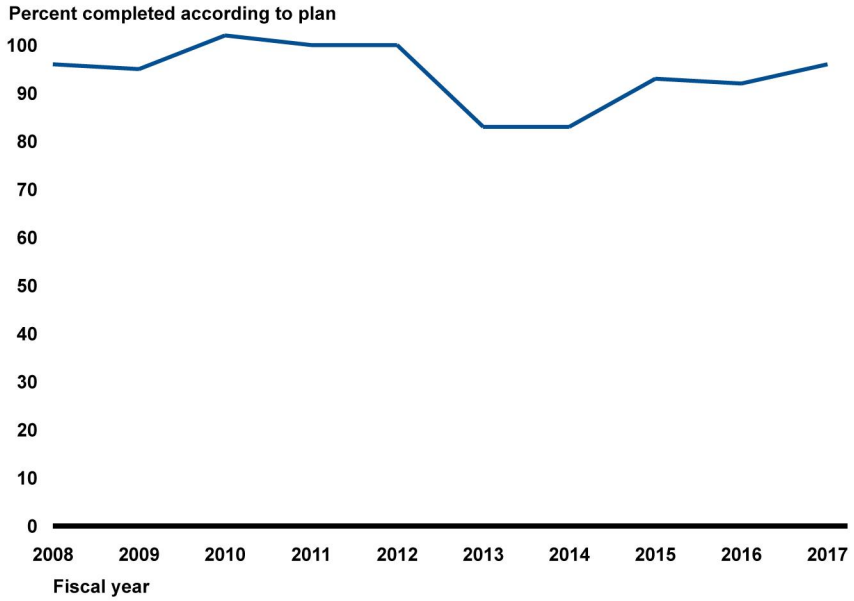
Notes: Depot performance metrics can be measured in terms of timeliness, though the specific manner may vary by depot. For example, some depots measure whether an individual repair was completed when expected and measure the days past the expected date the repair was actually completed. Other depots set a target number of repairs to complete in a certain period of time. Depots that exceed their output target may exceed 100 percent.

The Army depots are shown individually because they do not all measure performance in a manner that allows them to be combined for reporting purposes.

Two Army depots, Pine Bluff and Tooele, only provided performance data for one fiscal year, 2017, and thus are excluded from this figure.

Finally, the Marine Corps depot output decreased by less than 1 percent, as shown in figure 12.

Figure 12: Performance Output at the Two Marine Corps Depots, Fiscal Years 2008 – 2017



Source: GAO analysis of performance data from the two Marine Corps depots. | GAO-19-242

Note: We determined that the Marine Corps depot performance data for fiscal year 2007 were incomplete; for this reason, they are excluded from this figure. Production to plan is the percentage of items completed against the initial planned number. For example, if the depot plans to repair 100 of a given item, but completes only 75, its production to plan for that item is 75 percent.

The depots rely on their facilities and equipment to ensure they can conduct the large number of activities needed to efficiently repair DOD's complex weapons systems. Inadequate facilities can make the overall repair process less efficient, as maintainers perform workarounds that can increase maintenance time and costs. Because the depots are generally operating with equipment past its expected useful life, the depots may be incurring costs related to operating aging equipment – including performing equipment repairs, procuring spare parts, and expending labor hours to repair equipment – while at the same time delaying mission-related work. For example:

- At Albany Production Plant, officials told us that a shortage of paint booths results in vehicles remaining unpainted and stored outside. Exposure to the elements can cause flash rusting in the event of rain or high humidity, necessitating retreatment that increases both maintenance time and cost.

- At Norfolk Naval Shipyard, officials had to re-inspect 10 years' of parts made in a single furnace, after it was discovered that the controls on the furnace were reading incorrectly.[25]
- At Corpus Christi Army Depot, depot documentation shows that engines are moved nearly 5 miles across the depots during their repair process. According to officials at the depot, this is the result of years of incremental construction that did not allow them to optimize their workflow.
- At Fleet Readiness Center Southwest, officials told us that they had to develop an inefficient repair process to maintain the CMV-22 due to a lack of hangars that could accommodate the large aircraft.

While maintenance delays can be brief, extended maintenance delays can prevent the timely return of weapon systems to operational status. Delays can cause the services to incur operating and support costs without an operational benefit. Lack of weapon systems can also cause other negative effects such as an inability to train people to use the system, leading to a reduction in readiness.

The services have used various facility strategies to keep the depots operating, such as restoring and modernizing facilities when funding was available, developing workarounds when space or funding was not available, or continuing to use the inadequate facilities. Over time, this patchwork of old, modernized, and workaround solutions for new weapons systems can result in suboptimzed workflow that adds time and cost to the maintenance process, which can ultimately affect readiness. For example, at Production Plant Albany, the depot has four welding centers in different locations throughout the depot. According to officials, they utilized these welding centers over time as needs arose, and the centers are not ideally located for an efficient work flow. This means that the depot has to provide welding supplies, shift maintainers between, and deliver vehicles to and from these different locations.

Alternatively, investments that optimize depot facilities and equipment can positively affect maintenance efficiency. For example:

- Fleet Readiness Center Southwest recently built a new facility that optimizes the workflow for its repairs of H-60 helicopters. Officials stated that its previous H-60 facility could only fit eight helicopters at a

[25]GAO-17-548.

time, and only by crowding them such that using the crane on one required others to be moved as well, adding time and workload to the maintenance process. The new facility can accommodate more than 30 H-60s at a time, and each can be brought into and out of the facility without requiring others to be moved. As part of this effort, the depot also invested in additional lighting, ventilation, and crane capabilities that depot officials stated have increased the depot's capacity for conducting H-60 repairs by more than 20 percent over their previous facility.

- At Corpus Christi Army Depot, planners have designed a multiphase workflow for their engine and component repairs that involves investing in a new facility and related equipment. Officials noted that the current engine repair process has developed over decades, and is spread throughout the depot. The redesigned process, which involves several investments over more than two decades, is intended to have a more efficient workflow. An Army analysis estimated that this investment will reduce the time it takes to repair and test engines and components and could result in the depot requiring about 200,000 fewer labor hours, saving about $10 million in labor costs annually.
- The Naval Shipyard Optimization Plan released by the Navy in February 2018 addresses the shipyards' ability to maintain the current fleet, and projects that facility and equipment investments at the shipyards will increase efficiency and save resources. For example, the plan estimates that optimized facilities and equipment will save the shipyards over 325,000 labor days per year.[26]

The Military Services Do Not Consistently Track the Extent to Which Facility and Equipment Conditions Delay Maintenance

Despite the negative effect that poor conditions can have on depot performance, the military services do not consistently track when facilities and equipment conditions lead to maintenance delays. Based on our analysis, the services each track a form of maintenance delay—specifically, work stoppages caused by either equipment or facility conditions. Work stoppages are circumstances where maintenance can no longer proceed because the depot does not have everything it needs, including the facility space to begin additional work or equipment needed

[26]According to the Navy, this equates to an additional aircraft carrier maintenance period, one submarine overhaul, or three submarine inactivations per year.

to perform a certain function. However, table 1 below shows that although the services have the ability to track work stoppages, they do not all track both facility and equipment-related maintenance delays across all their depots. Further, even within a service, the depots may use different methodologies. Different methodologies make it difficult to compare across depots and identify issues. For example, according to Navy officials, the Navy aviation depots track work stoppages, but each depot uses different standards for determining which incidents are tracked. This means that an event counted as a work stoppage at one location might not be counted at another location.

Table 1: Service Tracking of Work Stoppages Caused by Equipment and Facility Conditions, as of September 2018

Category	Equipment-related work stoppages	Facility-related work stoppages
Army	Not tracked at seven of nine depots	Not tracked at eight of nine depots
Navy shipyards	Tracked	Not tracked
Navy aviation	Tracked (but methodologies vary) [a]	Tracked (but methodologies vary) [a]
Air Force	Tracked	Not tracked
Marine Corps	Tracked at both depots	Tracked at one of two depots

Source: GAO analysis of service documentation. | GAO-19-242

[a]According to Navy officials, the Navy aviation depots track work stoppages, but do not use the same standards for tracking incidents at each depot. Officials told us they have begun taking steps to track data consistently.

Standards for Internal Control in the Federal Government states that management should use quality information to achieve an entity's objectives.[27] However, the depots do not track maintenance delays caused by facility and equipment conditions, such as work stoppages, more consistently because there is currently no requirement from their respective materiel commands to do so. Every year, the services spend millions of dollars on depot facilities and equipment to meet their minimum investment requirement.[28] Establishing measures and using them to track maintenance delays caused by facility and equipment conditions would help the services to make better investment decisions because they could target investments to facility and equipment needs that would have the greatest impact on repair times or other key

[27]GAO, *Standards for Internal Control in the Federal Government*, GAO-14-704G (Washington, D.C.: Sept. 10, 2014).

[28]For more on the services' compliance with the 6 percent rule and the extent to which sustainment activities were included in investment reporting, see appendix I.

performance goals. Without knowing how often facility and equipment conditions lead to work delays, the services risk investing in less critical infrastructure and experiencing more work stoppages due to facility or equipment conditions.

