Research Report

JENNIFER LAMPING LEWIS, TERRENCE K. KELLY, GRANT JOHNSON, DOUGLAS C. LIGOR, ANTHONY JACQUES, BARBARA BICKSLER

Army Explosive Ordnance Disposal in Large-Scale Combat Operations

Can the Planned Force Meet Tomorrow's Requirements?

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Published by the RAND Corporation, Santa Monica, Calif.

Executive Summary

The U.S. Army and its explosive ordnance disposal (EOD) forces are changing to address large-scale combat operations (LSCO). This research focused on three areas of relevance for the force of 2027–2032: whether the Army has the right EOD force structure, whether the force is sufficiently manned, and how the Army can best govern the EOD force.

The planned EOD force structure is too small to execute its doctrine in LSCO. There will be more demands for EOD forces than they can provide under current doctrine. Furthermore, these force structure shortfalls do not account for defense support to civil authorities (DSCA) missions, which include support to the President and are considered homeland defense missions in wartime.

Should planned EOD force structure be expanded to meet LSCO and DSCA demands, forecasts indicate that the inventory of EOD personnel in the Regular Army will suffice to fill the units that would execute these missions. In contrast, the forecasted inventory of EOD personnel in the Army National Guard (ARNG) will not be sufficient to support the expanded force structure, with significant shortages across all grades, particularly in the senior ranks.

We examined key governance issues raised by members of Congress: whether EOD should be designated as special operations forces (SOF) or be made an Army basic branch. We found no compelling case for designating EOD as SOF. However, there is an argument for making EOD a basic branch, although doing so would require additional resources. The easiest and least expensive option would be to establish an EOD branch associated with the Sustainment Center of Excellence (COE).

We offer the following recommendations:

- The Army should address the disconnect between EOD doctrine and force structure by either providing more forces so the doctrine can be executed in LSCO or revising the doctrine to permit more flexible concepts of support.
- The Total Army Analysis (TAA) process should account for the DSCA mission set—missions that in wartime will be homeland defense and impose significant demands on the EOD force.
- Army leadership must address the manning shortfalls in the ARNG EOD force, including the lack of senior EOD leaders to command the ARNG group and battalions.
- The Army should consider options for making ARNG EOD personnel more readily available for DSCA missions to relieve stress on the Regular Army force and provide real-world missions to the ARNG force.
- EOD should not be made a special operations activity; concerns about how EOD supports SOF can be addressed in other ways.

About This Research Report

This report documents research and analysis conducted as part of a project entitled *Explosive Ordnance Disposal Support to Large Scale Combat Operations in Multi-Domain Operations and Defense Support to Civil Authorities for the Army of 2030*, sponsored by the Deputy Chief of Staff G-3/5/7, U.S. Army. The purpose of the project was to describe the roles of Army EOD forces in the future security environment, with special emphasis on multi-domain operations (MDO), and derive implications for Army doctrine, organizations, training, materiel, leader development, personnel, facilities, policy (DOTMLPF-P), force structure, and resourcing.

This research was conducted within RAND Arroyo Center's Forces and Logistics Program. RAND Arroyo Center, part of the RAND Corporation, is a federally funded research and development center (FFRDC) sponsored by the United States Army.

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Acknowledgments

We are grateful for the guidance and support provided by our action officer, Thomas Vail, and his colleagues, Matthew Boehme and Brent Conner. We also appreciate the time and accumulated wisdom shared by the many people with whom we spoke as part of this research effort. These include subject-matter experts within the U.S. Army Forces Command, U.S. Army Human Resources Command, U.S. Army Training and Doctrine Command, and the Army Service Component Commands, as well as retired EOD leaders. John Olive, Alan Powell, David Henshaw, Jeffrey Schley, Gary McKenzie, and Matthew Boyce provided invaluable assistance in helping us obtain, navigate, and understand the data stored in the EOD Information Management System.

Several of our RAND colleagues contributed to this research. Sale Lilly reviewed Operations and Contingency Plans and Time-Phased Force Deployment Data, participated in our discussions with EOD subject-matter experts, and shared his perspective as a former U.S. Navy intelligence officer. Christina Panis, Monica Rico, and Ryan Haberman provided extensive data analysis and programming support. Katharina Best, Derek Eaton, Reynold Hoover, Joshua Klimas, Michael Linick, and Bruce Orvis shared valuable insights from related research efforts, both past and

current. Finally, our peer reviewers, Michael Linick and Joel Predd, provided thoughtful advice and useful critiques, which improved the quality of our research products.

Summary

The U.S. Army is examining what it will need to support large-scale combat operations (LSCO) in the future and is actively preparing for—and undergoing—that transition. These efforts include the Army's EOD forces which, in addition to their combat missions, have responsibilities to support civil authorities, as mandated by federal statute and by Department of Defense (DoD) regulations, policies, and doctrine.

This report describes the result of a research project conducted by the RAND Arroyo Center for the EOD Branch in the office of the Deputy Chief of Staff for Operations, Plans, and Training (G-3/5/7) (G-38), Headquarters, Department of the Army. It examines the roles the Army EOD force can expect to face in LSCO as a key part of Army and Joint Force multi-domain operations in the FY 2027–2032 timeframe (five to ten years from the inception of the project) and assesses whether the future EOD force is able to meet future demands.

The research team focused its analysis on three areas of relevance: whether the Army has the right EOD force structure, whether the force is sufficiently manned, and how the Army can best govern the EOD force. To conduct this analysis, the team reviewed Army and DoD policy documents, legal and regulatory documents, and relevant research literature; participated in interviews with current and retired EOD leaders; and conducted various modeling efforts using data from the Explosive Ordnance Disposal Information Management System (EODIMS), the Army Human Resources Command, and the Defense Manpower Data Center to support its force structure and personnel assessments.

EOD in Large-Scale Combat Operations

EOD missions in LSCO are likely to be some version of "back to the future." In other words, the primary EOD missions in future large conflicts will resemble those in previous large conflicts, such as rendering safe unexploded military ordnance and providing intelligence on "first seen" military munitions (i.e., munitions that are previously unknown to U.S. forces). EOD command and control doctrine, which will drive how EOD support is provided to major commands and maneuver units, grew out of the critical role played by senior EOD commands in the counter-improvised explosive device (IED) fight of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). However, unlike in the OEF and OIF period, in which the U.S. Army faced relatively few military grade munitions, unexploded ordnance will be numerous, and "first seen" ordnance intelligence could be critical. IEDs will continue to be a problem but will become less important than other missions. Given the prevalence of unmanned systems on modern battlefields and the requirement for EOD to examine downed unmanned aerial systems,

loitering munitions that do not explode could also drive requirements. Thus, current doctrine might not be well aligned with future demands.

Sufficiency of Planned EOD Force Structure

The planned EOD force structure is not sufficient in the LSCO environment if the Army operates according to its current doctrine, on which our analysis was based. Army doctrine has EOD forces supporting major commands and large maneuver and SOF units, with EOD units allocated according to well-defined allocation rules. These allocation rules, if rigorously applied, have strong implications for how the EOD force will operate in future contingencies.

