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The Honorable John McCain
Chairman
The Honorable Jack Reed
Ranking Member
Committee on Armed Services
United States Senate
The Honorable Mac Thornberry
Chairman
The Honorable Adam Smith
Ranking Member
Committee on Armed Services
House of Representatives

Depot Maintenance: Executed Workload and Maintenance Operations at DOD Depots

The Department of Defense (DOD) uses its maintenance capabilities to maintain, overhaul, and repair its military weapon systems (such as aircraft and ships) and equipment (such as generators and radars).¹ To maintain these systems and equipment in order to meet national security goals, DOD uses a combination of military depots—public-sector facilities that are government-owned and government-operated—and private-sector contractors.² Depots have a key role in sustaining complex weapon systems and equipment both in peacetime and during mobilization, contingency, or other emergency. The military services operate 17 primary government-owned facilities—such as Anniston Army Depot at Anniston, Alabama; Air Force's Air Logistic Complex at Ogden, Utah; Norfolk Naval Shipyard at Portsmouth, Virginia; and Marine Depot Maintenance Command at Albany, Georgia—that perform depot-level maintenance on a wide range of vehicles and other military assets, including helicopters, combat vehicles, ships, aircraft, engines, and software.³ According to DOD, in fiscal year 2015 there were approximately 45,000 civilian personnel at the depots who perform maintenance and 30,000 other civilian non-maintainers—engineers, scientists, analysts, and supply specialists—who are essential to depot maintenance production.

¹There are two levels of DOD maintenance: field level and depot level. Field-level maintenance includes organizational and intermediate maintenance and requires fewer skills, but it occurs more frequently. Depot level maintenance occurs less frequently but requires greater skills. Maintenance ranges in complexity from daily system inspection, to rapid removal and replacement of components, to the complete overhaul or rebuild of a weapon system.

²Depot maintenance is an action performed on materiel or software in the conduct of inspection, repair, overhaul, or the modification or rebuild of end-items, assemblies, subassemblies, and parts that, among other things, requires extensive industrial facilities, specialized tools and equipment, or uniquely experienced and trained personnel that are not available in other maintenance activities. Depot maintenance is independent of any location or funding source and may be performed in the public or private sectors.

³We will refer to depots, shipyards, fleet readiness centers, air logistics complexes, and production plants collectively as depots in this report.

Section 2464 of Title 10 of the United States Code requires the Secretary of Defense to identify DOD's core logistics capabilities, which include capabilities that are necessary to maintain and repair weapon systems to enable the armed forces to fulfill strategic and contingency plans.⁴ Additionally, the Secretary of Defense must assign these facilities sufficient workload to ensure that the department can maintain cost efficiency and technical competence during peacetime while preserving its ability to respond to a mobilization, contingency, or emergency. While the statute does not define workload, DOD defines workload as an amount of depot maintenance work related to specific weapon systems, equipment, components, or programs and to specific services, facilities, and commodities.⁵

Senate Report 114-49 and House Report 114-02 accompanying the National Defense Authorization Act for Fiscal Year 2016 each included a provision for us to review DOD's processes and management of core capability requirements at the depots. In November 2016, we reported on DOD's 2016 Biennial Core Report and its planning and execution of depot maintenance workloads to sustain core capability requirements.⁶ We found that DOD, in accordance with DOD Instruction 4151.20, plans depot maintenance workloads by having components report biennially to the Office of the Secretary of Defense on their core capability requirements and planned workload. However, DOD is not consistently comparing or reporting whether workload intended to sustain a core capability has been executed, because DOD Instruction 4151.20 does not require it to do so. Additionally, while 10 U.S.C. § 2464 requires DOD to assign sufficient depot maintenance workload to the depots to sustain a core capability, it does not require DOD to determine whether the assigned workload has been executed. We included a matter for Congress to consider amending 10 U.S.C. § 2464 to require DOD to include information on whether the core requirements reported in the previous Biennial Core Report have been executed, among other things. This report includes additional information on depot maintenance by describing the executed maintenance workload at the military services' depots from fiscal year 2012 through 2015, and provides detailed information for each of the 17 depots, on executed workload, personnel, capital investments, process improvements, and public-private partnerships in enclosure I.

To perform our work, we reviewed 10 U.S.C. § 2464 and DOD Instruction 4151.20. We collected information on the military services' processes for managing, planning, and executing depot maintenance workloads by contacting officials from each of the military service headquarters, logistics, and materiel commands. We conducted site visits to nine depots where we interviewed depot officials to discuss trends in managing and executing workload, hiring and training personnel, and planning for capital investments.⁷ This non-generalizable sample was

⁴For the purposes of this report, we define capability as a combination of skilled personnel, facilities, and equipment, among other things.

⁵Department of Defense Instruction 4151.20, *Depot Maintenance Core Capabilities Determination Process* (Jan. 5, 2007). According to this instruction, workload is measured in direct labor hours. A direct labor hour is one hour of effort directly attributed to a category of work.

⁶GAO, *Depot Maintenance: Improvements to DOD's Biennial Core Report Could Better Inform Oversight and Funding Decisions*, [GAO-17-81](#) (Washington, D.C.: Nov. 28, 2016). We also reported on DOD's planned workload to sustain core capability requirements in our prior reviews of DOD's 2012 and 2014 Biennial Core Reports. See GAO, *Depot Maintenance: Accurate and Complete Data Needed to Meet DOD's Core Capability Requirements*, [GAO-14-777](#) (Washington, D.C.: Sep. 18, 2014) and GAO, *Depot Maintenance: Additional Information Needed to Meet DOD's Core Capability Reporting Requirements*, [GAO-13-194](#) (Washington, D.C.: Feb. 11, 2013). See a full list of GAO's related products at the end of this report.

⁷To perform repairs, depots require personnel and facilities—such as physical space, infrastructure, and equipment. The military services and depots make capital investments in facilities and equipment aimed at improving the effectiveness and efficiency of the repair process. We did not assess whether the military services had met the

selected to ensure a mix of military services (at least one per type of site—Army depot, Navy shipyard, Navy Fleet Readiness Center, Air Force Air Logistics complex, and Marine Corps depot) and types of weapon systems repaired (a mix of air, ground, and sea), among other factors. For the locations we did not visit, we collected information through questionnaires. We also collected and analyzed data on workload, personnel, and capital investment for each military depot for fiscal years 2012 through 2015. We chose this time frame because it covered the same time period as the information provided by DOD in its first two Biennial Core Report submissions to Congress, which were issued in September 2012 and June 2014.

We also conducted data reliability assessments for the data provided by each of the military services. To do this, we sent data reliability questionnaires to all four military services. For the Army, Navy, and Marine Corps, we reviewed their responses as well as documentation—such as guidance, training, and user manuals—provided to corroborate questionnaire responses, and interviewed knowledgeable agency officials to discuss the data. We concluded that the data provided by the Army, Navy, and Marine Corps were sufficiently reliable for the purposes of this report. We also sent a questionnaire to the Air Force, but we did not receive responses to all of the questions or related documentation that would allow us to assess the reliability of all of the Air Force data that we had obtained. Specifically, we were unable to assess the reliability of the Air Force's workload data and therefore we concluded that these data were of undetermined reliability. However, we are reporting the Air Force's workload data along with the information provided by the other three military services because, according to Air Force officials, they use this information to track the Air Force's workload internally, and we believe that reporting the Air Force workload data helps to provide a general indication of the magnitude of its workload compared to the other military services.

We conducted this performance audit from May 2015 to February 2017 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 based on our audit objectives.