DOD's Approach for Guiding Depot Investments Lacks Key Elements Important to Addressing the Depots' Challenges Efficiently and Effectively

The military services are developing optimization plans for their depots, but these plans lack analytically-based goals, results-oriented metrics, a full accounting of the resources, risks, and stakeholders, and a process for reporting on progress. Including these elements could enhance the effectiveness of service depot investments. Furthermore, there is currently no process at the Office of the Secretary of Defense level that monitors depot investment decisions or provides regular reporting to decision makers and Congress.

The Military Services Are Developing Optimization Plans, but These Plans Lack Key Elements to Guide Depot Investment

The services have each begun to develop depot optimization plans, as directed by Congress. In June 2018 Congress directed the Secretaries of the Army, Navy and Air Force to submit an engineering master plan for optimal placement and consolidation of facilities and major equipment, as well as an investment strategy addressing the facilities, major equipment and infrastructure requirements of depots under the jurisdiction of each service.[29] These plans are to include a life cycle cost analysis to modernize depot facilities and equipment and an investment strategy.

The Army, Navy, Air Force, and Marine Corps have all begun to develop depot optimization plans, and officials told us that they expect to complete work on these initial plans by the February 2019 date directed by Congress.[30] However, material management command officials also noted that more detailed plans – that include workflow optimization,

[29]S. Rep. 115-262 (2018).

[30]The Navy's plan for the aviation depots was released in 2019. However, the plan was provided after we had completed audit work on this engagement. As a result, we did not have an opportunity to review the plan to determine if it had the key elements we discuss here.

analysis of supporting utilities, and long-term investment planning – would not be possible by that date. Instead, officials intend to use the initial phase to develop a strategy for completing their final plans. Officials told us that they are using this initial development effort to identify the work needed to fully establish their depot optimization plans, identify the resources and expertise needed for implementation, and develop a timeline for completion. Depot optimization is a challenging effort that involves complex tasks such as, according to service officials, understanding interdependencies between facilities, equipment, and utilities; accounting for environmental, geographic, and economic factors; planning for facility construction and equipment purchases years in advance; and making arrangements for ongoing depot-level maintenance operations while facility and equipment improvements are underway.

The Navy developed a Shipyard Infrastructure Optimization Plan, released in February 2018, to address some of its longstanding challenges—including aging facilities and equipment, inefficient layouts, and lack of capacity. Officials estimate that the effort will cost $21 billion over 20 years, and will allow for increased repair capacity. Over time, the Navy estimates that this investment could ultimately save more than 328,000 labor days annually in reduced transportation and materiel movement time. We have a separate review examining the Navy's effort to optimize its shipyards, which examines its use of results-oriented elements.[31]

However, based on our discussions with officials from all four services, the depot plans for the Army and Marine Corps depots and arsenals, the Navy Fleet Readiness Centers, and the Air Force Air Logistics Complexes currently under development will lack certain key elements identified in our prior work, including:

- **Analytically-based goals.** The services have not fully established analytically-based goals for their depot investments that are tied to the service's operational needs. For example, Army and Air Force officials told us that they were still in the process of developing goals for their plans. Meanwhile, Navy aviation officials had developed some initial

[31]Senate Report 115-262, accompanying a bill for the National Defense Authorization Act of Fiscal Year 2019, directed GAO to report on the extent to which the Navy's Shipyard Infrastructure Optimization Plan addresses infrastructure deficiencies, and the extent to which the plan includes results-oriented elements to guide shipyard investment. In light of this ongoing effort, we are not making recommendations on the Navy's Shipyard Improvement Optimization Plan in this report.

goals, but expected these goals to change as their planning and information became more detailed. The Marine Corps is in the process of developing its plan, but officials say that they have not determined what analytically-based goals will serve as the foundation of their efforts. Some have told us that the only goal that is feasible by the February 2019 deadline is to plan to develop a better plan. Our prior work has shown that establishing analytically-based goals that define the desired outcomes and results is a leading practice that can enhance the success of an initiative.[32]

- **Results-oriented metrics.** As we noted earlier, planners lack key data critical for developing investment plans, such as the source and extent of facilities- and equipment-related maintenance delays. Army, Navy, Air Force, and Marine Corps officials all noted that they were planning to use metrics to determine the effectiveness of their respective plans. However, without established goals for their plans, the services cannot identify the best ways to measure progress in meeting those goals. In addition, the Army, Navy, and Air Force do not have metrics that tie their depot investments to specific outcomes, such as increased performance or improved readiness. Our prior work has shown that using results-oriented metrics enables effective monitoring and facilitates targeting efforts to those with the greatest effect.[33]
- **Identification of required resources, risks, and stakeholders.** Army, Navy, Air Force, and Marine Corps officials told us that they have begun identifying the resources needed for their plans. For example, all services have identified at least some of the project costs that will be needed for certain depot facility and equipment improvements. However, without having analytically-based goals to serve as a starting point, it is impossible to fully identify the required resources and risks because the desired end state has not been established. Meanwhile, Army, Air Force, and Navy aviation officials have identified many stakeholders that they intend to involve in their optimization efforts, though in some cases these stakeholders have not been included in the process. Service officials also noted that in

[32]GAO, *Managing For Results: Data-Driven Performance Reviews Show Promise But Agencies Should Explore How to Involve Other Relevant Agencies*, GAO-13-228 (Washington, D.C.: Feb. 27, 2013).

[33]GAO, *Results-Oriented Management: Strengthening Key Practices at FEMA and Interior Could Promote Greater Use of Performance Information*, GAO-09-676 (Washington, D.C.: Aug. 17, 2009).

some cases they lack the necessary engineering expertise to redesign their depot's workflow process from the ground up.

The services have identified about $6.5 billion in backlogged restoration and modernization projects for their depot facilities. However, this figure is likely under stated because our prior work has shown that depot facility projects are subject to factors such as regulatory compliance and historical preservation costs that can be hard to predict.[34] Moreover, the services track their backlog of needed facility improvements differently, which makes it difficult to determine the full scope of investment required and to provide effective oversight. Our prior work has shown that fully identifying 1) the resources required to achieve the goals, 2) the stakeholders that have equities and requisite expertise in the effort, and 3) potential risks to the effort are leading results-oriented practices that are key to success.[35]

- **Reporting on progress.** Army, Navy, Air Force, and Marine Corps officials told us that they are in the process of developing one-time reports for Congress on the depots' investment needs. However, these one-time reports will not provide Congress and decision makers with information after their initial release. Depot optimization planning will require time, along with sustained management and congressional attention to successfully implement. For example, the Navy's Shipyard Optimization Plan estimates that it will be a 20-year effort requiring around $21 billion. However, the other initial steps taken by the services to address the congressional request are not as focused on the long term. For example, Army and Air Force officials told us that their initial plans will likely be "plans to get to a plan" rather than a decades-long proposal like the Navy shipyards. Our prior work has shown that reporting on progress is a leading results-oriented practice that holds the organization accountable for results and provides information to senior leaders and Congress that can help keep an effort on track and responsive to changes.[36]

According to service officials, the military services' depot optimization plans will not include all the elements of a results-oriented management

[34]GAO-17-548.

[35]*See* GAO-13-228 and *DOD's 2010 Comprehensive Inventory Management Improvement Plan Addressed Statutory Requirements, but Faces Implementation Challenges*, GAO-11-240R (Washington, D.C.: Jan. 7, 2011).

[36]GAO-09-676.

approach because there is no requirement that the plans do so. Our prior work has found that a results-oriented management approach can help organizations remain operationally effective, efficient, and capable of meeting future requirements.[37] Specifically, our work has highlighted the importance of elements such as developing analytically-based goals; using results-oriented metrics to monitor progress; fully identifying required resources, risks, and stakeholders; and regular reporting on progress to making reform efforts more efficient, effective, and accountable. Congress directed the services to include some results-oriented elements in their plans, such as an identification of key steps and an initial report to Congress. However, including these additional elements—establishing results-oriented metrics; identifying all necessary resources, stakeholders, and associated risks; and regular reporting to decision makers and Congress—would further enhance the effectiveness of the plans. Without a plan that includes all the key elements of a results-oriented management approach, the services risk continued deterioration of the depots and making suboptimal investments that could hinder their ability to efficiently and effectively support readiness.

The Office of the Secretary of Defense Does Not Provide Oversight of or Report on Service Efforts to Invest in Depots

DOD has not developed a process to oversee the implementation of the services' depot optimization plans or provide reporting on depot investment effectiveness to DOD decision makers and Congress. Officials with the Deputy Assistant Secretary of Defense for Materiel Readiness stated that their role is to advocate for the service depots within DOD, and not to develop depot policies or review service depot investments. Specifically, they stated that they are unable to set infrastructure policy and do not have authority to alter service investment decisions. However, as part of an office reorganization during the summer of 2018, the Secretary of Defense tasked the Assistant Secretary of Defense for Sustainment with developing logistics and maintenance policy.

[37] *See* GAO-17-548 (Washington, D.C.: Sept. 12, 2017); *Defense Inventory: Actions Needed to Improve the Defense Logistics Agency's Inventory Management*, GAO-14-495 (Washington, D.C.: June 19, 2014); GAO-13-228; GAO-11-240R; GAO-09-676; *Managing For Results: Enhancing Agency Use of Performance Information for Management Decision Making*, GAO-05-927 (Washington, D.C.: Sept. 9, 2005); and GAO/GGD/AIMD-99-69.