An examination of the allocation rules and planned structure of EOD forces (Table S.1) suggests that all EOD teams, which reside in EOD companies, will be dedicated to Brigade Combat Teams (BCTs), Special Forces Groups (SFGs), or the Ranger Regiment. However, unlike in OEF and OIF, in which most of the area of operations was "owned" by a BCT, in LSCO there will be large parts of the battlefield outside the assigned areas of responsibility for BCTs. If current doctrine is rigorously followed, there will be no EOD companies or teams assigned to handle such critical missions as ammunition supply point assistance, corps and division rear area support, support for non-BCT units, such as Maneuver Enhancement Brigades, and support to theater-level assets, such as ports. These are critical missions which must be accomplished.

Table S.1. EOD Doctrinal Allocation Rules, EOD Group within Theater of Operations

EOD Organization	Modeling Rule of Allocation	Supported Organization
EOD Group	1 per Theater Army 1 per Corps 1 per JTF 1 per Combined JTF 1 per Homeland Defense 1 per 2-6 EOD Battalions	Theater Army Corps JTF Combined JTF
EOD Battalion	1 per Division 1 per JTF 1 per Combined JTF 2 per Homeland Defense 1 per 3-7 EOD Companies	EOD Group Division JTF Combined JTF
EOD Company	1 per BCT 1 per Special Forces Group (Airborne) 1 per Ranger Regiment 8 per Homeland Defense 1 per 1-5 EOD Platoons	EOD Battalion BCT Maneuver Enhancement Brigade SFG(A)

SOURCE: Army Techniques Publication (ATP) 4-32, *Explosive Ordnance Disposal (EOD) Operations*, May 12, 2022, Table 1-1.
NOTE: JTF = joint task force; SFG(A) = Special Forces Group (Airborne).

Fortunately, doctrine provides flexibility to senior EOD commanders in the form of command relationships. EOD companies will remain under the command of EOD battalions in most cases, and EOD battalions under EOD groups. These relationships allow EOD commanders to manage forces in theater. Because these missions must be performed, EOD leaders could allocate support from the units available in theater. However, this would leave some commands without dedicated EOD support, even though doctrine suggests the commands could expect such support.

Detailed analysis of how doctrine could address these shortfalls—assuming force structure were available to execute it—is not straightforward because the geometry of the battlefield would be different for LSCO in the U.S. European Command than in the U.S. Indo-Pacific Command. We offer no recommended changes to doctrine other than to note that past approaches, which offered more flexibility in providing EOD support, might be worth revisiting.

The bottom line is that there will be more demands for EOD forces than a direct application of the allocation rules would account for and that planned EOD forces, already too small for LSCO contingencies in which the force is rotating at maximum speed or deployed in whole, will need to adapt for these situations. In the words of one retired EOD senior leader, current EOD doctrine "will not scale" given planned force structure.

Furthermore, the estimated shortfall in force structure to support LSCO does not account for defense support to civil authorities (DSCA), which includes support to the President of the United States and accounts for nearly half of all manhours expended during Army-led EOD incidents over the last five years. These demands will likely persist not only in peacetime but also in wartime, with the domestic missions falling under the homeland defense mission category during a conflict.

Estimating the Shortfall in Planned EOD Force Structure

In our effort to estimate the demand for EOD forces over the next five to ten years, the EOD force planned for FY 2028 provided a useful starting point. Table S.2 presents this force structure under the heading "Planned Force." To comply with doctrinal allocation rules given the major units EOD supports, significant additional force structure would be needed, as shown in Table S.2 under the heading "Doctrinal Force." Providing sufficient support to civil authorities would require even more units: five additional companies in the Regular Army supporting homeland defense.

For the Regular Army, the omission of DSCA missions from the TAA process accounts for a large share of the gap between the EOD force planned for FY 2028 (i.e., the planned force in Table S.2) and the EOD force needed to support LSCO and perform DSCA missions (i.e., the doctrinal force with DSCA supplement in Table S.2). This shortfall is made more critical by the increased importance of the homeland defense mission in the 2022 National Defense Strategy, as DSCA missions performed within the United States are synonymous with EOD's role in homeland defense when the nation is at war.

Our analysis shows that, for the Regular Army's enlisted force, the omission of DSCA from the TAA process accounts for 62 percent of the gap between the planned EOD force and the EOD force needed to execute the full complement of EOD missions. For officers, the omission accounts for 19 percent of the gap. The omission of DSCA creates shortfalls in the ARNG as well. It accounts for 39 percent of the gap for the enlisted force and 18 percent of the gap for officers.

Table S.2. EOD Force to Support the Army under Doctrinal Allocation Rules and Provide Defense Support to Civil Authorities, FY 2028

		Planned Force		Doctrinal Force		Doctrinal Force with DSCA Supplement	
Supported Unit Type	**EOD Unit Type**	**Regular Army**	**ARNG**	**Regular Army**	**ARNG**	**Regular Army**	**ARNG**
Theater (or Field) Army, Corps	Group	2	1	10	0	10	0
Division	Battalion	6	3	10	8	10	8
BCT, SFG, Ranger Regiment	Company	36	14	37	29	37	29
N/A	WMD Company	1	0	1	0	1	0
Homeland Defense	Group	0	0	0	1	0	1
	Battalion	0	0	0	2	0	2
	Company	1	0	1	7	6	7

SOURCE: Features information from data on force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022; Army Technical Publication 4-32, 2022, Table 1-1; and EODIMS.
NOTE: WMD = weapons of mass destruction. We include Eighth U.S. Army, the major Army command in the Republic of Korea, even though it is not included in the supported force structure for 2028. The allocation of additional units between the components does not reflect doctrinal differences between Regular Army and ARNG EOD forces. Rather, the allocation resulted from assumptions we made to facilitate the analysis, including that (1) EOD forces will support forces of the same component whenever possible and (2) EOD forces in each component at each level will not be fewer than those indicated in the planned force without specific justification.

Manning the EOD Force

Looking at the size of the force and its ability to support such growth, we found that the planned increase in active duty enlisted personnel (32 percent growth between FYs 2021 and 2028) is not sufficient. To provide the Regular Army with the enlisted personnel it needs to both support LSCO per doctrinal allocation rules and perform DSCA missions as required by statute and regulations, the inventory of active duty enlisted personnel would need to grow by 73 percent instead. The Army plans to reduce the number of active duty officers by 41 percent between FYs 2021 and 2028, but this reduction is too severe. If the EOD force must support LSCO and perform DSCA missions, the reduction should be closer to five percent with cuts concentrated at the O3 grade.

The Army plans to increase the size of the ARNG's EOD force by a significant margin. Between FYs 2021 and 2028, the ARNG expects to raise the number of enlisted personnel by 83 percent and the number of officers by 27 percent. However, these increases are not sufficient to meet the demands imposed by LSCO and DSCA and would leave the ARNG with shortages across all grades. Our analysis indicates that the requisite increases in the size of the ARNG are quite a bit larger: The inventory of enlisted personnel would need to grow by a factor greater than five, and the officer inventory by a factor greater than three.

Of particular concern are the projected manning shortages in the ARNG's senior ranks. Our forecasts indicate that, if current policies and trends were to continue, there would be no colonels or lieutenant colonels in the ARNG's inventory of EOD personnel to fill the authorizations planned for FY 2028. This would leave senior ARNG EOD command and staff positions vacant, which raises questions about the viability of the ARNG EOD force.