Workload Executed across the Military Services' Depots Fluctuated From Fiscal Year 2012 through 2015

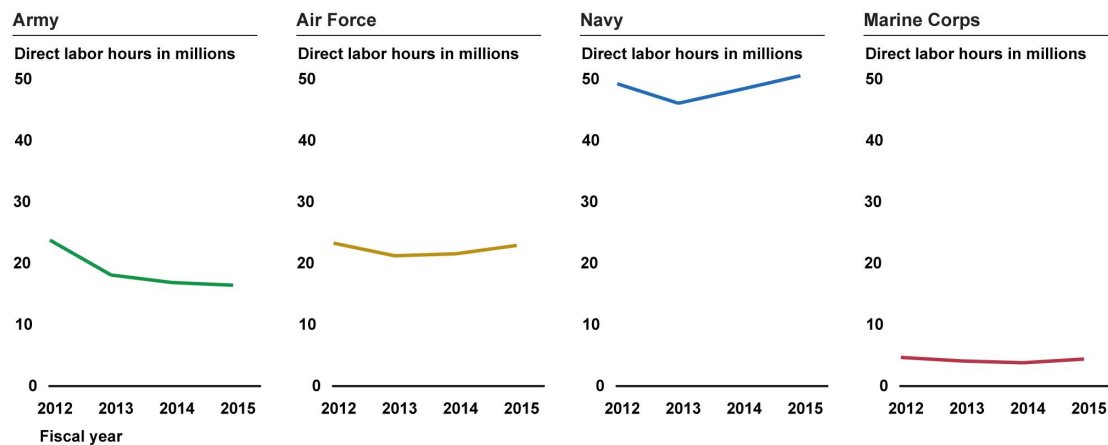
From fiscal year 2012 through 2015, the workload executed across the military services' depots fluctuated, as shown in figure 1. For all four military services, the greatest decrease in depot maintenance workload occurred in fiscal year 2013, which officials attributed to sequestration.⁸ Specifically, in response to reduced funding levels, some military services deferred depot

requirements of 10 U.S.C. § 2476, which states that in each fiscal year the Secretary of a military department shall invest in the capital budgets of the covered depots of that military department a total amount equal to not less than six percent of the average total combined maintenance, repair, and overhaul workload funded at all the depots of that military department for the preceding three fiscal years.

⁸The Budget Control Act of 2011, Pub. L. No. 112-25 (2011), established, among other things, a congressional Joint Select Committee on Deficit Reduction to propose legislation that would reduce federal deficits by \$1.5 trillion over ten years (fiscal years 2012–2021) and two sequestration procedures: a sequestration procedure originally to be ordered by the President on January 1, 2013 to ensure that the level of deficit reduction would be achieved in the event that the Joint Committee failed to reach agreement to reduce the deficit by at least \$1.2 trillion, and an additional sequestration procedure to be triggered if appropriations exceed established discretionary spending caps in a given fiscal year between fiscal years 2012 and 2021. The sequestration in fiscal year 2013 used the former procedure, triggered because the Joint Committee did not reach agreement.

maintenance that had been planned for fiscal year 2013 to future years.⁹ The number of workload hours executed at Army and Marine Corps depots generally declined during fiscal years 2012 through 2015 as a result of a decrease in ground combat operations for the Army and Marine Corps and are expected to decline further in fiscal year 2016, according to Army and Marine Corps officials. Workload hours executed at Air Force depots, according to Air Force officials, has fluctuated over this time period and is expected to increase in the future as depots begin repairs on new systems, such as the F-35 and KC-46. Additionally, workload hours executed at Navy depots have generally increased over this time period. Navy officials attributed this increase to workload executed to reduce maintenance backlogs that have accumulated from over a decade of increased operations tempo.

Figure 1: Workload Executed at Depots in Fiscal Years 2012 through 2015, in Direct Labor Hours



Source: GAO analysis of service data. | GAO-17-82R

⁹GAO, *Sequestration: Observations on the Department of Defense's Approach in Fiscal Year 2013*, [GAO-14-177R](#) (Washington, D.C. Nov. 7, 2013).

Data Table for Figure 1: Workload Executed at Depots in Fiscal Years 2012 through 2015, in Direct Labor Hours

	Year	Direct Labor Hours in millions
Army	2012	23.552
	2013	17.881
	2014	16.65
	2015	16.216
Air Force	2012	23.07
	2013	21.013
	2014	21.337
	2015	22.697
Navy	2012	49.04
	2013	45.865
	2014	48.072
	2015	50.347
Marine Corps	2012	4.447
	2013	3.87
	2014	3.58
	2015	4.182

Note: The workload data for the Air Force is the data as reported by the Air Force. We were unable to determine the reliability of these data based on the information provided by the Air Force.

The military services' depot maintenance workload varied, as described below:

- **Army:** The Army operates five depots—Anniston, Corpus Christi, Letterkenny, Red River, and Tobyhanna—that perform depot-level maintenance. The total workload at these depots declined from about 23.6 million direct labor hours in fiscal year 2012 to about 16.2 million direct labor hours in fiscal year 2015, a reduction of about 31 percent. According to officials, the completion of repair and recapitalization maintenance programs, as well as a decrease in ground combat operations, reduced the need for depot maintenance.¹⁰ Accordingly, Army workload is expected to further decline in the future.
- **Air Force:** The Air Force operates three Air Logistics Complexes—Ogden, Oklahoma City, and Warner Robins—that perform depot-level maintenance. The total workload, according to Air Force officials, decreased at these depots from about 23 million direct labor hours in fiscal year 2012 to about 22.7 million direct labor hours in fiscal year 2015, a reduction of about 2 percent. According to officials, Air Force workload is expected to increase in the future, as depots begin repairs on new systems, such as the F-35 and KC-46.
- **Navy:** The Navy operates four naval shipyards—Norfolk, Pearl Harbor, Portsmouth, and Puget Sound—and three fleet readiness centers—East, Southeast, and Southwest—that perform depot-level maintenance. The total workload at these depots increased from about

¹⁰Repair is the restoration of parts or components of equipment as necessitated by wear and tear, damage, or failure of parts, in order to maintain the equipment in efficient operating condition. Recapitalization is the refurbishment of equipment to near zero-time/zero-mile status (like-new condition) resulting in the same model with a fully available lifespan. See GAO, *Defense Logistics: Marine Corps and Army Reset Liability Estimates*, GAO-15-569R (Washington, D.C.: June 22, 2015).

49 million direct labor hours in fiscal year 2012 to about 50.3 million direct labor hours in fiscal year 2015, an increase of about 3 percent. Workload is expected to continue to rise; Navy officials attributed this increase to workload executed to reduce maintenance backlogs that have accumulated from over a decade of increased operations tempo.

- **Marine Corps:** The Marine Corps operates one depot that consists of two production plants—Albany and Barstow—that perform depot-level maintenance. The total workload declined from about 4.4 million direct labor hours in fiscal year 2012 to about 4.2 million direct labor hours in fiscal year 2015, a reduction of about 6 percent. Workload was expected to further decline as a result of a decrease in ground combat operations, according to Marine Corps officials.

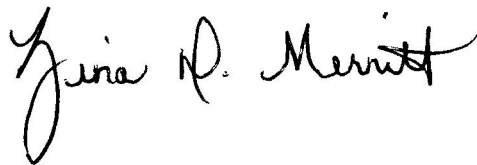
See enclosure I for additional information on the fluctuation of executed workload, personnel, capital investments, process improvements, and public-private partnerships, if applicable, at each of the 17 depots.¹¹

Agency Comments

We are not making any recommendations in this report. We provided a draft of this report to DOD for comment. DOD provided technical comments, which we incorporated as appropriate.

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

If you or your staff have any questions about this report, please contact me at (202) 512-5257 or merrittz@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in enclosure II.