As of January 2019, the Office of the Assistant Secretary of Defense for Sustainment has not developed a process to monitor the services' efforts to improve the condition of depot facilities and equipment. Furthermore, the Office of the Assistant Secretary of Defense for Sustainment does not report on service depot investments internally to the department or externally to Congress. Other Office of the Secretary of Defense organizations have successfully used a results-oriented management approach—which includes regular monitoring and reporting—to oversee the department-wide efforts to drive significant improvements. For example, officials with the Office of the Assistant Secretary of Defense for Logistics and Materiel Readiness created a Comprehensive Inventory Management Improvement Plan in 2010 that DOD used to improve data collection, develop standardized metrics, and provide increased oversight (see sidebar). The result was that DOD was able to achieve a number of improvements, such as reducing the value of its on-hand excess inventory by about $2 billion, improving policy and guidance, and establishing standardized metrics for monitoring its operations. Based on these positive results, DOD institutionalized this process through guidance and has continued to use it since 2010. Using this approach, DOD was ultimately able to improve its inventory management processes enough to have it removed from GAO's High Risk List in 2017.[38]

The Department of Defense's (DOD) Results-Oriented Approach for Improving Inventory Management

In developing the Comprehensive Inventory Management Improvement Plan, DOD took the following actions to establish department-wide metrics to improve the accuracy of demand forecasting, according to DOD officials:

1. It established a team of subject matter experts, including logistics management specialists, information technology and data experts, and operations research analysts (i.e., individuals with expertise in advanced mathematical and analytical methods), representing each of the services and the Defense Logistics Agency (DLA).

2. The team of experts assessed the data sources and methods used by the services and DLA and evaluated potential department-wide metrics for measuring demand forecasting accuracy based on the available data sources.

3. DOD implemented the standardized metrics in a phased approach with the initial phase focused on establishing a baseline for the metrics.

Through the process of establishing these metrics, DOD developed additional areas for exploration and improvement, such as improving its guidance on demand forecasting.

Source: GAO analysis of DOD documentation. | GAO-19-242

DOD does report some depot information to Congress; however, the information reported is limited in nature and does not address key issues concerning depot facilities and equipment. For example, every other year DOD is required to report to Congress on its core depot-level maintenance and repair capability requirements and workload.[39] DOD must also report annually on the percentage of depot maintenance funds expended during the preceding fiscal year and projected to be expended during the current and ensuing fiscal year, for performance of depot-level maintenance and repair workloads by the public and private sectors.[40] Combined with the services' reporting on their depot investment spending (see appendix I), this information provides Congress with some information about depot operations and performance. However, these reports do not inform Congress about several key points, including

[38]GAO, *High-Risk Series: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others,* GAO-17-317 (Washington, D.C.: Feb. 15, 2017).

[39]10 U.S.C. § 2464.

[40]10 U.S.C. § 2466.

whether the service depots are becoming more effective and efficient or the extent to which DOD has managed to address depot investment backlogs. We have noted in prior work that the backlog of facilities restoration and modernization projects at the depots can be significant, and that reducing these backlogs will likely take a sustained effort over many years.[41] Furthermore, these efforts are important to improving the effectiveness and efficiency of the depots, which is important to ensuring the readiness of military forces.

Improving readiness is one of DOD's top priorities. Specifically, the Secretary of Defense issued a memorandum in September 2018 about improving readiness which set a minimum target of 80 percent mission capability for DOD's key aviation platforms starting in fiscal year 2019.[42] In addition, the memorandum identified reducing operating and support costs for these platforms every year beginning in fiscal year 2019 as another priority. Furthermore, DOD has more broadly identified rebuilding readiness as a priority across all the services.[43] As noted previously, the depots are essential to providing readiness to DOD in the form of repaired weapon systems, and depot optimization efforts can provide a return on investment in the form of reduced maintenance time and cost. However, the investments made at the depots—which are crucial for optimization, throughput, and ultimately readiness—often need years and millions of dollars to execute, which means that long-term planning is essential to ensuring that investments are made effectively. Regular monitoring of the services' depot investment efforts could ensure that these investments target readiness drivers to produce the greatest effect.

Furthermore, our previous work has noted that timeframes for improvement efforts can slip, which makes reporting to DOD decision makers and Congress essential for holding stakeholders accountable for making progress. For example, we reported in 2017 that even though the Navy had developed capital investment plans in 2013 and 2015 intended to help improve the state of the facilities and equipment at the shipyards, backlogged restoration and maintenance projects had grown by 41

[41]GAO-17-548.

[42]Secretary of Defense Memorandum, *NDS Implementation – Mission Capability of Critical Aviation Platforms* (Sept. 17, 2018). This memorandum also noted that additional guidance on improving readiness for ground and naval systems would be forthcoming.

[43]Department of Defense, *2015-2017 Guidance for the Employment of the Force* (February 2015).

percent over 5 years which extended the amount of time required to clear the backlog under expected funding levels.[44] Without providing oversight of and reporting on service depot investments, DOD risks continued deterioration of the depots' facilities and equipment, suboptimal investments, and reduced military readiness as the services experience costly maintenance delays.

Conclusion

DOD's 21 depots are critical for repairing and maintaining its complex array of weapon systems. Inefficient depots contribute to longer maintenance times, increased costs, and reduced readiness. Currently, a majority of the depots have facilities that are in poor condition and are relying on old equipment that is past its useful service life. The military services spend millions of dollars annually on depot facilities and equipment in order to meet minimum investment requirements designed to sustain depot performance. Notwithstanding these expenditures, the services are not consistently required to track maintenance delays caused by facility or equipment conditions. This lack of tracking hinders the services' ability to target investments to facility and equipment needs that would have the greatest effect on repair times or other performance goals. By knowing how often facility and equipment conditions lead to work delays, the services could reduce the risk of investing in less critical facilities and equipment. They could also reduce the risk of more work stoppages caused by facility or equipment conditions.

The military services are in the midst of developing congressionally-directed depot optimization plans that are expected to include both 1) an analysis of the cost of depot facilities and equipment modernization and 2) an investment strategy. However, with the exception of the plan designed to address the Navy shipyards, the services' plans are still in the initial stages, and each one is expected to lack key elements of a results-oriented management approach—including analytically based goals, results-oriented metrics, full identification of required resources and risks, and regular reporting on progress—that would help guide investment. As the shipyard optimization plan has demonstrated, the cost of optimization may be high and, once defined, will require sustained management attention over many years to carry out successfully. In

[44]GAO-17-548.

addition, implementing a regular monitoring and reporting process to provide oversight and accountability over depot investments would further enhance DOD's ability to attain improvements at the depots significant enough to reverse years of decline and reach the challenging goals set by the Secretary of Defense for improving mission capability rates and reducing operating and support costs.

Recommendations for Executive Action

We are making the following 13 recommendations to the Department of Defense.

The Secretary of the Army should ensure that Army Materiel Command establishes measures for its depots to track facility or equipment conditions that lead to maintenance delays. (Recommendation 1)

The Secretary of the Army should ensure that Army Materiel Command implements tracking of the measures for identifying when facility or equipment conditions lead to maintenance delays at each Army depot. (Recommendation 2)

The Secretary of the Navy should ensure that Naval Sea Systems Command and the Commander, Fleet Readiness Centers establish measures for their depots to track facility or equipment conditions that lead to maintenance delays. (Recommendation 3)

The Secretary of the Navy should ensure that Naval Sea Systems Command and the Commander, Fleet Readiness Centers implement tracking of the measures for identifying when facility or equipment conditions lead to maintenance delays at each Navy depot. (Recommendation 4)

The Secretary of the Air Force should ensure that Air Force Materiel Command establishes measures for its depots to track facility or equipment conditions that lead to maintenance delays. (Recommendation 5)

The Secretary of the Air Force should ensure that Air Force Materiel Command implements tracking of the measures for identifying when facility or equipment conditions lead to maintenance delays at each Air Force depot. (Recommendation 6)

The Commandant of the Marine Corps should ensure that Marine Corps Logistics Command establishes measures for its depots to track facility or equipment conditions that lead to maintenance delays. (Recommendation 7)

The Commandant of the Marine Corps should ensure that Marine Corps Logistics Command implements tracking of the measures for identifying

when facility or equipment conditions lead to maintenance delays at each Marine Corp depot. (Recommendation 8)

The Secretary of the Army should ensure that Army Materiel Command incorporates in its depot optimization plan, key results-oriented elements including analytically-based goals, results-oriented metrics, identification of required resources, risks, and stakeholders, and regular reporting to decision makers on progress. (Recommendation 9)

The Secretary of the Navy should ensure that Commander, Fleet Readiness Centers incorporates in its depot optimization plan, key results-oriented elements including analytically-based goals, results-oriented metrics, identification of required resources, risks, and stakeholders, and regular reporting to decision makers on progress. (Recommendation 10)

The Secretary of the Air Force should ensure that Air Force Materiel Command incorporates in its depot optimization plan, key results-oriented elements including analytically-based goals, results-oriented metrics, identification of required resources, risks, and stakeholders, and regular reporting to decision makers on progress. (Recommendation 11)

The Commandant of the Marine Corps should ensure that Marine Corps Logistics Command incorporates in its depot optimization plan, key results-oriented elements including analytically-based goals, results-oriented metrics, identification of required resources, risks, and stakeholders, and regular reporting to decision makers on progress. (Recommendation 12)

The Secretary of Defense should ensure that the Assistant Secretary of Defense for Sustainment develops an approach for managing service depot investments that includes management monitoring and regular reporting to decision makers and Congress on progress. (Recommendation 13)

Agency Comments and Our Evaluation

We provided a draft of this report to DOD for review and comment. In written comments on a draft of this report (reproduced in appendix XXIV), DOD concurred with 12 of our 13 recommendations and stated, in general, that the Service Chiefs for the Army, Navy, Air Force, and Marine Corps will ensure that their respective material commands take actions to

implement the recommendations for their service. DOD also provided technical comments, which we incorporated where appropriate.