Governance of the Army EOD Force

Our examination of key governance issues raised by members of Congress considered several alternatives, namely whether the Army EOD force should

- be designated as a special operations activity
- be a separate branch as directed by Congress
- remain in the Ordnance branch or be moved to another branch.

In addition, we considered how an increase in force structure to address DSCA missions should be managed, if such an increase were to occur.

We found no compelling evidence to support designating EOD as a special operations activity; indeed, the evidence to the contrary seems greater. The administrative challenges the designation would create, not least of which is the de facto requirement for EOD to be established as a stand-alone branch within U.S. Army Special Operations Command (USASOC), would be significant. Most important, the functions that EOD performs are not inherently Special Operations functions; they are important to Special Operations Forces in the same way they are important to other Army units and commands. The benefit of the designation is that it would force the Army to train and prepare EOD units and personnel to better support Special Operations Forces. However, the Army could gain many, if not all, of these benefits by organizing EOD such that the units that support USASOC commands are either organic or assigned to the units they support, rather than in a supporting role.

There is a good argument for making EOD a basic branch of the Army, but doing so would require additional resources. While detailed analysis of the difficulty and cost of such a move is beyond the scope of this study, it seems that creating a separate branch associated with the Sustainment COE would be the easiest and most inexpensive option.

One might also argue in favor of moving EOD out of the sustainment warfighting function and COE and into the protection warfighting function and Maneuver Support COE because they

align more closely with the functions EOD actually performs. However, this move would require significant resources to establish an EOD school and develop the ability within the COE to support EOD force modernization.

Recommendations

The Army should address the disconnect between EOD doctrine and force structure by either providing more force structure so the doctrine can be executed in LSCO or revising the doctrine to permit more flexible concepts of support. In the most demanding LSCO force employment contingencies—i.e., rotational employment or more general mobilization and employment—the EOD force cannot support major commands and maneuver or SOF units as the doctrine indicates it will. Even if more force structure were provided to permit one-to-one support relationships, there are important missions, such as rear area security and ammunition supply point support, that EOD will have to perform, and which are not accounted for in force allocation rules. The Army should consider revising its doctrine to permit more flexible concepts of support in addition to the unit allocation rules currently in place.

The TAA process should account for the DSCA mission set—missions that in wartime will be homeland defense and impose significant demands on the EOD force. These missions are not captured in joint scenarios and planning but are required by legislation and regulation. The omission of DSCA missions from the TAA process results in decreased EOD unit readiness and unreasonable stress on the force.

Army leadership must address the manning shortfalls in the ARNG EOD force, **including the lack of senior EOD leaders to command the ARNG group and battalions**. This part of the force is critical to the overall EOD effort in LSCO but cannot perform its mission without resolving significant shortages in personnel. While our analysis did not examine in detail how to address this challenge, a few things are clear. Since it takes years to train EOD-qualified personnel and the expected ARNG shortfalls are most significant at the more senior grades, Army leaders likely need at least a two-pronged approach. To address the shortfalls over the long run, the Army must fill the personnel pipeline with EOD-qualified personnel by recruiting and training effectively. In the short run, the Army should address the problem in the senior ranks by encouraging EOD-qualified personnel leaving the Regular Army to serve in the ARNG's EOD force.

The Army should consider options for making ARNG EOD personnel more readily available for DSCA missions to relieve stress on the Regular Army force and provide real-world missions to the ARNG force. Because DSCA missions are federal, they must be performed by units operating under Title 10. When not mobilized, ARNG forces operate under State authority and Title 32, which presents a challenge to accessing them for DSCA. However, DoD has addressed this challenge in other areas, such as the 49th Missile Defense Battalion in the

Alaska National Guard and National Guard pilots who fly combat air patrol missions for Operation Noble Eagle.

EOD should not be made a special operations activity. There is no compelling evidence to justify such a designation and doing so would create dysfunction in EOD and USASOC. Concerns about how EOD supports SOF can be addressed in other ways, such as creating additional habitual support relationships between EOD units and SOF.

Contents

Figures and Tables

Figures

Tables

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Chapter 1. Introduction

The Army's explosive ordnance disposal (EOD) mission is complex and cuts across both military and civilian activities. According to Army Regulation 75-15, "Army EOD provides integrated and layered protection support to forces, civil authorities and critical infrastructure…."[1] In addition to its combat missions, defense support of civil authorities (DSCA) missions, in particular, are mandated by federal statute and by Department of Defense (DoD) regulations, policies, and doctrine.[2] The threats managed by EOD forces are also both conventional and non-conventional (i.e., chemical, biological, radiological, and nuclear).

During the past 20 years, the Army EOD force has undergone significant changes. The force expanded in size and focused on improvised explosive device (IED) missions in support of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF), but experienced force reductions after those conflicts concluded. As the focus of defense strategy moves away from counterinsurgency operations in the Middle East and back to strategic competition, Army EOD is shifting its focus to large-scale combat operations (LSCO).[3]

This report describes the result of a research project conducted by the RAND Arroyo Center for the EOD branch in the office of the Deputy Chief of Staff for Operations, Plans, and Training (G-3/5/7) (G-38), Headquarters, Department of the Army. It examines the roles Army EOD can expect to face in LSCO as a key part of Army and Joint Force multi-domain operations in the fiscal year (FY) 2027–2032 time frame (five to ten years from the inception of the project); estimates the demands on EOD forces from LSCO and legal and regulatory requirements for EOD support to civil authorities; evaluates the sufficiency of the size and composition of Army EOD forces to meet future demands; and assesses selected aspects of current organization and governance of the Army's EOD force.

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[1] Army Regulation 75-15, *Policy for Explosive Ordnance Disposal,* Headquarters, Department of the Army, December 17, 2019.

[2] See Department of Defense Directive 3025.18, *Defense Support of Civil Authorities (DSCA)*, Under Secretary of Defense for Policy, December 29, 2010, change 2, March 19, 2018; DoDD 3025.13, *Employment of DoD Capabilities in Support of the U.S. Secret Service (USSS), Department of Homeland Security (DHS)*, Under Secretary of Defense for Policy, October 8, 2010, change 1, May 4, 2017; Department of Defense Instruction 3025.21, *Defense Support of Civilian Law Enforcement Agencies*, Under Secretary of Defense for Policy, February 27, 2013, change 1, February 8, 2019; Joint Publication 3-42, *Joint Explosive Ordnance Disposal*, Joint Chiefs of Staff, September 9, 2016; Public Law 94-524, Presidential Protection Assistance Act of 1976, October 17, 1976.

[3] U.S. Department of Defense, *2022 National Defense Strategy of the United States of America*, October 2022.

Scope and Approach

The objective of this work is to examine the ability of proposed EOD forces to support demands from both LSCO and DSCA as set out in law and regulation. To make this determination, we considered three questions:

- Does the Army have the right EOD force structure?
- Will this force be sufficiently manned to meet future mission requirements?
- How can the Army best govern the EOD force?

Because this report covers a complex set of topics requiring varied approaches, details regarding the methods used to conduct the analysis are presented in the individual chapters and supporting appendices. Here, we provide an overview.