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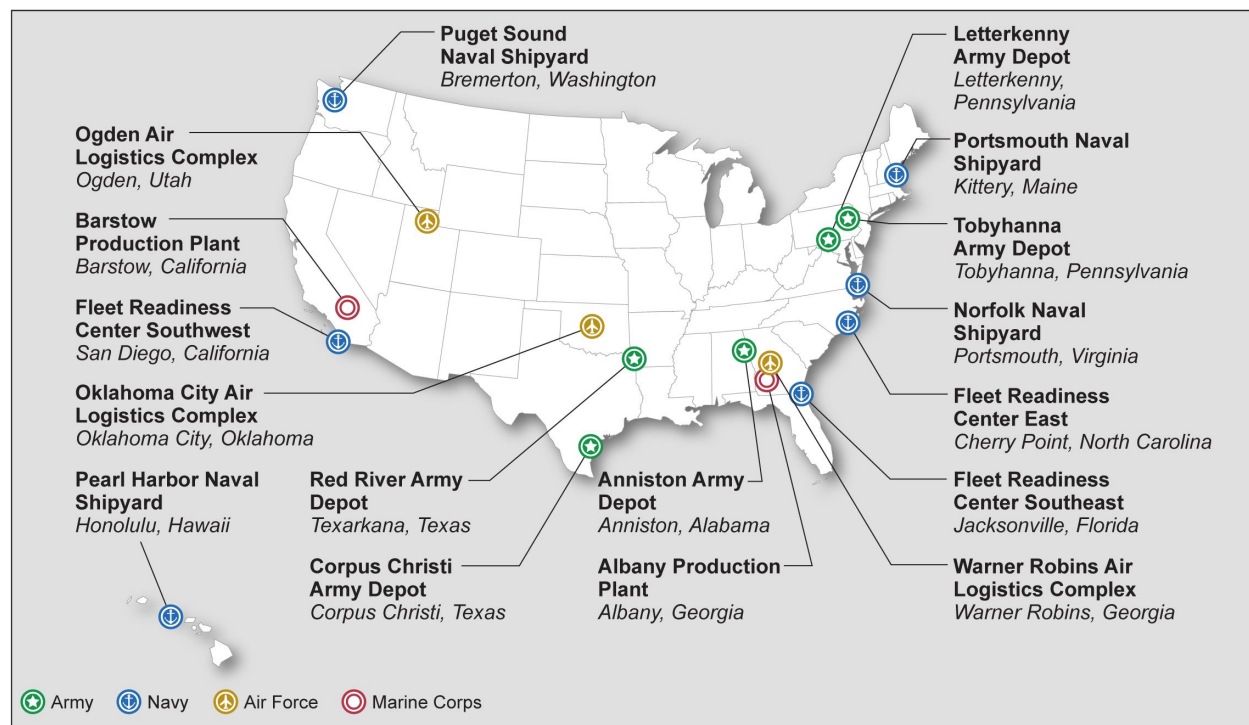
Enclosures – 2

¹¹Section 2474 of Title 10 of the U.S. Code directs the Secretary of each military department to designate each of DOD's depot-level maintenance activities as Centers of Industrial and Technical Excellence (CITE) in their core competencies. It also states that the Secretary may authorize and encourage the head of a CITE to enter into public-private partnerships, comprising government and private sector employees, to perform work related to the CITE's core competencies, or for private industry to use any facilities or equipment of the CITE that are not fully utilized for the military department's own production or maintenance requirements.

Enclosure I: Overview of the 17 Depots

The depots' mission is to provide a ready and controlled source of depot maintenance. There are 17 depots located across the United States (see figure 2) that primarily perform depot-level maintenance, repair, and overhaul activities on a wide range of vehicles and other military assets, including helicopters, combat vehicles, air defense systems, ships, fighter and bomber aircraft, engines, and software. This enclosure provides detailed information about each of the 17 depots on executed workload, personnel, capital investments, process improvements, and public-private partnerships.

Figure 2: Department of Defense's (DOD) Depot Maintenance Sites



Source: GAO analysis of Department of Defense documents. | GAO-17-82R



Anniston Army Depot

Army

Anniston, Alabama

The Army has designated Anniston Army Depot (ANAD) as a Center of Industrial and Technical Excellence for the maintenance and repair of Combat Vehicles (Wheeled and Track—except the Bradley), including Assault Bridging, Artillery, and Small Caliber Weapons.

Systems Repaired

Abrams Tanks, M88 Recovery Vehicle, M9 Armored Combat Earthmover, Stryker Vehicles, M113 Carrier, Self-Propelled and Towed howitzers, Assault Bridge Vehicles, and small arms.

Expected future workload includes upgrades to the Stryker and Abrams tanks, the Armored Multi-Purpose Vehicle, mine clearing equipment, and small arms.

Challenges

According to Army officials, the uncertainty and instability of the workload creates risk in determining which skill sets are necessary to plan for future readiness. Additionally, Army officials stated that because funds are diminishing and workload is not readily available, they will need to continue developing detailed succession and training plans to ensure the correct mix of skills in the workforce.

Figure 3: Systems Repaired at Anniston Army Depot



Source: Defense Video Imagery Distribution System and U.S. Army. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload decreased from 3,746,000 to 2,821,000 direct labor hours (DLHs). Army officials expected it to decrease further in fiscal year 2016 and attributed the declining workload to the decreased demand for repairing Abrams tanks and other combat vehicles. Specifically, Army officials stated that because the Army's Abrams tank fleet has a low average age, the depot is not required to execute much workload for its maintenance and repair.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel at the depot decreased from 3,365 to 2,711. Army officials attributed this decrease to declining workload but expected the number to remain steady in fiscal year 2016.
- **Capital investment.** In fiscal years 2012 through 2015, capital investment decreased. According to the Army, recent investments have included equipment to enable laser cutting and minor upgrades to small arms areas. The Army has also made investments in logistics software at all of its depots. According to the Army, this investment at ANAD was about \$35 million in fiscal years 2012 through 2015.

Figure 4: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Anniston Army Depot

	2012	2013	2014	2015
Thousands of workload hours	3,746	3,031	3,155	2,821
Number of personnel	3,365	2,896	2,968	2,711
Thousands of dollars of capital investment	30,070	19,168	7,680	9,339

Source: U.S. Army. | GAO-17-82R

- **Process improvements.** Army officials stated that their process improvements have saved or avoided over \$38 million in costs since fiscal year 2012. For example, ANAD improved processes in the assembly for the Abrams hull and turret.
- **Public-private partnerships.** According to Army officials, in fiscal years 2012 through 2015, ANAD engaged in partnerships that accounted for approximately 2,925,000 DLHs, at a value of \$480 million. These agreements included performing repairs on the Stryker combat vehicle and various foreign military sales. ANAD expects to be involved in partnerships to upgrade systems, such as the M1A2SEPV3, M88, and M109A7, in the future.



Corpus Christi Army Depot

Army

Corpus Christi, Texas

The Army has designated Corpus Christi Army Depot (CCAD) as a Center of Industrial and Technical Excellence for the maintenance and repair of structural helicopter airframes and blades; advanced composite technologies; flight controls and control surfaces; and aviation engines, transmissions, and hydraulic systems.

Systems Repaired

Helicopters (AH-64, AH-1, CH-47, OH-58, UH-60, and UH-1), engines and associated systems and subsystems.

At present, the Army has not identified any future weapon systems that will be repaired at CCAD.

Challenges

According to Army officials, CCAD experiences workload fluctuations, which can lead to difficulties in matching workforce skills to requirements. Additionally, to help mitigate workload shortfalls, CCAD sometimes seeks work from other services.

Figure 5: Systems Repaired at Corpus Christi Army Depot



Source: Defense Video Imagery Distribution System. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload declined from 5,481,000 to 3,656,000 direct labor hours (DLHs). Army officials attributed the decline to decreased ground combat operations and budgets and expected it to decline further in fiscal year 2016.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel decreased from 5,014 to 3,606. Army officials expected further decreases in fiscal year 2016 as a result of declining workload.
- **Capital investment.** In fiscal years 2012 through 2015, total spending on capital investment varied. According to the Army, recent investments included manufacturing equipment such as furnaces, vertical stretch presses, and x-ray equipment for rotor blade production. Future investments will include upgrades to equipment and facilities that enable testing of engines and towers which in turn enable testing of helicopter rotor blades. The Army has also made investments in logistics software at all of its depots. According to the Army, this investment at CCAD was about \$80 million in fiscal years 2012 through 2015.