DOD did not concur with our recommendation that the Assistant Secretary of Defense for Sustainment (ASD for Sustainment) develop an approach for managing service depot investments. In its response, DOD stated it could not develop such an approach until the services finalized and resourced depot optimization plans. DOD stated it would continue to monitor capital investments at service depots through the budget process.

We continue to believe that the ASD for Sustainment should develop an approach for managing service depot investments that includes management monitoring and regular reporting to decision makers and Congress on progress for several reasons. First, our recommendation is focused on the ASD for Sustainment developing an approach for overseeing the services' overall depot investments, not just those contained in their optimization plans. While the depot optimization plans will certainly affect the services' depot investments, the depots will require additional investments to sustain, restore, and modernize their operations apart from their efforts to optimize facility layout and workflow.

Second, the ASD for Sustainment's early involvement in the services' development and resourcing of depot optimization plans could enhance service efforts to identify appropriate analytically-based goals aligned with the Secretary of Defense's readiness objectives, enhance optimization across the DOD enterprise, and ensure sustained senior leadership attention to achieving optimal depot efficiency and effectiveness. Waiting until the services' depot optimization plans have been resourced – that is, funded – could result in the ASD for Sustainment beginning its involvement and oversight after critical optimization decisions, such as setting goals, identifying key metrics, and adjudicating trade-offs across the depot enterprise, have been made on an individual basis by the services.

Third, while monitoring investments at the service depots through the budget process is an important aspect of oversight, the ASD for Sustainment could enhance the oversight of and accountability over depot investments through a more comprehensive oversight approach. This comprehensive approach could include regular monitoring that focuses on ensuring that approved depot investment funding is implemented as planned and achieves desired results. An approach focused on the implementation of efforts aimed at desired outcomes could better position DOD and the services to make sustained progress.

Finally, having regular reporting of progress will help ensure DOD leadership and the Congress have the information needed to help make critical funding and policy decisions. Reporting on progress towards desired outcomes also could assist in ensuring that there is accountability within the department for reversing years of decline and reaching the challenging goals set by the Secretary of Defense for improving mission capability rates and reducing operating and support costs.

We are sending copies of this report to the appropriate congressional committees, the Acting Secretary of Defense, and the Secretaries of the Army, Navy, Air Force, and the Commandant of the Marine Corps. In addition, the report is available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have questions about this report, please contact me at maurerd@gao.gov or (202) 512-9627. 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 XXV.

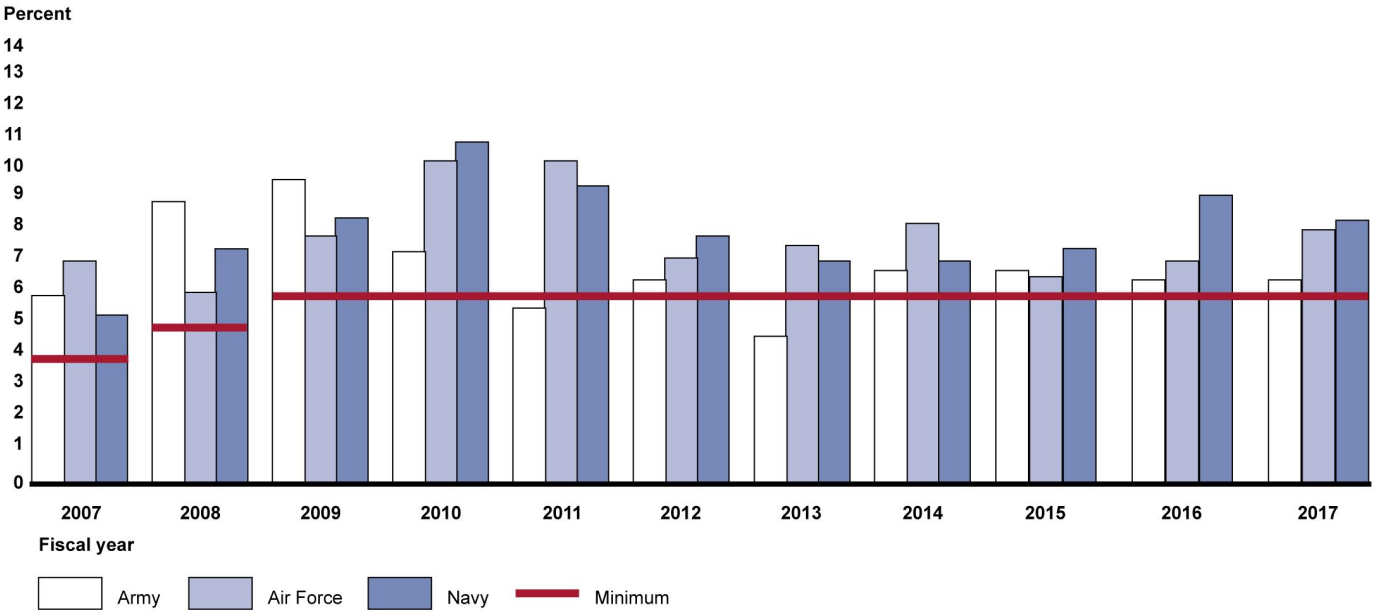
Diana Maurer
Director,
Defense Capabilities and Management

Appendix I: Service Depot Investment Has Generally Met Statutory Requirements

Military Departments Generally Have Met the 6 Percent Rule

Based on our analysis of service budget submissions and 6 percent project lists, we found that the departments have generally met the 6 percent requirement in fiscal years 2007 through 2017 (see fig. 13).

Figure 13: Military Department Reported Depot Investment as a Percentage of Average Total Combined Maintenance, Repair, and Overhaul Workload



Source: GAO analysis of Department of Defense budget justification data. | GAO-19-242

Note: Section 2476 of title 10, United States Code requires the secretary of each military department to invest in the capital budgets of the military department a total amount equal to not less than 6 percent of the average total combined maintenance, repair, and overhaul workload funded at the covered depots for the preceding 3 fiscal years. This is also known as the "6 percent rule". The law allowed the military departments 2 years to reach the required 6 percent investment level prior to full implementation in 2009. The term "covered depot" refers to the 17 Army, Navy, Air Force, and Marine Corps depots and four Army arsenals. Compliance with the 6 percent rule is applied to the military

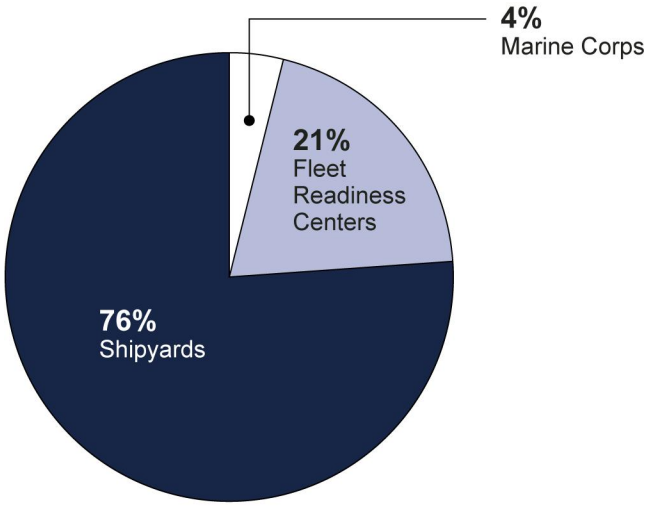
departments, therefore the Marine Corps depot funding is included in Department of the Navy reporting. We found that these totals included some sustainment activity after fiscal year 2012, but the amount did not materially affect compliance with the investment minimum.

As shown above, the Navy and Air Force met the minimum requirement every year since the minimum investment requirement was enacted in fiscal year 2007. The Army met the minimum investment requirement for most years, but did not meet the minimum on two occasions, in fiscal year 2011 and fiscal year 2013. According to Army officials, they missed the fiscal year 2011 minimum by around $21 million due to a software project that was scheduled to execute in fiscal year 2011, but was unable to execute and moved to fiscal year 2012 instead. An Army official attributed the difference in fiscal year 2013, which was over $68 million, to the effects of fiscal year 2013 sequestration, which generally reduced funding available to the services.[1]

While the Navy met its minimum investment requirement every year, it is worth noting that the 6 percent rule measures compliance by department. Therefore, the Navy's reported investments include those for its four shipyards, its three fleet readiness centers, and the two Marine Corps depots. From fiscal year 2007 through fiscal year 2017, the shipyards accounted for 76 percent of Navy depot investment (see fig. 14).