We reviewed the Army's plans for the EOD force during the period of interest (FYs 2027–2032) and examined what will be expected of the force in LSCO. We created a snapshot of the EOD force planned for FY 2028 based on information drawn from Army documents and data. Information on future expectations for the force during LSCO leveraged Army documents that describe its vision for the future security environment and interviews with current and retired EOD leaders on how LSCO will affect EOD missions.

We assessed the sufficiency of the EOD force structure planned for FY 2028 in terms of its ability to meet (1) the expected demands of LSCO and (2) the legislative and regulatory requirements to support civil authorities. To determine whether the planned EOD force structure can sufficiently support a major commitment of U.S. forces, we reviewed the allocation rules specified in Army doctrine and evaluated the planned EOD force in relation to those rules. To determine whether the planned EOD force can sufficiently support civil authorities, we used data from the Explosive Ordnance Disposal Information Management System (EODIMS) to estimate the workload associated with DSCA missions and interviewed subject-matter experts in the Army Force Management community to learn whether and how the force planning process accounts for the demands imposed by DSCA missions. Using existing DoD policy as a guideline, we also examined how EOD would be able to support the force and the attendant stress on the EOD force if a large conflict required forces to rotate in and out of theater.

To determine whether the EOD force will be sufficiently manned in the future to meet mission requirements, we developed a statistical model that forecasts the number of EOD personnel, by grade and component, through FY 2032 assuming current policies and trends continue. We then compared our forecasts to the number of personnel needed to meet the demands of LSCO and DSCA. The analysis identified potential surpluses and deficiencies in the future inventory of EOD personnel, which the Army might consider as it formulates and adjusts its personnel management policies.

Our investigation into the governance of EOD forces focused primarily on questions raised by members of Congress concerning a different organization for the force, but it also addressed questions that emerged from our analysis of force structure and personnel. We leveraged Army

institutional constructs (e.g., branch and force modernization proponency, warfighting functions) to evaluate alternate governance structures and the magnitude of changes needed for different options. Our analysis did not include estimating the cost of these options, although this is a critical question.

Organization of the Report

The remainder of this report presents the results of these analyses. We begin in Chapter 2 with an overview of the EOD missions and future force structure plans. Chapters 3 through 5, address the three topics on which our analysis focused—whether the Army has the right EOD force structure, sufficiency of personnel to meet mission demands, and governance of the EOD force, respectively. From these assessments, the research team identified key findings and proposed recommendations to the Army, which are discussed in Chapter 6. The report contains three supplemental appendices that cover the methodology for forecasting the inventory of EOD personnel (Appendix A), the methodology underlying the rotational rate analysis (Appendix B), and a review of EOD legislation and related materials from 2018–2022 (Appendix C).

Chapter 2. Mission Demands and Future EOD Forces

This study centers on the sufficiency of the Army EOD force to perform its mission supporting forces conducting multi-domain operations (MDO) in LSCO, which necessarily considers the demands of DSCA and homeland defense missions. This chapter provides the groundwork for that discussion. It starts with a brief overview of how EOD became the force it currently is and provides an assessment of the missions EOD can expect in both LSCO and DSCA. The chapter closes with a snapshot of the future force.

From Bomb Disposal in 1941 to Explosive Ordnance Disposal Today

Army EOD grew out of the Army Bomb Disposal force, originally modeled after the British effort to address unexploded ordnance (UXO) from German bombing of London and other areas in World War II (WWII).[4] Established in 1941 as part of the Army Ordnance Department, the Army Bomb Disposal force was created as the United States prepared for its eventual entry into WWII (as was the Navy's Mine Disposal School). Army bomb disposal units were redesignated as EOD in 1949.[5] As with other unit types, the EOD force shrank after WWII, and then expanded for and contracted after the Korean War. The EOD force expanded again for Vietnam, but after that conflict did not decline in size as much as after previous conflicts, because the Army recognized the force would be needed in peacetime as well.[6] As we demonstrate in Chapter 3, peacetime demands are significant.

EOD support in combat zones evolved from an area approach—that is, EOD would support deployed units within a given area—to one in which, at least in doctrine, EOD units are allocated to support maneuver units and major commands. Deployments for Desert Shield and Desert Storm in 1990 and 1991, respectively, featured control teams to manage EOD support to forces. These were the first signs of what would become the current force structure (a provisional EOD group was created to control EOD in theater).[7] By the mid-1990s EOD groups and battalions would manage EOD support to major operations and units.[8] These command and control relationships would mature through OEF and OIF, in part because of the need to support

[4] Robert Leiendecker, *Bomb Disposal, The Early Years of Explosive Ordnance Disposal (An Informal History), 1940 to 1949*, July 2012, p. 10–11.

[5] Samuel J. Hooper, *The History of U.S. Army Bomb Disposal and Explosive Ordnance Disposal 1941 thru 1945*, undated, p. 32.

[6] Hooper, undated, p. 44.

[7] Retired EOD leaders, interview with the authors, August 5, 2022.

[8] For an overview of EOD command and control in the mid-1990s see: Field Manual 9-15, *Explosive Ordnance Disposal Service and Unit Operations*, Secretary of the Army, May 8, 1996, Sections 1-8 and 1-9.

functional joint task forces (JTFs) focused on the IED challenge, resulting in doctrinal tables of allocation of EOD support to major commands and units.[9] The resultant force and its specified structure and doctrine in 2022, which Army plans indicate will undergo some but not major changes in the next five years, is the starting point of our examination of the force for LSCO.

Future Demands on EOD Forces

With strategic competition at the center of national defense strategy, Army planning is focused on preparing for MDO in LSCO with a peer competitor—a situation U.S. forces have not faced since 1945.[10] These conflicts are, by definition, larger and more demanding than OEF and OIF. The Korean War might provide an approximate floor for what would be needed (multi-corps operations under an army command), and a world war requiring national mobilization might provide a ceiling. Relatively short air and maritime conflicts, in which the Army plays only a supporting role, are not considered. As such, we assume throughout that LSCO with a peer competitor will be a significant conflict involving large portions, if not all, of U.S. Army deployable forces.

For the EOD community, this raises questions about how the nature of EOD missions is likely to change and how EOD units will support the maneuver units and major commands. The demands imposed by LSCO must be considered in tandem with other demands on EOD forces, particularly DSCA missions, which are required by statute and regulation and expend a large number of EOD manhours.

Large-Scale Combat Operations: Back to the Future

To assess the nature of the demands on the EOD force in LSCO, we consulted a number of Army publications and interviewed current and former senior EOD leaders.[11] The results indicate a shift from the past 20 years, in which IEDs were the dominant threat to U.S. forces, to operations that will be driven primarily by military ordnance fired by peer militaries, such as

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[9] Army Techniques Publication (ATP) 4-32, Tables 1-1 and 1-2.

[10] U.S. Department of Defense, 2022.