Figure 6: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Corpus Christi Army Depot

	2012	2013	2014	2015
Thousands of workload hours	5,481	4,479	4,215	3,656
Number of personnel	5,014	4,815	4,267	3,606
Thousands of dollars of capital investment	18,324	82,631	22,730	15,193

Source: U.S. Army. | GAO-17-82R

- **Process improvements.** CCAD encourages employees to train in process improvement principles and then apply those principles at the shop floor level, according to Army officials. According to its internal tracking, CCAD has saved or avoided more than \$270 million in costs since fiscal year 2012 through these efforts.
- **Public-private partnerships.** According to Army officials, in fiscal years 2013 through 2015, CCAD engaged in public-private partnerships and commercial service repairs, valued at \$827,000, to assist with helicopter component assemblies. In fiscal year 2016 such partnerships are expected to provide \$322,000 in revenue, according to Army officials.



Letterkenny Army Depot

Army

Letterkenny, Pennsylvania

The Army has designated Letterkenny Army Depot (LEAD) as a Center of Industrial and Technical Excellence for the maintenance and repair of Air Defense and Tactical Missile Ground Support Equipment and Mobile Electric Power Generation Equipment.

Systems Repaired

Air Defense and Tactical Missiles, Mobile Electric Power, Route Clearance Vehicles (RCV), and Material Handling Equipment (MHE).

Expected future workload includes projects to support the Multi-Mission Launcher, Terminal High Altitude Area Defense, and the High Mobility Artillery Rocket System.

Challenges

Army officials stated that delays in funding and changes in workload cause significant problems, including delays in procuring material and meeting schedules and losses in needed skillsets. Additionally, Army restrictions as a result of budget constraints have made it difficult for LEAD to hire permanent staff. While some of the unfilled positions can be filled with temporary workers, officials do not consider this to be a sustainable strategy.

Figure 7: Systems Repaired at Letterkenny Army Depot



Source: Defense Video Imagery Distribution System. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload declined from 3,378,000 to 2,646,000 direct labor hours (DLHs). Army officials expected further declines in fiscal year 2016 as a result of the return to a peacetime environment.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel decreased from 2,925 to 2,214. Army officials attributed this decrease to uncertainty in planned workload and Army restrictions related to hiring.
- **Capital investment.** In fiscal years 2012 to 2015, capital investment varied. According to the Army, recent capital investments have focused primarily on minor building construction and upgrades. The Army has also made investments in logistics software at all of its depots. According to the Army, this investment at LEAD was about \$34 million in fiscal years 2012 through 2015.

Figure 8: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Letterkenny Army Depot

	2012	2013	2014	2015
Thousands of workload hours	3,378	2,907	2,794	2,646
Number of personnel	2,925	2,452	2,417	2,214
Thousands of dollars of capital investment	10,855	17,427	12,890	6,828

Source: U.S. Army. | GAO-17-82R

- **Process improvement.** LEAD has implemented improvements aimed at reducing pollution and energy consumption and has conducted additional efforts involving improved engineering and performance capabilities. Army officials noted that their continuous process improvements had led to savings or cost avoidances in excess of \$165 million since fiscal year 2009.
- **Public-private partnerships.** LEAD is currently engaged in public-private partnerships to repair equipment, such as the Shadow Unmanned Aircraft System, that has been heavily used over the last few years, as well as various foreign military sales. According to Army officials, in fiscal year 2016 these partnerships will account for approximately 98,000 DLHs, at a value of almost \$64 million.



Texarkana, Texas

The Army has designated Red River Army Depot (RRAD) as a Center of Industrial and Technical Excellence for the maintenance and repair of Tactical Wheeled Vehicles, the Bradley Fighting Vehicle, Multiple Launch Rocket System (MLRS) chassis, and rubber products.

Systems Repaired

Tactical wheeled vehicles—including Mine Resistant Ambush Protected (MRAP) vehicles, the High Mobility Multipurpose Wheeled Vehicle (HMMWV), the Family of Medium Tactical Vehicles (FMTV); the Bradley Fighting Vehicle; and the MLRS.

Expected future workload includes the Armored Multi-Purpose Vehicle and the Joint Light Tactical Vehicle.

Challenges

Army officials highlighted a number of challenges facing the depot, such as difficulty with hiring; converting skilled temporary employees into permanent workers; and lack of workload, which could result in a loss of critical skills needed to maintain certain weapon systems.

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Red River Army Depot

Army

Figure 9: Systems Repaired at Red River Army Depot



Source: Defense Video Imagery Distribution System and Red River Army Depot. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload declined from 5,225,000 to 3,789,000 direct labor hours (DLHs). Army officials attributed the declining workload to the completion of repair and recapitalization maintenance programs for ground combat vehicles and expected further declines in fiscal year 2016.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel decreased from 4,583 to 3,938. Army officials attributed this decrease to declining workload, attrition, and hiring constraints, and expected further decreases in fiscal year 2016.
- **Capital investment.** In fiscal years 2012 through 2015, capital investment varied. According to the Army, recent investments have included infrastructure improvements—such as cranes and engine machine shops—for a new facility to support tactical wheeled vehicle maintenance. The Army has also made investments in logistics software at all of its depots. According to the Army, this investment at RRAD was about \$38 million in fiscal years 2012 through 2015.

Figure 10: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Red River Army Depot

	2012	2013	2014	2015
Thousands of workload hours	5,225	3,200	3,022	3,789
Number of personnel	4,583	3,423	3,698	3,938
Thousands of dollars of capital investment	99,833	30,543	27,617	48,200

Source: U.S. Army. | GAO-17-82R

- **Process improvements.** According to Army officials, RRAD process improvements in fiscal years 2012 through 2015 have resulted in a cost avoidance of more than \$208 million. For example, RRAD has recently implemented several initiatives, such as improvements to MRAP repair times—resulting in an estimated cost avoidance of \$15 million—and investigating and revamping its process for producing meters for M969 trailers—resulting in an estimated cost avoidance of \$2.6 million.
- **Public-private partnerships.** In fiscal years 2012 through 2015, RRAD engaged in 92 partnering agreements valued at \$75 million, according to Army officials. These partnerships include upgrades to the HMMWV, and overhauls of M113 road wheels, among others. According to Army officials, in fiscal year 2016 these partnerships will account for approximately 114,000 DLHs, at a value of \$12 million.



Tobyhanna, Pennsylvania

The Army has designated Tobyhanna Army Depot (TYAD) as a Center of Industrial and Technical Excellence for the maintenance and repair of systems associated with Command, Control, Communications, and Computers; Intelligence, Surveillance, and Reconnaissance; Electronics; Avionics; and Missile Control.

Systems Repaired

Command, control, communications, computers, intelligence, surveillance and reconnaissance systems, electronics, avionics, and missile guidance and control systems.

Expected future workload includes the Counterfire Target Acquisition Radar, Post Deployment Software Support, Ground/Air Task Oriented Radar, the Air Force Joint Threat Emitter and Long-Range Ground Radar, and the Navy Rolling Airframe Missile Launcher.

Challenges

According to Army officials, TYAD has a large number of employees who are currently—or will soon become—eligible for retirement. As a result, TYAD may lose technical expertise. TYAD is also challenged by recent budget cuts and Army-imposed hiring restrictions that make it difficult to attract and hire new employees.

February 2017

Tobyhanna Army Depot

Army

Figure 11: Systems Repaired at Tobyhanna Army Depot



Source: Tobyhanna Army Depot. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload declined from 5,722,000 to 3,304,000 direct labor hours (DLHs). Army officials attributed this decline to decreasing ground combat operations and defense budget, but expected workload to increase slightly in fiscal year 2016.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel decreased from 4,510 to 3,217. Army officials attributed this decrease to attrition and hiring restrictions, but expected a slight increase in fiscal year 2016.
- **Capital investment.** In fiscal years 2012 through 2015, capital investment varied. According to the Army, projected capital investments are expected to decrease. Recent capital investments include a number of building renovations and improvements to water facilities. The Army has also made investments in logistics software at all of its depots. According to the Army, this investment at TYAD was about \$47 million in fiscal years 2012 through 2015.