[1]In March 2013, the President ordered across-the-board spending reductions, known as sequestration, for all federal agencies and departments. As a result, DOD's discretionary resources were reduced by about $37.2 billion over the remainder of fiscal year 2013. *See* GAO, *Sequestration: Documenting and Assessing Lessons Learned Would Assist DOD in Planning for Future Budget Uncertainty*, GAO-15-470 (Washington, D.C.: May 27, 2015).

Figure 14: Distribution of Navy Depot Investment Spending, by Organization, Fiscal Years 2007 – 2017

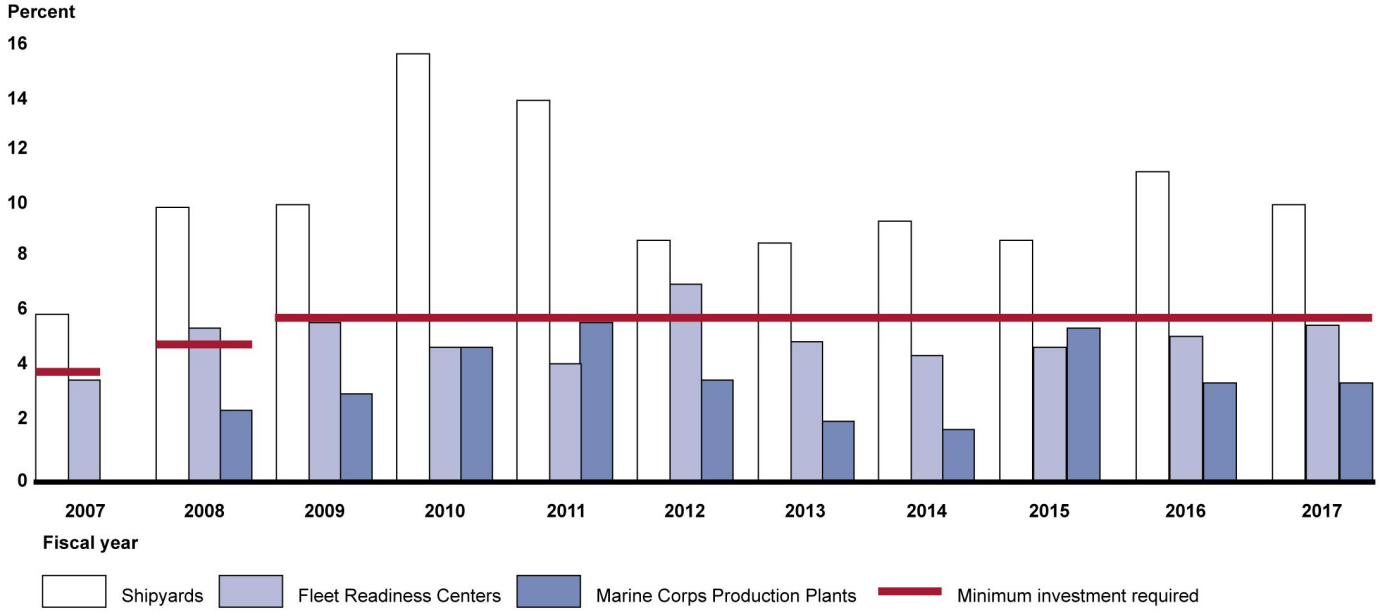


Source: GAO analysis of Navy and Marine Corps investment data. | GAO-19-242

Note: Numbers may not add to 100 due to rounding.

If these three organizations were viewed independently, only the shipyards would have regularly met their minimum investment requirement; the fleet readiness centers and Marine Corps depots have generally invested less than 6 percent of their respective maintenance, repair, and overhaul workload, as shown in figure 15. Under this perspective, the fleet readiness centers would only have met the 6 percent minimum in fiscal years 2008 and 2012, and the Marine Corps depots would never have met the 6 percent minimum.

Figure 15: Navy Depot Investment as a Percentage of Average Total Combined Maintenance, Repair, and Overhaul Workload, by Navy Organization, Fiscal Years 2007 – 2017



Source: GAO analysis of Department of Defense budget data and Navy and Marine Corps investment projects. | GAO-19-242

Military Department Compliance with Fiscal Year 2012 Change to Prohibit Facility Sustainment

The services have counted some facilities sustainment activities towards meeting the 6 percent minimum since fiscal year 2012, but the effect of these activities on the departments' ability to meet the minimum investment requirement appears minimal.[2] In fiscal year 2012, Congress revised 10 U.S.C. § 2476 to prohibit the services from counting sustainment activity towards meeting their 6 percent investment minimum. Sustainment activities are defined as the regular activities needed to keep a facility in good working order. We requested project documentation from each of the services for a number of the investments that they counted towards their 6 percent minimum.[3]

Army officials were only able to provide us with about one-third of our requested project documentation (46 out of 158 projects requested); as a result, our assessment of the Army is limited. Of the project documentation we did receive, we found sustainment activities accounted for 13 projects totaling about $21 million in nominal dollars from fiscal year 2012 through fiscal year 2017. Those projects represent approximately 1 percent of the Army's total depot investment over that time. The Army's compliance with the 6 percent rule would not have been affected if those projects had been properly excluded.

[2]Sustainment is the maintenance and repair activities necessary to keep an inventory of facilities in good working order. It includes regularly scheduled adjustments and inspections, preventive maintenance tasks, and emergency response and service calls for minor repairs. It also includes major repairs or replacement of facility components (usually accomplished by contract) that are expected to occur periodically throughout the life cycle of facilities. This work includes regular roof replacement, refinishing of wall surfaces, repairing and replacement of heating and cooling systems, replacing tile and carpeting, and similar types of work. It does not include environmental compliance costs, facility leases, or other tasks associated with facilities operations (such as custodial services, grounds services, waste disposal, and the provision of central utilities). DOD 7000.14-R, *Financial Management Regulation*, vol. 2B, chap. 8, § 080105 (Dec. 2016).

[3]We excluded any 6 percent project that was not related to facilities, such as equipment purchases and process improvements, as these activities cannot, by definition, be sustainment. We also excluded any project that was under $250,000 in projected costs, in order to focus on those projects with the most likelihood of affecting the departments' compliance with the 6 percent rule. This analysis identified sustainment projects that should not have been counted, but is not a generalizable sample.

Navy and Marine Corps officials were able to provide project documentation for 172 out of 211 projects requested.[4] Navy sustainment activities accounted for 47 projects totaling about $94 million in nominal dollars from fiscal year 2012 through fiscal year 2017. Those projects represent about 3 percent of the Navy's total depot investment over that time. If those projects had been properly excluded, the Navy would still have met its 6 percent minimum for each fiscal year.

Finally, Air Force officials were able to provide project documentation for 136 out of 138 projects requested. Air Force sustainment activities accounted for 51 projects totaling about $45 million in nominal dollars from fiscal year 2012 through fiscal year 2017. Those projects represent about 2 percent of the Air Force's total depot investment over that time. If those projects had been properly excluded, the Air Force would still have met its 6 percent investment minimum for each fiscal year.

[4]The Navy shipyards were able to provide additional documentation for 143 out of 156 requested projects, the Navy aviation depots were able to provide documentation for 8 out of 33 requested projects, and the Marine Corps were able to provide documentation for 21 out of 22 requested projects.

Appendix II: Anniston Army Depot Overview

Figure 16: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Anniston Army Depot

Appendix III: Corpus Christi Army Depot Overview

Figure 17: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Corpus Christi Army Depot

Appendix IV: Letterkenny Army Depot Overview

Figure 18: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Letterkenny Army Depot

Appendix V: Pine Bluff Arsenal Overview

Figure 19: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Pine Bluff Arsenal

Appendix VI: Red River Army Depot Overview

Figure 20: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Red River Army Depot

Appendix VII: Rock Island Arsenal Overview

Figure 21: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Rock Island Arsenal

Appendix VIII: Tobyhanna Army Depot Overview

Figure 22: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Tobyhanna Army Depot

Appendix IX: Tooele Army Depot Overview

Figure 23: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Tooele Army Depot

Appendix X: Watervliet Arsenal Overview

Figure 24: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Watervliet Arsenal

Appendix XI: Norfolk Naval Shipyard Overview

Figure 25: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Norfolk Naval Shipyard

Appendix XII: Pearl Harbor Naval Shipyard Overview

Figure 26: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Pearl Harbor Naval Shipyard

Appendix XIII: Portsmouth Naval Shipyard Overview

Figure 27: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Portsmouth Naval Shipyard

Appendix XIV: Puget Sound Naval Shipyard Overview

Figure 28: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Puget Sound Naval Shipyard

Appendix XV: Fleet Readiness Center (FRC) East Depot Overview

Figure 29: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Fleet Readiness Center – East

Appendix XVI: Fleet Readiness Center (FRC) Southeast Depot Overview

Figure 30: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Fleet Readiness Center – Southeast

Appendix XVII: Fleet Readiness Center (FRC) Southwest Depot Overview

Figure 31: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Fleet Readiness Center – Southwest

Appendix XVIII: Ogden Air Logistics Complex (ALC) Overview

Figure 32: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Ogden Air Logistics Complex

Appendix XIX: Oklahoma City Air Logistics Complex (ALC) Overview

Figure 33: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Oklahoma City Air Logistics Complex

Appendix XX: Warner Robins Air Logistics Complex (ALC) Overview

Figure 34: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Warner Robins Air Logistics Complex

Appendix XXI: Albany Production Plant Depot Overview

Figure 35: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Albany Production Plant