[11] Literature reviewed included ATP 4-32, 2022; ATP 4-32.1, *Explosive Ordnance Disposal (EOD) Group and Battalion Headquarters Operations*, Headquarters, Department of the Army, January 24, 2017; U.S. Army Training and Doctrine Command, *The Operational Environment (2021-2030): Great Power Competition, Crisis, and Conflict*, 2020; U.S. Army Futures Command Pamphlet 525-2, *Future Operational Environment: Forging the Future in an Uncertain World 2035-2050*, U.S. Army Futures Command, undated; U.S. Training and Doctrine Command (TRADOC) Pamphlet 525-92, *The Operational Environment and the Changing Character of Warfare*, U.S. Army Training and Doctrine Command, 2019; U.S. Army Futures Command Pamphlet 71-20-7, *Army Futures Command Concept for Protection 2028*, U.S. Army Futures Command, 2021; TRADOC Pamphlet 525-4-1, *The U.S. Army Functional Concept for Sustainment, 2020-2040*, U.S. Army Training and Doctrine Command, February 2017.

The research team interviewed 20 current (Regular Army and ARNG) and six retired EOD experts and leaders for this effort.

UXO response operations and munitions exploitation and technical intelligence for "first seen" ordnance (i.e., munitions that are previously unknown to U.S. forces).

In addition, LSCO will likely require EOD support to protect large facilities needed for a joint force operating in a foreign theater during war with a peer competitor. These missions could include rendering safe ordnance threats to ports, logistics depots, and transportation infrastructure and providing support to large ammunition supply dumps. Such missions can be manhour intensive. When asked to describe the types of EOD missions that will likely be prevalent during LSCO, one EOD leader referenced an explosion at a former Army ammunition plant that expended 220 EOD manhours over two days.

The conflict in Ukraine, which was active while this research was underway (May 2022 to March 2023), provides a clear example of the type and magnitude of the UXO mission likely to be encountered. There, hundreds of thousands of mines and unexploded munitions have already been cleared with more created daily.[12] In late 2022, munitions expenditures in the Russo-Ukrainian War were running between 20,000 and 30,000 artillery rounds fired per day, to say nothing of other types of munitions and land mines.[13] Many of these munitions are old and of questionable reliability; as Russia expends its munitions stocks, the risk of UXO increases.[14]

This snapshot of a medium-sized conflict between relatively modern militaries illustrates how LSCO will differ significantly from OEF and OIF, during which small numbers of mortar and rocket rounds represented the majority of military munitions expended by insurgents and terrorists. IEDs, though still a threat in many situations, will likely be "ankle biters" during LSCO, in the words of one senior EOD leader.[15] It is not clear whether functional task forces similar to those created in OEF and OIF, such as JTF Troy or Paladin, will be created in LSCO, but if they are, the EOD force will be asked to play a key role in them and should remain ready to do so.

EOD doctrine will need to account for these changes in operating environment and focus. While mission types might change in proportion, they will not change much in kind. In Chapter 3, we examine how doctrine allocates forces to support the force. Training is also implied in these changes; fortunately, EOD training continues to address UXO and ordnance intelligence functions.

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[12] Sergiy Krazay, "Almost One Third of Ukraine Needs to be Cleared of Ordnance, Ministry Says," *Reuters*, August 12, 2022.

[13] Courtney Kube, "Russia and Ukraine are Firing 24,000 or More Artillery Rounds a Day," *NBC News*, November 10, 2022.

[14] Jake Epstein, "Russia is Running Out of New Rockets and Artillery Shells and May Need to Rely on 'Unpredictable' Decades-old Ammo Instead, US Military Official Says," *Business Insider*, December 13, 2022.

[15] Senior EOD leader, interview with authors, August 18, 2022.

Defense Support of Civil Authorities

Both statute and regulation require that DoD EOD forces provide support and assistance to civilian agencies.[16] These agencies include the Department of Homeland Security; the Bureau of Alcohol, Tobacco, Firearms, and Explosives; the Federal Bureau of Investigation; the U.S. Secret Service; and the Department of State. The overwhelming majority of DSCA incidents to which Army EOD units respond are Very Important Person (VIP) support missions.[17] These missions provide protection to the President of the United States (POTUS), the Vice President, the First Lady, presidential candidates, and foreign dignitaries, among others. VIP support missions also include EOD support provided during National Special Security Events, such as presidential inaugurations, the State of the Union address, the United Nations General Assembly, and the Democratic and Republican national conventions.[18]

In recent years, DSCA missions have been both numerous and manhour intensive. During FYs 2017–2021, DSCA missions accounted for 16 percent of all Army-led EOD incidents and 44 percent of all manhours expended during Army-led EOD incidents.[19] These observations are consistent with the findings of a 2022 RAND study and a 2019 U.S. Government Accountability Office report.[20]

Our discussions with subject-matter experts within the Army EOD and U.S. Secret Service communities suggest that demands from DSCA missions would likely persist during LSCO. While some VIP support missions can be sourced with EOD teams from state and local authorities, DoD EOD teams are strongly favored, if not required, for many VIP support missions and especially for those that protect POTUS, who serves as the Commander in Chief of the armed services. Furthermore, when the nation is at war, DSCA missions performed within the United States are synonymous with EOD's role in homeland defense, a mission DoD has prioritized per the 2022 National Defense Strategy.[21]

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[16] See DoDD 3025.18, 2018; DoDD 3025.13, 2017; DoDI 3025.21, 2019; Joint Publication 3-42, 2016; Pub. L. 94-524, 1976.

[17] Our analysis of EODIMS data indicate that during FYs 2017–2021, VIP support missions accounted for 81 percent of all Army-led DSCA missions and 96 percent of the manhours expended on Army-led DSCA missions.

[18] United States Secret Service, "Securing Events," webpage, undated.

[19] The percentages were computed using data from EODIMS.

[20] Bruce Held, Jennifer Lamping Lewis, Douglas C. Ligor, Jeffrey A. Drezner, Grant Johnson, Sale Lilly, Monica Rico, Tucker Reese, Erik Van Hegewald, Christina Panis, and Barbara Bicksler, *Assessment of the Department of Defense's Explosive Ordnance Disposal Enterprise*, RAND Corporation, 2022, Not available to the general public; U.S. Government Accountability Office, *Warfighter Support: Actions Needed to Improve Explosive Ordnance Disposal Forces Planning*, GAO-19-698, September 2019.

[21] U.S. Department of Defense, 2022.

Snapshot of the EOD Force Planned for FYs 2027–2032

Having described the expected demands on the EOD force, we now turn to the Army's plans for the structure of its EOD forces, as well as the personnel needed to man the planned units.[22] Table 2.1 provides an accounting of the principal parts of the EOD force in the Regular Army and Army National Guard (ARNG) planned for FY 2028. This force profile was produced by the Total Army Analysis (TAA) process, an analytic effort that "develops a fiscally constrained force based on [National Military Strategy] objectives…and the dynamics of internal and external constraints."[23]

Table 2.1. Planned EOD Units, FY 2028

Unit Type	Regular Army	ARNG
Group	2	1
Battalion	6	3
Line Company	36	14
Specialist Company	2	0

SOURCE: Force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022.
NOTE: The two specialist companies are the EOD weapons of mass destruction (WMD) and EOD Continental U.S. (CONUS) Support companies, which have unique missions and organizations. The line companies include one company that requires airborne-qualified personnel.