Figure 12: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Tobyhanna Army Depot

	2012	2013	2014	2015
Thousands of workload hours	5,722	4,264	3,464	3,304
Number of personnel	4,510	3,552	3,198	3,217
Thousands of dollars of capital investment	91,433	63,258	33,317	69,373

Source: U.S. Army. | GAO-17-82R

- **Process improvements.** TYAD has established a Continuous Process Improvement organization to coordinate various improvement efforts. The focus of each effort is on improving productivity, increasing capacity, or producing higher quality products. According to Army officials, TYAD has realized more than \$300 million in savings from various process improvements since fiscal year 2002.
- **Public-private partnerships.** In fiscal years 2012 through 2015, TYAD engaged in public-private partnerships to assist with software support and various foreign military sales, among other things. According to Army officials, as of August 2016, the depot is engaged in 50 ongoing partnerships with more than 30 industrial firms, valued at approximately \$31.5 million.



Ogden, Utah

The Air Force has designated Ogden Air Logistics Complex (OO-ALC) as a Center of Industrial and Technical Excellence for the maintenance and repair of missiles, landing gear, and fighters.

Systems Repaired

Fighters and attack aircraft (A-10, F-16, F-22, and F-35), Tester aircraft (T-38), Cargo aircraft (C-130), landing gear, missile systems, and software.

Expected future workload includes the Ground Based Strategic Deterrent system and the TX trainer aircraft.

Challenges

Air Force officials expressed concerns about the length of the hiring process, and about personnel gaps, largely in software maintenance. OO-ALC relies on overtime to mitigate personnel gaps and engages with educational institutions to increase the number of qualified personnel in the hiring pool, according to Air Force officials.

February 2017

Ogden Air Logistics Complex

Air Force

Figure 13: Systems Repaired at Ogden City Air Logistics Complex



F-16 T-38 A-10 F-22 F-35

Source: Defense Video Imagery Distribution System. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload increased from 7,193,000 direct labor hours (DLHs) to 7,400,000 DLHs. In fiscal year 2016, workload was expected to increase further as repairs for the newer weapon systems, such as the F22, F-35, and associated commodities increase, according to Air Force officials.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel has generally increased. According to Air Force officials, the workforce is expected to increase in coming years to support future increases in workload.
- **Capital investment.** In fiscal years 2012 through 2015, capital investment varied, but it was expected to increase in fiscal year 2016 in order to enable OO-ALC to repair new systems. According to the Air Force, recent capital investments include equipment for F-16 and F-35 repairs, an F-22 building remodel, and investments in data tracking systems.

Figure 14: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Ogden Air Logistics Complex

	2012	2013	2014	2015
Thousands of workload hours ^a	7,193	6,967	7,119	7,400
Number of personnel ^b	7,444	7,413	7,648	8,099
Thousands of dollars of capital investment	80,161	127,237	202,199	80,357

Source: U.S. Air Force. | GAO-17-82R

^aThe workload data for the Air Force are the data reported by the Air Force. We were unable to determine the reliability of these data based on the information provided by the Air Force.

^bCivilian personnel refers only to maintenance personnel that perform direct labor.

- **Process improvements.** According to Air Force officials, as part of the Air Force Sustainment Center's standardized process improvement efforts that began in 2012, OO-ALC implemented initiatives to enhance production, such as graphical tools that map out the maintenance schedules for aircraft. Recent accomplishments include repairing more A-10 aircraft than planned since fiscal year 2014, according to Air Force officials.
- **Public-private partnerships.** In fiscal years 2012 through 2015, OO-ALC engaged in about 20 public-private partnership agreements to perform repairs on the F-22 and F-35 aircraft and various commodities, according to Air Force officials.



Oklahoma City, Oklahoma

The Air Force has designated Oklahoma City Air Logistics Complex (OC-ALC) as a Center of Industrial and Technical Excellence for the maintenance and repair of bombers, tankers, Airborne Warning and Control Systems (AWACS), and engines.

Systems Repaired

Bombers (B-1 and B-52), Tankers (KC-10 and KC-135), E3 AWACS, engines, and software.

Expected future workload includes the KC-46 aircraft, the Air Force's new tanker, and engines for the KC-46, MQ-9 Reaper, and RQ-4 Global Hawk.

Challenges

Air Force officials expressed concerns about replacing personnel skilled at engine parts repairs, who were lost during sequestration, but stated that the depot can use overtime to meet workload requirements. Air Force officials stated that hiring is generally not a challenge, because OC-ALC is in a location that attracts a skilled labor pool.

February 2017

Oklahoma City Air Logistics Complex

Air Force

Figure 15: Systems Repaired at Oklahoma City Air Logistics Complex



Source: Defense Video Imagery Distribution System. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload varied. According to Air Force officials, the largest decline in workload occurred in fiscal year 2013 because of budget cutbacks as a result of sequestration, but workload has since increased and was expected to increase further in fiscal year 2016 for aircraft and engine repairs.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian maintenance personnel varied. According to Air Force officials; it was expected to increase in fiscal year 2016 in order to meet the increased workload.
- **Capital investment.** In fiscal years 2012 through 2014, capital investment decreased. According to Air Force officials, it began increasing in fiscal year 2015 in order to enable repairs on new systems. According to the Air Force, recent investments have included building facilities for KC-46 aircraft and acquiring equipment for MQ-9 engine depot activation.

Figure 16: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Oklahoma City Air Logistics Complex

	2012	2013	2014	2015
Thousands of workload hours ^a	8,194	7,153	7,528	7,941
Number of personnel ^b	9,309	8,886	8,618	8,974
Thousands of dollars of capital investment	166,546	133,909	105,834	116,039

Source: U.S. Air Force. | GAO-17-82R

^aThe workload data for the Air Force are the data as reported by the Air Force. We were unable to determine the reliability of these data based on the information provided by the Air Force.

^bCivilian personnel refers only to maintenance personnel that perform direct labor.

- **Process improvements.** According to Air Force officials, as part of the Air Force Sustainment Center's standardized process improvement efforts, OC-ALC established processes that allowed personnel to specialize in specific tasks and for the production line to determine where delays occur. Recent accomplishments include repairing more KC-135 aircraft than planned each year, which led to an estimated savings of \$3 million per aircraft, according to Air Force officials.
- **Public-private partnerships.** Air Force officials stated that in fiscal years 2012 through 2015, OC-ALC engaged in 9 public-private partnership agreements to perform repairs on components for the C-17 cargo aircraft and the F-22 and F-35 fighter aircraft.



Warner Robins, Georgia

The Air Force has designated Warner Robins Air Logistics Complex (WR-ALC) as a Center of Industrial and Technical Excellence for the maintenance and repair of cargo aircraft, the F-15, and aviation electronics.

Systems Repaired

Cargo aircraft (C-5, C-17, C-130), Fighter aircraft (F-15), aviation electronics, and software.

Expected future workload includes aviation electronics for the KC-46, F-35, and F-22 aircraft and the MQ-9 unmanned aerial system.

Challenges

Air Force officials stated that the hiring process is slow and lengthy but that while the complex has some personnel shortages that are slow to be filled, these shortages have not affected its ability to accomplish repair work.

February 2017

Warner Robins Air Logistics Complex

Air Force

Figure 17: Systems Repaired at Warner Robins Air Logistics Complex



- **Workload.** In fiscal years 2012 through 2015, workload declined from 7,683,000 to 7,356,000 direct labor hours (DLHs). According to Air Force officials, the decline was a result of budget cutbacks due to sequestration. Air Force officials expected the workload to remain steady in fiscal year 2016.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel decreased. Air Force officials expect the number of civilian personnel to increase slightly in fiscal year 2016. Air Force officials stated that, because of process improvements, they are able to repair more aircraft with fewer resources.
- **Capital investment.** In fiscal years 2012 through 2015, capital investment varied. According to Air Force officials, it is expected to increase to support the repair of components for the F-35. According to the Air Force, recent investments include equipment for an Air Force-developed software tester and facility upgrades.