Appendix XXII: Barstow Production Plant Depot Overview

Figure 36: Systems Supported, Depot Performance, Facility Condition, and Equipment Condition at Barstow Production Plant

Appendix XXIII: Scope and Methodology

To determine the state of the depots' facilities and equipment, we analyzed service reports and performance metrics for the 21 military service maintenance depots from fiscal year 2007, when the minimum investment requirement–known as the 6 percent rule–began, to fiscal year 2017, the latest for which most data are available.[1] This analysis included all maintenance depots covered under the 6 percent rule requirement. The depots we collected data for are:

- Anniston Army Depot, Anniston, Alabama
- Corpus Christi Army Depot, Corpus Christi, Texas
- Letterkenny Army Depot, Letterkenny, Pennsylvania
- Pine Bluff Arsenal, Pine Bluff, Arkansas
- Red River Army Depot, Texarkana, Texas
- Rock Island Arsenal, Rock Island, Illinois
- Tobyhanna Army Depot, Tobyhanna, Pennsylvania
- Tooele Army Depot, Tooele, Utah
- Watervliet Arsenal, Watervliet, New York
- Norfolk Naval Shipyard, Portsmouth, Virginia
- Pearl Harbor Naval Shipyard, Honolulu, Hawaii
- Portsmouth Naval Shipyard, Kittery, Maine
- Puget Sound Naval Shipyard, Bremerton, Washington
- Fleet Readiness Center East, Cherry Point, North Carolina
- Fleet Readiness Center Southeast, Jacksonville, Florida
- Fleet Readiness Center Southwest, San Diego, California
- Ogden Air Logistics Complex, Ogden, Utah

[1]The minimum investment requirement, or 6 percent rule, was established in the *John Warner National Defense Authorization Act for Fiscal Year 2007,* Pub. L. No.109-364, § 332 (2006), *codified at* 10 U.S.C. § 2476.

- Oklahoma City Air Logistics Complex, Oklahoma City, Oklahoma
- Warner Robins Air Logistics Complex, Warner Robins, Georgia
- Albany Production Plant, Albany, Georgia
- Barstow Production Plant, Barstow, California

For each of these locations, we collected and analyzed data such as facility condition rating, facility age, number of facility repairs, equipment age, number of equipment repairs, restoration and modernization backlog, work stoppages due to facility and equipment conditions, depot investment projects, and depot performance metrics including on-time delivery and delayed maintenance days. Whenever possible, we collected data from fiscal year 2007 – the year in which the 6 percent rule was first enacted – to fiscal year 2017, the latest for which most data were available.

To assess the reliability of the data to address the objectives in this report, we submitted and reviewed service responses to data reliability questionnaires, reviewed system documentation and interviewed officials to understand system operating procedures, organizational roles and responsibilities, and error-checking mechanisms. We also conducted our own error checks to look for inaccurate or questionable data and discussed with officials any data irregularities we found. We conducted these assessments on the following systems:

- the Installation Status Reporting system for data on Army facility condition and replacement cost from fiscal year 2010 to fiscal year 2017;
- the internet Navy Facility Asset Data Score for data on Navy and Marine Corps facility condition, age, and replacement cost from fiscal year 2013 to fiscal year 2017;
- the Automated Civil Engineering System for data on Air Force facility condition and replacement cost for fiscal year 2018;
- the Defense Property Accountability System for data on Army age of equipment for fiscal year 2017;
- the Facilities and Equipment Maintenance system for data on Navy shipyard equipment repair tickets from fiscal year 2007 to 2017, Army and Air Force facility repair tickets from fiscal year 2007 to 2017, and Army and Air Force equipment repair tickets from fiscal year 2007 to 2017;

- the Maximo system for data on Navy shipyard and Navy aviation age of equipment, fiscal year 2017; Navy shipyard, Navy aviation, and Marine Corps facility repair tickets from fiscal years 2007 to 2017; and Navy aviation and Marine Corps equipment repair tickets from fiscal years 2007 to 2017;
- the General Fund Enterprise Business System for data on facility and equipment repairs and investment projects from fiscal year 2007 through fiscal year 2017;
- the Defense Industrial Financial Management System for data on Air Force age of equipment for fiscal year 2017;
- the Logistics Modernization Program for data on Army depot performance from fiscal years 2014 to 2017, investment projects, and equipment repairs from fiscal year 2007 through fiscal year 2017;
- the Navy Modernization Process for data on Navy shipyard performance from fiscal years 2007 to 2017;
- Production Status Reporting for data on Navy aviation depot performance from fiscal years 2007 to 2017;
- the Aircraft/Missile Maintenance Production/Compression Report for data on Air Force depot performance from fiscal years 2007 to 2017; and
- the Master Scheduling Support Tool for data on Marine Corps depot performance from fiscal years 2007 to 2017.

We found the data that we used from these systems to be sufficiently reliable for the purposes of summarizing trends in the selected facility and equipment metrics reported.

To determine the extent to which the services track data on maintenance delays caused by facilities and equipment conditions, we requested data on work stoppages related to facilities and equipment conditions at the depots. We also spoke with service officials about delays and work stoppages and the ability of the services to collect this data, and the extent to which they used delay and work stoppage data to target their investments. We did not assess the reliability of any work stoppage data, as we are not reporting this data.

In our analysis of facility condition ratings, we took the average of the condition ratings for all facilities in a given depot and fiscal year, and then weighted them by the replacement value of the facilities in order to ensure

that costlier facilities were given greater weight in the analysis.[2] We used this information to determine the current status of the overall depot facility condition and reviewed this in conjunction with the depots' performance metrics. We also reviewed Department of Defense (DOD) and service guidance on logistics, maintenance, facilities, and equipment. We visited three of the 21 service depots, which were selected based on resources and availability, to gain insight into the specific challenges faced at the depots. We also interviewed service depot and budget officials to obtain an understanding of how they manage the depot investment process. To support our analysis on each of our objectives, we interviewed officials from the following organizations:

Office of the Secretary of Defense

- Office of the Deputy Assistant Secretary of Defense for Materiel Readiness

Navy

- Headquarters, Department of the Navy
- Command, Fleet Readiness Centers
- Naval Air Systems Command
- Fleet Readiness Center Southwest
- Naval Sea Systems Command

Army

- Headquarters, Department of the Army
- Army Material Command
- Corpus Christi Army Depot

Marine Corps

- Marine Corps Logistics Command
- Marine Depot Maintenance Command

[2]This method is similar to the one we used in GAO, *Naval Shipyards: Actions Needed to Improve Poor Conditions that Affect Operations*, GAO-17-548 (Washington, D.C.: Sept. 12, 2017). As we noted in that report, there are other means by which facility ratings can be assessed, such as by using simple averages or weighting by the criticality of the facility. However, the previous report did not identify any particular advantage to using these other methods, and so we continue to use this method for consistency. This method is the same used by the Navy to calculate its condition ratings.

- Marine Corps Logistics Base Albany

Air Force

- Headquarters, Department of the Air Force
- Air Force Material Command
- Air Force Sustainment Center

To determine the extent to which DOD and the services have developed an approach for guiding depot investments to address key challenges, we discussed with service depot and materiel command officials the depot investment process, the existence of investment plans at the DOD, service, or depot levels, and any challenges in meeting service operational needs resulting from inadequate investment. We also reviewed service documentation on current and future investment plans and analyzed the depots' processes guiding investment decisions to determine whether these included any elements of a results-oriented management approach. Our previous work has highlighted the importance of a results-oriented management approach to effective operations and investment at various organizations, including defense logistics.[3]

To determine whether the military departments are complying with the requirements of the 6 percent rule, we reviewed service reports on compliance and verified the reports by comparing reported figures to the services' approved facility and equipment project lists. To determine the extent to which the amounts identified for capital budget activities by the military departments were spent on sustainment of existing facilities, we reviewed 6 percent project investment lists and obligated amounts provided by the services from fiscal years 2012 – the first year in which sustainment was prohibited in 6 percent reporting – to fiscal year 2017 –

[3]*See* GAO, *Naval Shipyards: Actions Needed to Improve Poor Conditions that Affect Operations*, GAO-17-548 (Washington, D.C.: Sept. 12, 2017); *Defense Inventory: Actions Needed to Improve the Defense Logistics Agency's Inventory Management*, GAO-14-495 (Washington, D.C.: June 19, 2014); *Managing for Results: Data-Driven Performance Reviews Show Promise but Agencies Should Explore How to Involve Other Relevant Agencies,* GAO-13-228 (Washington, D.C.: Feb. 27, 2013); *DOD's 2010 Comprehensive Inventory Management Improvement Plan Addressed Statutory Requirements, but Faces Implementation Challenges*, GAO-11-240R (Washington, D.C.: Jan. 7, 2011); *Results-Oriented Management: Strengthening Key Practices at FEMA and Interior Could Promote Greater Use of Performance Information*, GAO-09-676 (Washington, D.C.: Aug. 17, 2009); *Managing For Results: Enhancing Agency Use of Performance Information for Management Decision Making*, GAO-05-927 (Washington, D.C.: Sept. 9, 2005); and GAO/GGD/AIMD-99-69.

the last year for which projects were available. We compared those lists with the services' actual reported 6 percent spending in their respective budget justification books (specifically, the Fund-6 Report), and reconciled any differences.