The EOD units outlined in Table 2.1 will support the Major Force Elements specified in Table 2.2.[24] Most of the EOD units fall under U.S. Army Forces Command (FORSCOM) or their respective State National Guards when not deployed, though some are assigned to U.S. Army Pacific (one battalion and four companies) and a small force to U.S. Army Europe and Africa

[22] A comprehensive review would include understanding EOD modernization plans and other requirements for a functional force, but such an analysis was outside the scope of this effort.

[23] "TAA is a three phase force structure analysis process that defines the required Army force structure within end strength and accounts for the military and DA Civilian requirements and authorizations necessary to comply with DOD guidance. The TAA provides the basis for the Army's POM development and the establishment of the POM Force…. It is an integral part of the OSD PPBE and the Chairman, JCS's Joint Strategic Planning System. The TAA process develops a fiscally constrained force based on NMS objectives to be achieved and the dynamics of internal and external constraints. The fiscally constrained force is developed to achieve an affordable and effective force to support national objectives." U.S. Army War College Strategic Studies Institute, *2021-2022 How the Army Runs, A Senior Leader Reference Handbook*, Carlisle, PA, October 6, 2022, pp. 3–24.

[24] The units in Table 2.2 are those specified as receiving EOD support under the "Modeling Rules of Allocation" in ATP 4-32. In addition, Maneuver Enhancement Brigades (MEBs) are noted as supported units in the ATP, but not listed under the modeling rules of allocation. See ATP 4-32, Table 1-1, p. 1-4. Furthermore, MEBs are not currently assigned to divisions, but rather support them. This will become an important point when we discuss the sufficiency of EOD doctrine and missions, such as divisional rear area EOD support, that might not be sufficiently accounted for in doctrine.

(two companies). The TAA process does not account for the demands imposed by DSCA missions, except for a single specialist company in the Regular Army that provides EOD support in CONUS.

Table 2.2. Major Force Elements Allocated EOD Support, FY 2028

Major Force Element	Regular Army	ARNG
Theater or Field Army	6	0
Corps	4	0
Division	10	8
Brigade Combat Team	31	27
Special Forces Group	5	2
Ranger Regiment	1	0

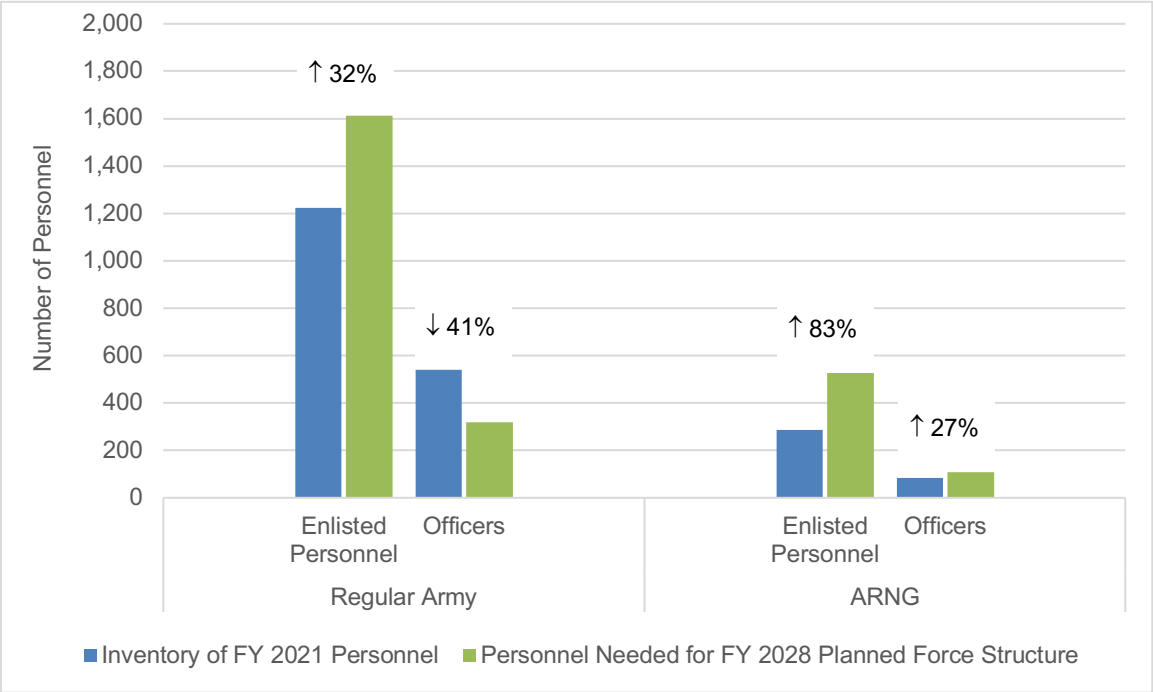
SOURCE: Force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022.
NOTE: We include Eighth U.S. Army, the major Army command in the Republic of Korea, even though it is not included in the supported force structure for 2028.

To execute its missions as planned, the Army must have sufficient personnel to man the EOD force structure specified in Table 2.1. We computed the requisite personnel by applying the Tables of Organization and Equipment (TOEs) and adding margins for personnel in Table of Distribution and Allowance (TDA) units and trainees, transients, holdees, and students (TTHS).[25] Figure 2.1 presents the results by component and grade in relation to the FY 2021 inventory of Army EOD personnel.

To man the force structure planned for FY 2028, the Regular Army would require about 1,600 enlisted personnel and 320 officers, and the ARNG would require about 520 enlisted personnel and 110 officers. When compared to the FY 2021 inventory of Army EOD personnel, these personnel counts represent increases in active duty enlisted personnel, enlisted ARNG personnel, and ARNG officers but a decrease in active duty officers.

[25] The TOEs were obtained from Force Management System Web. In addition to the personnel associated with the units listed in Table 2.1, we included active duty enlisted EOD personnel who fall within chemical, biological, radiological, nuclear, explosives (CBRNE) companies identified in force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022. The TDA and TTHS margins were computed using the personnel data. The TDA margins were obtained by taking the ratio of TDA to TOE personnel by component, pay grade, and FY and then averaging over FYs 2012 to 2021. The TTHS margins were obtained in a similar fashion for the Regular Army. Because the reserve component does not have a TTHS account, the TTHS margins for the ARNG were set to zero.

Figure 2.1. Army EOD Personnel Needed to Man the Force Structure Planned for FY 2028 Compared to FY 2021 Inventory of Army EOD Personnel



SOURCE: Features information from data on force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022; the Total Army Personnel Database (TAPDB); and Defense Manpower Data Center (DMDC) Reserve Master File.
NOTE: Personnel counts for the Regular Army include EOD personnel who fall within CBRNE companies identified in force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022, as well as margins for personnel in TDA and TTHS units. Personnel counts for the ARNG include margins for personnel in TDA units; because the reserve component does not have a TTHS account, the TTHS margins for the ARNG were set to zero.