Figure 18: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015

	2012	2013	2014	2015
Thousands of workload hours ^a	7,683	6,893	6,690	7,356
Number of personnel ^b	8,536	7,683	7,579	7,150
Thousands of dollars of capital investment	48,521	56,918	42,686	58,917

Source: U.S. Air Force. | GAO-17-82R

^aThe workload data for the Air Force are the data reported by the Air Force. We were unable to determine the reliability of these data based on the information provided by the Air Force.

^bCivilian personnel refers only to maintenance personnel that perform direct labor.

- **Process improvements.** According to Air Force officials, as part of the Air Force Sustainment Center's standardized process improvement efforts, WR-ALC employed initiatives to enhance production, such as routinely holding meetings of various groups of workers and supervisors to identify and resolve production issues. Accomplishments include meeting on-time delivery goals for the C-17 aircraft, which reduced cost overruns by \$10 million, according to Air Force officials.
- **Public-private partnerships.** According to Air Force officials, WR-ALC engaged in more than 50 public-private partnerships to perform repairs on the C-17, F-15, and F-22 aircraft and other systems.



Cherry Point, North Carolina

The Navy has designated Fleet Readiness Center East (FRC East) as a Center of Industrial and Technical Excellence for the maintenance and repair of sea-based and maritime aircraft and the related aeronautical systems.

Systems Repaired

Helicopters (AH-1, CH-53E, MH-53E, UH-1Y), Airplanes (AV-8B and EA-6B), Fighter aircraft (F/A-18 A, C, and D variants), the MV-22 Osprey, and various engines and components.

Future workload includes the F-35.

Challenges

Navy officials reported challenges in identifying shortfalls in aircraft component workload across the FRCs that are due to variability in demand, which makes it difficult to track whether shortfalls exist. Navy officials also identified challenges in having sufficient qualified applicants in a variety of trade series. At FRC East specifically, Navy officials stated that it is difficult to attract and hire sheet metal mechanics, machinists, and tools and parts personnel, because they have to compete with private industry for personnel with these skills.

February 2017

Fleet Readiness Center – East

Navy

Figure 19: Systems Repaired at Fleet Readiness Center East



Source: Defense Video Imagery Distribution System. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload increased from 3,466,000 to 3,618,000 direct labor hours (DLHs). According to Navy officials, workload was expected to decline in fiscal year 2016 as a result of changes to requirements, schedules, and the availability of material and fiscal resources.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel at FRC East decreased. In fiscal year 2016, the projected workforce was expected to increase to support a higher demand for repairs, which is expected to begin in fiscal year 2017, according to Navy officials.
- **Capital investment.** In fiscal years 2012 through 2015, capital investment varied; it is currently below its recent high of fiscal year 2012. According to the Navy, recent capital investments include a number of health and safety improvements and additional test equipment needed to repair the MV-22 and the F-35.

Figure 20: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Fleet Readiness Center – East

	2012	2013	2014	2015
Thousands of workload hours	3,466	3,060	3,373	3,618
Number of personnel	3,227	3,146	3,048	3,201
Thousands of dollars of capital investment	37,187	15,674	21,321	22,605

Source: U.S. Navy. | GAO-17-82R

- **Process improvement.** According to Navy officials, FRC East, along with the other Navy FRCs, has focused its recent process improvement efforts on Critical Chain Project Management. These efforts are intended to increase the speed with which aircraft and components move through the FRC. FRC East is also developing its capability to quickly produce spare parts using rapid prototyping.
- **Public-private partnerships.** According to Navy officials, in fiscal years 2012 through 2015, FRC East engaged in partnerships to repair components for the AV-8B and MV-22 aircraft, among others, that accounted for more than 932,000 DLH at a value of \$128 million. Future efforts are aimed at improving support for V-22 components and for F-35 modifications.



Jacksonville, Florida

The Navy has designated Fleet Readiness Center Southeast (FRC SE) as a Center of Industrial and Technical Excellence for the maintenance and repair of sea-based and maritime aircraft and the related aeronautical systems and equipment.

Systems Repaired

Helicopters (MH-60R and S) Aircraft (C-2A and E-2 C and D, EA-6B, P-3), Fighter Aircraft (F/A-18 A-F variants), Trainers (T-6, T-34, T-44), and various components.

Future workload includes the unmanned aircraft MQ-4C Triton.

Challenges

Navy officials reported challenges in identifying shortfalls in aircraft component workload across the FRCs that are due to variability in demand, which makes it difficult to track whether shortfalls exist. Navy officials also identified challenges in having sufficient qualified applicants in a variety of trade series. At FRC SE specifically, Navy officials identified shortfalls in machinists, sheet metal mechanics, aircraft mechanics, and nondestructive inspection technicians.

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Fleet Readiness Center – Southeast

Navy

Figure 21: Systems Repaired at Fleet Readiness Center-Southeast



Source: Defense Video Imagery Distribution System and Fleet Readiness Center Southeast. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload decreased from 3,986,000 to 3,702,000 direct labor hours (DLHs). Navy officials attribute the decrease to furloughs and hiring freezes as a result of sequestration, but they expect workload to increase in fiscal year 2016.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel decreased, but it was expected to increase in fiscal year 2016 in order to support repairs for components in fiscal year 2017, according to Navy officials.
- **Capital investment.** In fiscal years 2012 through 2015, capital investment varied. According to the Navy, spending on capital investments was projected to increase in fiscal year 2016. Recent capital investments include renovations to air quality systems and building repairs. Future planned investments include upgrades to wastewater facilities.

Figure 22: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Fleet Readiness Center – Southeast

	2012	2013	2014	2015
Thousands of workload hours	3,466	3,060	3,373	3,618
Number of personnel	3,227	3,146	3,048	3,201
Thousands of dollars of capital investment	37,187	15,674	21,321	22,605

Source: U.S. Navy. | GAO-17-82R

- **Process improvement.** According to Navy officials, FRC SE, along with the other FRCs, has focused its recent process improvement efforts on Critical Chain Project Management. These efforts are intended to increase the speed with which aircraft and components move through the depot.
- **Public-private partnerships.** According to Navy officials, in fiscal years 2012 through 2015, partnerships at FRC SE accounted for more than 1.1 million DLHs, at a value of about \$126 million. These partnerships included, among other things, providing avionics component repairs for the F-35. Future partnerships will be focused on the unmanned aircraft MQ-4C Triton, according to Navy officials.



North Island, California

The Navy has designated Fleet Readiness Center-Southwest (FRC SW) as a Center of Industrial and Technical Excellence for the maintenance and repair of sea-based and maritime aircraft and related aeronautical systems and equipment.

Systems Repaired

Helicopters (AH-1, CH-53E, HH-60, MH-60, and UH-1Y), Airplanes (C-2A, E-2C, E-2D, and EA-18G), Fighter aircraft (F/A-18 A-F variants), the MV-22 Osprey, and various engines and components.

Future workload includes the F-35 and MQ-4C Triton unmanned aerial system.

Challenges

Navy officials reported challenges in identifying shortfalls in aircraft component workload across the FRCs that are due to variability in demand, which makes it difficult to track whether shortfalls exist. Specific challenges at FRC SW, according to Navy officials, are an aging infrastructure that makes it difficult to sustain workload and establish new capabilities and competing with industry to hire certain specialists.

February 2017

Fleet Readiness Center – Southwest

Navy

Figure 23: Systems Repaired at Fleet Readiness Center-Southwest



Source: Defense Video Imagery Distribution System. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload declined from 3,779,000 to 3,229,000 direct labor hours (DLHs). Navy officials attributed the decline to a decrease in customer demand, the reduced availability of material, and declining fiscal resources, and aging infrastructure, but expected workload to increase in fiscal year 2016.
- **Personnel.** In fiscal years 2012 through 2015, the number of personnel decreased from 2,522 to 2,370. The workforce was expected to increase in fiscal year 2016 in order to support increased workload that is expected to begin in fiscal year 2017, according to Navy officials.
- **Capital investment.** In fiscal years 2012 through 2015, capital investment varied, but it was expected to increase in fiscal year 2016. According to the Navy, recent capital investments include construction of a new building, purchase of testing equipment, and renovations to existing buildings.