We then identified facility projects that cost $250,000 and above with the potential for sustainment activities.[4] First, an analyst recorded his assessment of whether a project might include sustainment activity. A second analyst independently reviewed the same information and recorded her assessment. The two analysts created a final assessment that reconciled their two independent assessments and reflects their consensus. This sample is not generalizable to all service projects, but was chosen to identify the projects most likely to affect compliance with the 6 percent rule.

We then requested and collected additional project documentation, such as project proposals, for those projects that both analysts agreed had the potential to include sustainment activities. Using this more detailed project documentation, an analyst recorded his assessment of whether a project included sustainment activity. A second analyst independently reviewed the same information and recorded her assessment of whether the project included sustainment activity. The two analysts created a final assessment that reconciled their two independent assessments and reflects their consensus.

[4]We made the determination as to whether a project had the potential for sustainment activities by comparing its name and/or short description against the DOD definition of sustainment. DOD defines sustainment as the maintenance and repair activities necessary to keep an inventory of facilities in good working order. It includes regularly scheduled adjustments and inspections, preventive maintenance tasks, and emergency response and service calls for minor repairs. It also includes major repairs or replacement of facility components (usually accomplished by contract) that are expected to occur periodically throughout the life cycle of facilities. This work includes regular roof replacement, refinishing of wall surfaces, repairing and replacement of heating and cooling systems, replacing tile and carpeting, and similar types of work. It does not include environmental compliance costs, facility leases, or other tasks associated with facilities operations (such as custodial services, grounds services, waste disposal, and the provision of central utilities). DOD 7000.14-R, *Financial Management Regulation*, vol. 2B, chap. 8, § 080105 (Dec. 2016). The military departments have guidance that promulgates this definition, but in the interest of consistency, we made our determinations solely using the DOD guidance. We limited the review to facilities projects because, by definition, equipment projects cannot be considered sustainment. We also limited the sample to projects that cost $250,000 and above in order to focus on those projects most likely to have had an impact on whether a service's reporting of sustainment affected their meeting the 6 percent investment minimum.

We then shared the results of our review to obtain the services' perspectives. In some cases, the services provided additional information about a project that led us to revise our initial determination, such as noting that a particular project was conducted as a result of severe weather damage (which is considered restoration, even if the activity would otherwise be considered sustainment). For the Air Force and Navy shipyards, our final determination of sustainment projects – as presented in summary in appendix I – was consistent with the services' respective determinations of which projects included sustainment activity. We presented these amounts using nominal, non-inflation adjusted dollars, in order that the comparison with that year's 6 percent minimum reporting would be comparable. Officials from the Marine Corps and Navy aviation command did not agree with our determination that one and three of the reviewed projects, respectively, included sustainment activity. The Army did not provide a response to most of our sustainment determinations.

We conducted this performance audit from August 2017 to April 2019 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.

Appendix XXIV: Comments from the Department of Defense

SUSTAINMENT

ASSISTANT SECRETARY OF DEFENSE
3500 DEFENSE PENTAGON
WASHINGTON, DC 20301-3500

APR 12 2019

Ms. Diana Maurer
Director, Defense Capabilities and Management
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Maurer:

This is the Department of Defense (DoD) response to the Government Accountability Office (GAO) Draft Report, GAO-19-242, "MILITARY DEPOTS: Actions Needed to Improve Poor Conditions of Facilities and Equipment that Affect Timeliness and Efficiency of Maintenance" dated February 22, 2019 (GAO Code 102250). Detailed comments on the report recommendations are enclosed. Additionally, and as stressed in the enclosure, I note that the Air Force questions the supporting data for recommendation #5 regarding aging facilities and equipment impacts on depot performance.

Sincerely,

Robert H. McMahon

Enclosure:
As stated

GAO DRAFT REPORT DATED FEBRUARY 22, 2019
GAO-19-242 (GAO CODE 102250)

"MILITARY DEPOTS: Actions Needed to Improve Poor Conditions of Facilities and Equipment that Affect Timeliness and Efficiency of Maintenance"

DEPARTMENT OF DEFENSE COMMENTS
TO THE GAO RECOMMENDATIONS

RECOMMENDATION 1: The GAO recommends that the Secretary of the Army should ensure that Army Materiel Command establishes measures for its depots to track facility or equipment conditions that lead to maintenance delays.

DoD RESPONSE: Concur. The Secretary of the Army will ensure that Army Materiel Command establishes measures for its depots to track facility or equipment conditions that lead to maintenance delays.

RECOMMENDATION 2: The GAO recommends that the Secretary of the Army should ensure that Army Materiel Command implements tracking of the measures for identifying when facility or equipment conditions lead to maintenance delays at each Army depot.

DoD RESPONSE: Concur. The Secretary of the Army will ensure that Army Materiel Command implements tracking of the measures for identifying when facility or equipment conditions lead to maintenance delays at each Army depot.

RECOMMENDATION 3: The GAO recommends that The Secretary of the Navy should ensure that Navy Sea Systems Command and the Commander, Fleet Readiness Centers establish measures for its depots to track facility or equipment conditions that lead to maintenance delays.

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2

RECOMMENDATION 5: The GAO recommends that the Secretary of the Air Force should ensure that Air Force Materiel Command establishes measures for its depots to track facility or equipment conditions that lead to maintenance delays.

DoD RESPONSE: Concur. The Secretary of the Air Force will ensure that Air Force Materiel Command establishes measures for its depots to track facility or equipment conditions that lead to maintenance delays. While the Air Force concurs with the GAO's recommendations, it takes issues with the GAO's conclusions in this report. Therefore, the Air Force would appreciate the opportunity to discuss the conclusions with the GAO.

RECOMMENDATION 6: The GAO recommends that the Secretary of the Air Force should ensure that Air Force Materiel Command implements tracking of the measures for identifying when facility or equipment conditions lead to maintenance delays at each Air Force depot.

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RECOMMENDATION 7: The GAO recommends the Commandant of the Marine Corps should ensure that Marine Corps Logistics Command establishes measures for its depots to track facility or equipment conditions that lead to maintenance delays.

DoD RESPONSE: Concur. The Commandant of the Marine Corps will ensure that Marine Corps Logistics Command establishes measures for its depots to track facility or equipment conditions that lead to maintenance delays.

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DoD RESPONSE: Concur. The Commandant of the Marine Corps will ensure that Marine Corps Logistics Command implements tracking of the measures for identifying when facility or equipment conditions lead to maintenance delays at each Marine Corps depot.

RECOMMENDATION 9: The GAO recommends the Secretary of the Army should ensure that Army Materiel Command incorporates in its depot optimization plan, key results-oriented elements including analytically-based goals, results-oriented metrics, identification of required resources, risks, and stakeholders, and regular reporting to decision makers on progress.

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3

RECOMMENDATION 10: The GAO recommends the Secretary of the Navy should ensure that Commander, Fleet Readiness Centers incorporates in its depot optimization plan, key results-oriented elements including analytically-based goals, results-oriented metrics, identification of required resources, risks, and stakeholders, and regular reporting to decision makers on progress.

DoD RESPONSE: Concur. The Secretary of the Navy will ensure that Commander, Fleet Readiness Centers incorporates in its depot optimization plan, key results-oriented elements including analytically-based goals, results-oriented metrics, identification of required resources, risks, and stakeholders, and regular reporting to decision makers on progress.

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RECOMMENDATION 12: The GAO recommends the Commandant of the Marine Corps should ensure that Marine Corps Logistics Command incorporates in its depot optimization plan, key results-oriented elements including analytically-based goals, results-oriented metrics, identification of required resources, risks, and stakeholders, and regular reporting to decision makers on progress.

DoD RESPONSE: Concur. The Commandant of the Marine Corps will ensure that Marine Corps Logistics Command incorporates in its depot optimization plan, key results-oriented elements including analytically-based goals, results-oriented metrics, identification of required resources, risks, and stakeholders, and regular reporting to decision makers on progress.

RECOMMENDATION 13: The GAO recommends the Secretary of Defense should ensure that the Assistant Secretary of Defense for Sustainment develops an approach for managing service depot investments that includes management monitoring and regular reporting to decision makers and Congress on progress.

DoD RESPONSE: Non-concur. The Assistant Secretary of Defense for Sustainment cannot develop an approach for managing depot investments and monitoring progress until depot optimization plans are finalized and resourced through programming actions. After these steps have been accomplished the Department can assess investment progress against the plan for executing resources. The Department will continue to monitor capital investments at Service depots through depot maintenance related budget exhibits and program reviews.

Appendix XXV: GAO Contact and Staff Acknowledgments

GAO Contact

If you or your staff have questions about this report, please contact Diana Maurer, (202) 512-9627 or maurerd@gao.gov

Staff Acknowledgments

In addition to the individual named above, key contributors to this report are Suzanne Wren, (Assistant Director), James Lackey (Analyst in Charge), Andrew Duggan, Amie Lesser, Felicia Lopez, Michael Perkins, Carol Petersen, Michael Silver, John E. “Jet” Trubey, Britney Tsao, and Lillian Yob.