This force will operate under doctrine that captures lessons from EOD's experience in OEF and OIF. Army doctrine has EOD forces supporting major commands and large maneuver and special operations forces (SOF) commands, with EOD units allocated according to well defined rules of allocation (ROAs).[26] An examination of the most current doctrinal ROAs and the planned structure of EOD forces suggests that all EOD teams, which reside in EOD companies, could be dedicated to Brigade Combat Teams (BCTs), Special Forces Groups (SFGs), or the Ranger Regiment.[27] If this doctrine were rigorously followed, there would be no EOD companies or teams available to handle such critical missions as ammunition supply point assistance, corps and division rear area support, support for non-BCT units, such as MEBs, and support to theater-

[26] ATP 4-32, 2022, Tables 1-1 and 1-2; Deputy Chief of Staff G3/5/7, *SRC 09 Ammunition / EOD TAA 24 - 28 Rules of Allocation (ROA)*, Department of the Army, September 25, 2020, pp. 7, 8, 14, 15, 17, 18; ATP 4-32.1, 2017.

[27] ATP 4-32, 2022, Tables 1-1 and 1-2; force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022.

level assets, such as ports. However, doctrine also indicates that EOD companies will remain under the command of EOD battalions in most cases, which would allow more senior EOD commanders to manage forces in theater in accord with the supported unit priorities.[28] Chapter 3 provides a more detailed description of the doctrinal ROAs, as well as a quantitative analysis that explores the consequences of applying the ROAs strictly given the force planned for FY 2028.

Conclusion

EOD missions in LSCO will be, in some ways, "back to the future"—that is, they will be similar to the missions EOD was created to perform in the early 1940s. UXO will be numerous, and "first seen" ordnance intelligence could be critical. EOD command and control doctrine, which will drive how EOD support is provided to major commands and maneuver units, grew out of the critical role played by senior EOD commands in the counter-IED fight of OEF and OIF. Consequently, current doctrine might not be well aligned with the future demands Army EOD forces are likely to face.

[28] ATP 4-32.1, 2017, p. 1-4, para. 1-28. Older EOD doctrine, such as Field Manual (FM) 9-15, 1996, provides some indication of the resources required to perform these missions; see, for example, Chapter 1, "EOD Command and Control," pp. 1-8 and 1-9.

Chapter 3. Sufficiency of Planned EOD Force Structure

In this chapter, we assess the sufficiency of the EOD force structure planned for FY 2028 in terms of its ability to meet (1) the expected demands of LSCO and (2) the legislative and regulatory requirements to support civil authorities. To determine whether the planned EOD force structure can sufficiently support a major commitment of U.S. forces, we reviewed the allocation rules specified in Army doctrine and TAA and evaluated the planned EOD force in relation to those rules and the major commands and maneuver forces planned for FY 2028.[29] To determine whether the planned EOD force can sufficiently support civil authorities, we interviewed subject-matter experts in the Army Force Management community and asked about the extent to which the TAA process accounts for the demands imposed by DSCA missions.

Following the initial assessment, we constructed augmented EOD force profiles in two steps. First, we modified the planned EOD force, which we described in Table 2.1, by adding the units necessary to achieve compliance with the doctrinal and TAA rules of allocation. Using data from EODIMS, we then estimated the workload associated with DSCA missions and added the units necessary to cover that workload. The chapter closes with an analysis of the potential effects on deployment tempo of not augmenting the planned EOD force with the additional units.

EOD Force to Support the Army under Doctrinal Allocation Rules

Because LSCO requires the employment of a large force, we assume that EOD forces will be deployed to support major commands and maneuver forces—the primary actors in LSCO—in accordance with Army doctrine. The senior Army command will likely be a Theater Army, potentially with a Field Army in theater as well if the conflict occurs in the U.S. Indo-Pacific Command (INDOPACOM) or if multiple corps are committed.[30] These armies will command one or more subordinate corps. Because of the size and complexity of any LSCO conflict, one or more EOD groups will be in theater.

[29] ATP 4-32, 2022; force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022.

[30] The Eighth U.S. Army is the only field army in the Army inventory. In a conflict with China (the primary LSCO scenario in the INDOPACOM theater), tensions on the Korean peninsula would be quite high, even if it were not in the conflict zone. Accordingly, we assume that the Eighth U.S. Army would have EOD support throughout such a conflict. A conflict in Korea that does not involve China is also possible. So, too, is the possibility of the creation of a field army in other theaters if multiple corps are deployed, but we do not consider that possibility here either. Field Manual 3-94, *Armies, Corps, and Division Operations,* Department of the Army, July 2021, para. 3-113, p. 3-21.

Three categories of deployment are possible:

- The conflict is significant enough to require the deployment of all available forces—specifically, forces do not rotate into theater as they did in OEF and OIF, but rather deploy and stay there.
- The conflict is not large enough to require the deployment of the full force but is large enough to require forces to rotate at the maximum rates stipulated in DoD policy.[31]
- The conflict is small enough so that either no rotation is necessary (i.e., the conflict ends before rotations are needed), or rotation happens at rates slower than the maximum rates stipulated in DoD policy.

While the third category could hold, and some joint planning scenarios assume it would, the premise of this analysis—MDO in LSCO with a peer competitor—would all but necessarily require more. Furthermore, at the start of a conflict with a major adversary it would not be clear which forces will be required or for how long; U.S. experiences in OEF and OIF represent such a case. Accordingly, *our analysis assumes one of the first two categories applies* as these best capture the likely demand and illustrate the limits of the proposed force structure. In particular, we assume that MDO in LSCO with a peer competitor would be significantly more demanding than the operations the Army experienced during OEF and OIF.

Table 3.1 provides the allocation rules that apply given the assumptions detailed above.[32] These rules describe how EOD will support the deployed force.

Table 3.1. EOD Doctrinal Allocation Rules, EOD Group within Theater of Operations

EOD Organization	Modeling Rule of Allocation	Supported Organization
EOD Group	1 per Theater Army 1 per Corps 1 per JTF 1 per Combined JTF 1 per Homeland Defense 1 per 2-6 EOD Battalions	Theater Army Corps JTF Combined JTF
EOD Battalion	1 per Division 1 per JTF 1 per Combined JTF 2 per Homeland Defense 1 per 3-7 EOD Companies	EOD Group Division JTF Combined JTF
EOD Company	1 per BCT 1 per SFG(A) 1 per Ranger Regiment 8 per Homeland Defense 1 per 1-5 EOD Platoons	EOD Battalion BCT MEB SFG(A) Ranger Regiment

SOURCE: Army Technical Publication 4-32, 2022, Table 1-1.

[31] See Directive Type Memorandum 21-005, *Deployment-to-Dwell, Mobilization-to-Dwell Policy Revision*, Under Secretary of Defense for Personnel and Readiness, August 16, 2021, change 1, October 13, 2022.

[32] ATP 4-32, 2022, Table 1-1.