Figure 24: Workload, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Fleet Readiness Center – Southwest

	2012	2013	2014	2015
Thousands of workload hours	3,779	3,289	3,193	3,229
Number of personnel	2,522	2,531	2,456	2,370
Thousands of dollars of capital investment	72,408	10,959	20,594	17,869

Source: U.S. Navy. | GAO-17-82R

- **Process improvement.** According to Navy officials, FRC SW, along with the other FRCs, has focused its recent process improvement efforts on Critical Chain Project Management. These efforts are intended to increase the speed with which aircraft and components move through the depot.
- **Public-private partnerships.** According to Navy officials, in fiscal years 2012 through 2015, FRC SW engaged in partnerships for a number of avionics, electronics, and hydraulics systems. These partnerships accounted for more than 307,000 DLH, at a value of \$35.3 million. Future public-private partnerships will include workload on the avionics systems for the E-2 and AH-1, among others.



Portsmouth, Virginia

The Navy has designated Norfolk Naval Shipyard (NNSY) as a Center of Industrial and Technical Excellence for maintenance and repair, modernization, disposal, and emergency repair of ships, systems, and components.

Systems Repaired

Nuclear Aircraft Carriers (Nimitz Class), Submarines (Los Angeles Class and Ohio Class), and Various Surface Combatants (CGs, LHDs, LPDs, LCCs, FFGs, and AS Tenders).

Future workload includes the Ford Class Carrier and Submarines (Virginia Class and Columbia Class).

Challenges

According to Navy officials, the Naval Shipyards do not face challenges maintaining core level workload requirements, because in each reported fiscal year they have executed higher levels of workload than were required to maintain a core capability. Similarly, there is currently no skills gap among personnel that affects minimum core level requirements.

February 2017

Norfolk Navy Shipyard

Navy

Figure 25: Systems Repaired at Norfolk Naval Shipyard



Source: Defense Video Imagery Distribution System. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload declined from 12,263,000 to 11,720,000 direct labor hours (DLHs). Navy officials expected workload to increase in fiscal year 2016 in order to reduce ship maintenance backlogs that have accumulated as a result of consistently high operations tempo over the past several years.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel remained relatively steady, but it was expected to increase in fiscal year 2016 in order to support the increased workload, according to Navy officials.
- **Capital investment.** In fiscal years 2012 through 2015, capital investments varied. Recent capital investments have focused on restoring buildings that are used for nuclear engineering management and ship and submarine maintenance, according to the Navy.

Figure 26: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Norfolk Naval Shipyard

	2012	2013	2014	2015
Thousands of workload hours	12,263	10,786	11,638	11,720
Number of personnel	9,036	9,417	9,117	9,321
Thousands of dollars of capital investment	124,346	85,269	50,648	104,007

Source: U.S. Navy. | GAO-17-82R

- **Process improvements.** According to Navy officials, the Navy has established forums across all four Navy shipyards. These forums include the cumbersome work practices task force, which has implemented improved testing of piping joints, and the corporate industrial process community of practice, which identifies improvements in various disciplines (such as piping, electrical, and mechanical).
- **Public-private partnerships.** NNSY is not currently engaged in any public-private partnerships. According to Navy officials, the Navy generally does not rely on public-private partnerships at the public shipyards, although it has used some in the past.



Honolulu, Hawaii

The Navy has designated Pearl Harbor Naval Shipyard (PHNSY) as a Center of Industrial and Technical Excellence for the maintenance and repair, modernization, disposal, and emergency repair of ships, systems, and components.

Systems Repaired

Nuclear Submarines (Los Angeles Class and Virginia Class) and Surface Combatants (CGs, DDGs, LPDs, FFGs, AS Tenders).

The Navy has not designated any additional systems to be repaired at PHNSY in the future.

Challenges

According to Navy officials, the Naval Shipyards do not face challenges maintaining core level workload requirements, because in each reported fiscal year they have executed higher levels of workload than were required to maintain a core capability. Similarly, there is currently no skills gap among personnel that affects minimum core level requirements.

February 2017

Pearl Harbor Naval Shipyard

Navy

Figure 27: Systems Repaired at Pearl Harbor Naval Shipyard



Surface ships

Submarines

Source: Defense Video Imagery Distribution System. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload increased from 5,656,000 to 5,723,000 direct labor hours (DLHs). Navy officials expected workload to increase further in fiscal year 2016 in order to reduce ship maintenance backlogs that have accumulated as a result of consistently high operations tempo over the past several years.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel remained steady, but it was expected to increase in fiscal year 2016 to support the increased workload, according to Navy officials.
- **Capital investment.** In fiscal years 2012 through 2015, capital investment varied. Recent capital investments include dry-dock repairs and overhauls and repairs to training facilities for submarine maintenance, according to the Navy.

Figure 28: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Pearl Harbor Naval Shipyard

	2012	2013	2014	2015
Thousands of workload hours	5,656	5,428	5,523	5,723
Number of personnel	4,405	4,525	4,334	4,457
Thousands of dollars of capital investment	47,349	50,048	108,711	46,056

Source: U.S. Navy. | GAO-17-82R

- **Process improvements.** According to Navy officials, the Navy has established forums across all four Navy shipyards. These forums include the cumbersome work practices task force, which has implemented improved testing of piping joints, and the corporate industrial process community of practice, which identifies improvements in various disciplines (such as piping, electrical, and mechanical).
- **Public-private partnerships.** PHNSY is not currently engaged in any public-private partnerships. According to Navy officials, the Navy generally does not rely on public-private partnerships at the public shipyards, although it has used some in the past.



Portsmouth Naval Shipyard

Navy

Kittery, Maine

The Navy has designated Portsmouth Naval Shipyard (PNSY) as a Center of Industrial and Technical Excellence for the maintenance and repair, modernization, disposal, and emergency repair of ships, systems, and components.

Systems Repaired

Nuclear Submarines (Los Angeles Class and Virginia Class).

The Navy has not designated any additional systems to be repaired at PNSY in the future.

Challenges

According to Navy officials, the Naval Shipyards do not face challenges maintaining core level workload requirements because in each reported fiscal year they have executed higher levels of workload than were required to maintain a core capability. Similarly, there is currently no skills gap among personnel that affects minimum core level requirements.

Figure 29: Systems Repaired at Portsmouth Naval Shipyard



Los Angeles-class submarines Virginia-class submarines

Source: Defense Video Imagery Distribution System. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload increased from 5,839,000 to 6,321,000 direct labor hours (DLHs). Navy officials expected workload to further increase in fiscal year 2016 in order to reduce ship maintenance backlogs that have accumulated as a result of the consistently high operations tempo.
- **Personnel.** In fiscal year 2012 through 2015, the number of civilian personnel increased. Navy officials expected the workforce to increase further in fiscal year 2016 in order to support the increased workload.
- **Capital investment.** In fiscal years 2012 through 2015, capital investment varied; it is currently below its recent high of fiscal year 2012. Recent investments include structural improvements to repair berths, building renovations, and purchases of cranes to support repairs for the Virginia Class submarine, according to the Navy.

Figure 30: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Portsmouth Naval Shipyard

	2012	2013	2014	2015
Thousands of workload hours	5,839	5,685	6,011	6,321
Number of personnel	4,539	4,672	4,614	4,749
Thousands of dollars of capital investment	127,893	78,371	99,647	36,231

Source: U.S. Navy. | GAO-17-82R

- **Process improvements.** According to Navy officials, the Navy has established forums across all four Navy shipyards. These forums include the cumbersome work practices task force, which has implemented improved testing of piping joints and the corporate industrial process community of practice, which identifies improvements in various disciplines (such as piping, electrical, and mechanical).
- **Public-private partnerships.** PNSY is not currently engaged in any public-private partnerships. According to Navy officials, the Navy generally does not rely on public-private partnerships at the public shipyards, although it has used some in the past.