Appendix XXVI: Accessible Data

Data Tables

Accessible Data for Summary of Facilities, Equipment, and Performance at 21 Service Depots

Category	Subcategory	Number of service depots
Facility condition	Good	4
Facility condition	Fair	5
Facility condition	Poor	12

Category	Subcategory	Number of service depots
Equipment age	Below service life	3
Equipment age	Above service life	15
Equipment age	Not enough data	3

Category	Subcategory	Notes
Performance	Navy shipyards	45% increase in days of maintenance delay
Performance	Navy aviation	45% on-time decrease
Performance	Air Force	17% on-time decrease
Performance	Marine Corps	Less than 1% decrease in meeting planned production
Performance	Army	Not enough data

Accessible Data for Figure 5: Average Weighted Facility Condition Ratings at the 21 Military Depots, Fiscal Year 2017

Military depot	Condition rating
Ogden ALC	68
FRC Southwest (North Island)	72
Norfolk Naval Shipyard	73

Military depot	Condition rating
OK City ALC	73
Barstow	73
Pearl Harbor Naval Shipyard & IMF	73
Corpus Christi Depot	74
Portsmouth Naval Shipyard	74
FRC Southeast (Jacksonville)	75
Tobyhanna Depot	78
Watervliet Arsenal	79
Albany	79
FRC East (Cherry Point)	80
Puget Sound Naval Shipyard & IMF	81
Rock Island Arsenal	84
Warner Robins ALC	84
Pine Bluff Arsenal	87
Red River Depot	92
Letterkenny Depot	92
Tooele Depot	92
Anniston Depot	94

Accessible Data for Figure 6: Change in Average Weighted Facility Condition Rating for the 21 Military Depots, Fiscal Years 2013 – 2017

Military depot	Condition rating
Corpus Christi Depot	-16.2
Watervliet Arsenal	-11.29
Pearl Harbor Naval Shipyard & IMF	-8.3
FRC Southwest (North Island)	-5.33
Red River Depot	-4.48
Tooele Depot	-3.37
Letterkenny Depot	-2.97
Anniston Depot	-2.13
FRC Southeast (Jacksonville)	-1.05
Pine Bluff Arsenal	0.17
Tobyhanna Depot	1.87
Norfolk Naval Shipyard	6.82
Rock Island Arsenal	7.24
FRC East (Cherry Point)	7.4

Military depot	Condition rating
Portsmouth Naval Shipyard	10.7
Puget Sound Naval Shipyard & IMF	12.41
Ogden ALC	
OK City ALC	
Warner Robins ALC	
Albany	
Barstow	

Accessible Data for Figure 7: Average Age of Equipment as a Percentage of Its Expected Service Life, by Depot, as of Fiscal Year 2017

Military depot	Percentage
Tobyhanna Depot	29
Corpus Christi Depot	56
Red River Depot	84
Pearl Harbor Naval Shipyard & IMF	106
Letterkenny Depot	120
Portsmouth Naval Shipyard	122
Albany	123
Puget Sound Naval Shipyard & IMF	132
FRC East (Cherry Point)	140
Barstow	157
OK City ALC	167
Rock Island Arsenal	171
FRC Southwest (North Island)	174
FRC Southeast (Jacksonville)	174
Ogden ALC	182
Warner Robins ALC	195
Watervliet Arsenal	198
Norfolk Naval Shipyard	208
Anniston Depot	0
Tooele Depot	0
Pine Bluff Arsenal	0

Accessible Data for Figure 8: On-Time Performance at the Navy's Three Aviation Depots, Fiscal Years 2007 – 2017

Fiscal year	Aircraft	Engines and modules	Components
2007	56	50	
2008	57	65	
2009	61	70	
2010	51	70	
2011	44	46	
2012	42	68	
2013	37	57	35
2014	44	34	37
2015	41	48	38
2016	34	45	38
2017	31	29	33

Accessible Data for Figure 9: On-Time Performance at the Three Air Force Aviation Depots, Fiscal Years 2007 – 2017

Fiscal year	Percent on-time
2007	98
2008	91
2009	82
2010	77
2011	71
2012	94
2013	90
2014	78
2015	78
2016	81
2017	81

Accessible Data for Figure 10: Days of Maintenance Delay at the Four Navy Shipyards, Fiscal Years 2007 – 2017

Fiscal year	Days late
2007	986
2008	644

Fiscal year	Days late
2009	693
2010	400
2011	466
2012	1124
2013	686
2014	1094
2015	1777
2016	1583
2017	1431

Accessible Data for Figure 11: Depot Performance Measures at Seven Army Depots, Fiscal Years 2014 – 2017

Fiscal year	Anniston	Watervliet	Red River	Tobyhanna	Letterkenny	Rock Island	Corpus Christi
2014		89		84		38	103
2015	85	94	91	78	63	54	96
2016	88	95	89	78	65	59	100
2017	87	88	92.5	78	83	84	103

Accessible Data for Figure 12: Performance Output at the Two Marine Corps Depots, Fiscal Years 2008 – 2017

Fiscal year	Percent completed according to plan
2008	96
2009	95
2010	102
2011	100
2012	100
2013	83
2014	83
2015	93
2016	92
2017	96

Accessible Data for Figure 13: Military Department Reported Depot Investment as a Percentage of Average Total Combined Maintenance, Repair, and Overhaul Workload

Fiscal year	Army	Air Force	Navy
2007	6	7.1	5.38
2008	9	6.1	7.49
2009	9.7	7.9	8.48
2010	7.4	10.3	10.9
2011	5.6	10.3	9.5
2012	6.5	7.2	7.9
2013	4.7	7.6	7.1
2014	6.8	8.3	7.1
2015	6.8	6.6	7.5
2016	6.5	7.1	9.2
2017	6.5	8.1	8.4

Accessible Data for Figure 14: Distribution of Navy Depot Investment Spending, by Organization, Fiscal Years 2007 – 2017

Organization	Distribution percentage
Marine Corps	4%
Fleet Readiness Centers	21%
Shipyards	76%

Accessible Data for Figure 15: Navy Depot Investment as a Percentage of Average Total Combined Maintenance, Repair, and Overhaul Workload, by Navy Organization, Fiscal Years 2007 – 2017

Fiscal year	Shipyards	Fleet Readiness Centers	Marine Corps Production Plants
2007	6.1	3.7	0
2008	10	5.6	2.6
2009	10.1	5.8	3.2
2010	15.6	4.9	4.9
2011	13.9	4.3	5.8
2012	8.8	7.2	3.7
2013	8.7	5.1	2.2
2014	9.5	4.6	1.9

Fiscal year	Shipyards	Fleet Readiness Centers	Marine Corps Production Plants
2015	8.8	4.9	5.6
2016	11.3	5.3	3.6
2017	10.1	5.7	3.6

Agency Comment Letter

Accessible Text for Appendix XXIV Comments from the Department of Defense

Page 1

APR 12 2019

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Director, Defense Capabilities and Management

U.S. Government Accountability Office

441 G Street, NW

Washington, DC 20548

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Related GAO Products

DOD Depot Workforce: Services Need to Assess the Effectiveness of Their Initiatives to Maintain Critical Skills. GAO-19-51. Washington, D.C.: December 14, 2018.

Navy Readiness: Actions Needed to Address Costly Maintenance Delays Facing the Attack Submarine Fleet. GAO-19-229. Washington, D.C.: November 19, 2018.

Air Force Readiness: Actions Needed to Rebuild Readiness and Prepare for the Future. GAO-19-120T. Washington, D.C.: October 10, 2018.

Weapon System Sustainment: Selected Air Force and Navy Aircraft Generally Have Not Met Availability Goals, and DOD and Navy Guidance Need to Be Clarified. GAO-18-678. Washington, D.C.: September 10, 2018.

Military Readiness: Analysis of Maintenance Delays Needed to Improve Availability of Patriot Equipment for Training. GAO-18-447. Washington, D.C.: June 20, 2018.

Navy Shipbuilding: Past Performance Provides Valuable Lessons for Future Investments. GAO-18-238SP. Washington, D.C.: June 6, 2018.

Navy Readiness: Actions Needed to Address Persistent Maintenance, Training, and Other Challenges Affecting the Fleet. GAO-17-809T. Washington, D.C.: September. 19, 2017.

Naval Shipyards: Actions Needed to Improve Poor Conditions that Affect Operations. GAO-17-548. Washington, D.C.: September 12, 2017.

Navy Shipbuilding: Policy Changes Needed to Improve the Post-Delivery Process and Ship Quality. GAO-17-418. Washington, D.C.: July 13, 2017.

Department of Defense: Actions Needed to Address Five Key Mission Challenges. GAO-17-369. Washington, D.C.: June 13, 2017.

Military Readiness: DOD's Readiness Rebuilding Efforts May Be at Risk without a Comprehensive Plan. GAO-16-841. Washington, D.C.: September 7, 2016.

Defense Inventory: Further Analysis and Enhanced Metrics Could Improve Service Supply and Depot Operations. GAO-16-450. Washington, D.C.: June 9, 2016.

Military Readiness: Progress and Challenges in Implementing the Navy's Optimized Fleet Response Plan. GAO-16-466R. Washington, D.C.: May 2, 2016.

Defense Inventory: Actions Needed to Improve the Defense Logistics Agency's Inventory Management. GAO-14-495. Washington, D.C.: June 19, 2014.

DOD's 2010 Comprehensive Inventory Management Improvement Plan Addressed Statutory Requirements, But Faces Implementation Challenges. GAO-11-240R. Washington, D.C.: January 7, 2011.

GAO's Mission

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