Bremerton, Washington

The Navy has designated Puget Sound Naval Shipyard (PSNS) as a Center of Industrial and Technical Excellence for the maintenance and repair, modernization, disposal, and emergency repair of ships, systems, and components.

Systems Repaired

Nuclear carriers (Nimitz Class), Submarines (Los Angeles Class, Seawolf Class, and Ohio Class), and surface combatants (DDG-51 Class).

Future workload includes the Ford Class carrier and Columbia Class submarines.

Challenges

According to Navy officials, the Naval Shipyards do not face challenges maintaining core level workload requirements, because in each reported fiscal year they have executed higher levels of workload than were required to maintain a core capability. Similarly, there is currently no skills gap among personnel that affects minimum core level requirements.

February 2017

Puget Sound Naval Shipyard

Navy

Figure 31: Systems Repaired at Puget Sound Naval Shipyard



Aircraft carriers

Surface ships

Submarines

Source: Defense Video Imagery Distribution System. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload increased from 14,051,000 to 16,034,000 direct labor hours (DLHs). Navy officials expected the workload to increase further in fiscal year 2016, in order to reduce ship maintenance backlogs that have accumulated as a result of consistently high operations tempo over the past several years.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel increased to support the increased workload, and it was expected to increase further in fiscal year 2016, according to Navy officials.
- **Capital investment.** In fiscal years 2012 through 2015, capital investment varied, but it was expected to increase in fiscal year 2016. Recent capital investments include repairs to a fire station and a water treatment system, according to the Navy.

Figure 32: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Puget Sound Naval Shipyard

	2012	2013	2014	2015
Thousands of workload hours	14,051	13,968	14,740	16,034
Number of personnel	10,537	10,778	10,876	11,942
Thousands of dollars of capital investment	69,508	117,350	61,100	116,793

Source: U.S. Navy. | GAO-17-82R

- **Process improvements.** According to Navy officials, the Navy has established forums across all four Navy shipyards. These forums include the cumbersome work practices task force, which has implemented improved testing of piping joints, and the corporate industrial process community of practice, which identifies improvements in various disciplines (such as piping, electrical, and mechanical).
- **Public-private partnerships.** PSNS is not currently engaged in any public-private partnerships. According to Navy officials, the Navy generally does not rely on public-private partnerships at the public shipyards, although it has used some in the past.



Albany, Georgia

According to the Marine Corps, Albany Production Plant (PPA) is Operated by the Marine Corps Depot Maintenance Command (MDMC) and is a Center of Industrial and Technical Excellence for the maintenance and repair of ground vehicles and their associated components.

Systems Repaired

Amphibious Assault Vehicle (AAV), Light Armored Vehicle (LAV), High Mobility Multipurpose Wheeled Vehicle (HMMWV), Mine Resistant Ambush Protected vehicle (MRAP), Medium Tactical Vehicle Replacement, communications/electronics equipment, and small arms.

PPA expects to repair the Joint Light Tactical Vehicle in the future.

Challenges

According to Marine Corps officials, current workload is sufficient to maintain core capabilities, and there are no challenges in maintaining skills or hiring the depot workforce. Marine Corps officials also stated that, to date, overseas contingency funding has enabled them to adequately sustain core requirements. However, declining budgets and diminishing overseas contingency funding may make it difficult to sustain core capabilities in the future, according to Marine Corps officials.

February 2017

Albany Production Plant

Marine Corps

Figure 33: Systems Repaired at Albany Production Plant



Source: Defense Video Imagery Distribution System. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload declined from 3,163,000 to 2,606,000 direct labor hours (DLHs), and it was expected to decline further in fiscal year 2016 as a result of decreased combat operations and the associated reductions in overseas contingency operations funding, according to Marine Corps officials.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel decreased from 1,515 to 1,211. Marine Corps officials attributed this decrease to declining workload, and they expected further decreases in fiscal year 2016.
- **Capital investment.** In fiscal years 2012 through 2015, capital investment decreased, and it was expected to decrease further in fiscal year 2016 as a result of declining workload, according to Marine Corps officials. Recent capital investments include new machinery for small arms repair and minor construction on LAV repair facilities.

Figure 34: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Albany Production Plant

	2012	2013	2014	2015
Thousands of workload hours	3,163	2,635	2,366	2,606
Number of personnel	1,515	1,334	1,248	1,211
Thousands of dollars of capital investment	4,647	3,995	3,213	3,007

Source: U.S. Marine Corps. | GAO-17-82R

- **Process improvements.** According to Marine Corps officials, PPA has process improvement experts who assist in the development of local projects, which are briefed monthly to the MDMC. Improvement initiatives include standardizing production processes for the LAV and the AAV. Specific improvement initiatives at PPA include developing the capability to generate nitrogen for laser cutting and reducing disposal costs associated with blasting paint off of vehicles.
- **Public-private partnerships.** PPA is not currently engaged in any public-private partnerships. While the Marine Corps is in discussions with industry to develop future partnerships, no other agreements have yet been reached, according to Marine Corps officials.



Barstow Production Plant

Marine Corps

Barstow, California

According to the Marine Corps, Barstow Production Plant (PPB) is operated by the Marine Corps Depot Maintenance Command (MDMC) and is a Center of Industrial and Technical Excellence for the maintenance and repair of ground vehicles and their associated components.

Systems Repaired

Amphibious Assault Vehicle (AAV), Light Armored Vehicle (LAV), High Mobility Multipurpose Wheeled Vehicle, Mine Resistant Ambush Protected vehicle (MRAP), Medium Tactical Vehicle Replacement (MTVR), howitzers, communications/electronics equipment, and small arms.

PPB expects to repair the Joint Light Tactical Vehicle in the future.

Challenges

According to Marine Corps officials, current workload is sufficient to maintain core capabilities, and there are no challenges in maintaining skills or hiring the depot workforce. Marine Corps officials also stated that, to date, overseas contingency funding has enabled them to adequately sustain core requirements. However, declining budgets and diminishing overseas contingency funding may make it difficult to sustain core capabilities in the future, according to officials.

Figure 35: Systems Repaired at Barstow Production Plant



Source: Defense Video Imagery Distribution System. | GAO-17-82R

- **Workload.** In fiscal years 2012 through 2015, workload increased from 1,284,000 to 1,576,000 direct labor hours (DLHs). However, the workload was expected to decrease in fiscal year 2016 as a result of decreased combat operations and the associated reductions in overseas contingency funding, according to Marine Corps officials.
- **Personnel.** In fiscal years 2012 through 2015, the number of civilian personnel decreased from 819 to 764. Marine Corps officials attribute this decrease to declining workload and expected further decreases in fiscal year 2016.
- **Capital investment.** In fiscal years 2012 through 2015, capital investment has decreased, and it was expected to decrease further in fiscal year 2016 as a result of declining workload, according to Marine Corps officials. Recent capital investments include new materials handling equipment and machinery.

Figure 36: Workload Hours, Civilian Personnel, and Capital Investment for Fiscal Years 2012 through 2015 at Barstow Production Plant

	2012	2013	2014	2015
Thousands of workload hours	1,284	1,235	1,214	1,576
Number of personnel	819	603	637	764
Thousands of dollars of capital investment	4,108	2,563	3,417	2,917

Source: U.S. Marine Corps. | GAO-17-82R

- **Process improvements.** According to Marine Corps officials, PPB has process improvement experts who assist in the development of local projects, which are briefed monthly to the MDMC. Improvement initiatives include standardizing production processes for the LAV and the AAV. Specific improvement initiatives at PPB include increasing the accuracy of work-in-process for vehicles awaiting painting and increasing the workspace for communications equipment repairs.
- **Public-private partnerships.** PPB is not currently engaged in any public-private partnerships. While the Marine Corps is in discussions with industry to develop future partnerships, no agreements have yet been reached, according to Marine Corps officials.

Enclosure II: GAO Contact and Staff Acknowledgments

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GAO's Related Products

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