Two separate, but largely identical, sets of allocation rules are germane to our analysis:

- Those that accompanied TAA 24-28, which were published in September 2020[33]
- Those that were articulated in Army Technical Publication (ATP) 4-32, which were published in May 2022.[34]

Points of disagreement between these two sets of ROAs likely stem from having been published a few years apart.[35] While our analysis references both sets, we rely more heavily on the ROAs presented in Table 3.1, which were drawn from the more recent source, ATP 4-32.[36]

To construct the EOD force profile needed to support a major commitment of U.S. forces, we apply the allocation rules (Table 3.1) to the Major Force Elements planned for FY 2028 (Table 2.2).[37] In addition, we assume the following:

- EOD groups and battalions will support only major U.S. Army commands. JTFs and Combined JTFs would receive support from senior EOD commands only if they are built on an Army or corps headquarters. No functional JTF or Combined JTFs, such as JTF Troy or Paladin, will be created. If JTFs, Combined JTFs, or other additional support requirements are needed, the units and personnel will be drawn from the existing force structure.
- EOD groups will not support the Geographic Combatant Commands or U.S. Forces Korea.
- EOD forces will support forces of the same component (e.g., Regular Army, ARNG) whenever possible.[38]
- EOD forces in each component at each level will not be fewer than those indicated by TAA without specific justification.

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[33] Department of the Army, 2020, pp. 7, 8, 14, 15, 17, 18.

[34] ATP 4-32, 2022, Tables 1-1 and 1-2.

[35] There are two points of disagreement that bear most directly on our analysis. First, a strict application of the most current doctrinal ROAs (ATP 4-32) to the EOD force planned for FY 2028 suggests that all EOD teams, which reside in EOD companies, could be dedicated to BCTs, SFGs, or the Ranger Regiment. However, ATP 4-32 also indicates that EOD companies can support MEBs, which are responsible for parts of a division rear area. The TAA 24-28 ROAs stipulate that an EOD company would support ports in theater, but this rule does not appear in ATP 4-32. In favoring the more recent source, our analysis assumes that priority of support would go to the BCTs, leaving no EOD companies or teams available to handle ammunition supply point assistance, corps and division rear area support, support for non-BCT units, such as MEBs, and support to theater-level assets, such as ports.

The second point of disagreement pertains to the homeland defense mission. While the allocation rules in TAA 24-28 do not stipulate EOD forces for homeland defense, the more recent ATP 4-32 does include this mission (see Department of the Army 2020, pp. 8, 12, 15 and ATP 4-32, Tables 1-1 and 1-2). Given that DSCA missions are both numerous and manhour-intensive, this is an important change with implications for the force. As before, we rely on the more recent source and include EOD support for homeland defense in our analysis.

[36] A third publication that bears on this discussion is ATP 4-32.1, 2017.

[37] Force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022.

[38] We make this assumption for force planning purposes only. EOD forces might or might not be deployed and employed in this manner.

Table 3.2 presents the results of our analysis. The first three columns indicate the Major Force Elements (Table 2.2) and homeland defense units requiring EOD support per Army doctrine. The remaining columns present two distinct EOD force profiles: Columns five and six present the planned EOD force (Table 2.1) as a benchmark, while columns seven and eight show the doctrinal EOD force—i.e., the EOD force that would be needed to comply with the allocation rules in Table 3.1.

Table 3.2. EOD Force to Support the Army under Doctrinal Allocation Rules, FY 2028

Supported Units				Planned Force		Doctrinal Force	
Unit Type	Regular Army	ARNG	EOD Unit Type	Regular Army	ARNG	Regular Army	ARNG
Theater (or Field) Army	6	0	Group	2	1	10	0
Corps	4	0					
Division	10	8	Battalion	6	3	10	8
BCT	31	27	Company	36	14	37	29
SFG	5	2					
Ranger Regiment	1	0					
N/A			WMD Company	1	0	1	0
Homeland Defense			Group	0	0	0	1
			Battalion	0	0	0	2
			Company	1	0	1	7

SOURCE: Features information from data on force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022, p. 11; ATP 4-32, 2022, Table 1-1.
NOTE: We include Eighth U.S. Army, the major Army command in the Republic of Korea, even though it is not included in the supported force structure for 2028. Neither the WMD company nor the EOD units listed under homeland defense support a specific unit. The WMD company is included in the planned EOD force and carried over to the doctrinal EOD force. The EOD units listed under homeland defense are derived from ATP 4-32. Because the planned EOD force includes a CONUS Support company in the Regular Army, we carry that company over to the doctrinal EOD Force and add seven, instead of eight, companies to the ARNG for homeland defense.

Table 3.1 suggests that meeting the expected demands of LSCO would require a significant increase in the size of the EOD force currently planned for FY 2028. If the entire force were deployed for a large war, the Regular Army would need an additional eight groups, four battalions, and one company. A total of ten EOD groups would be needed to support the five theater armies, Eighth U.S. Army, and the four corps; a total of ten battalions would be needed to support the ten Regular Army divisions; and a total of 37 companies would be needed to support the 31 BCTs, five SFGs, and one Ranger Regiment in the Regular Army. The CONUS Support company, which supports homeland defense, and the WMD company are carried over from the planned EOD force.

If, instead, forces were rotating into a combat zone at a deployment-to-dwell (BOG:Dwell) rate of 1:2, the Regular Army would need seven, rather than ten, EOD groups: four groups that

would rotate at the same rate as the four corps and three groups that would rotate to support one theater army. However, if the conflict were to include more than one theater army, such as a conflict with China that involved Eighth U.S. Army, the total number of EOD groups needed would again be ten.[39]

The ARNG would need an additional seven battalions and 22 companies. A total of ten battalions would be needed to support the eight ARNG divisions and homeland defense, and a total of 29 companies would be needed to support the 27 BCTs and two SFGs in the ARNG. A total of eight companies would be needed to satisfy the homeland defense requirement, but we reduced the total to seven because the EOD force planned for FY 2028 includes one company in the Regular Army supporting homeland defense (i.e., the CONUS Support company).

Army doctrine requires that there be one EOD group for every two to six EOD battalions.[40] With a total of ten EOD battalions (eight supporting ARNG divisions and two supporting homeland defense), the ARNG doctrinal force should include two EOD groups. However, Table 3.2 shows only one group in the ARNG to support homeland defense. We chose not to add a second group and assumed that some of the ARNG battalions would be attached to Regular Army groups because the ARNG has very few senior officers in its personnel inventory, as we explain in Chapter 4.

EOD Force to Provide Defense Support for Civil Authorities

As we described in Chapter 2, DSCA missions have imposed significant demands on the EOD force in recent years. Our discussions with subject-matter experts in the Army Force Management community revealed that the TAA process does not account for the demands imposed by DSCA.[41] The reason offered was that LSCO will likely consume EOD units to such an extent that DSCA missions will be of lesser priority and, accordingly, relegated to non-DoD EOD teams. While DoD regulations, policies, and doctrine direct the Department to evaluate requests for support to civil authorities in relation to their effects on military readiness, our discussions with subject-matter experts within the Army EOD and U.S. Secret Service communities indicated that DoD EOD teams are strongly favored for many VIP support missions and especially for those that protect POTUS.[42] Moreover, when the nation is at war, DSCA missions performed within the United States are synonymous with EOD's role in homeland defense, a mission DoD has prioritized per the 2022 National Defense Strategy.[43]

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[39] The addition of EOD groups to support JTFs or Combined JTFs would raise the number further.

[40] ATP 4-32, 2022, Table 1-1.

[41] However, we note that the TAA EOD Force includes a company for CONUS Support.

[42] See DoDD 3025.18, 2018; DoDD 3025.13, 2017; DoDI 3025.21, 2019.

[43] U.S. Department of Defense, 2022.

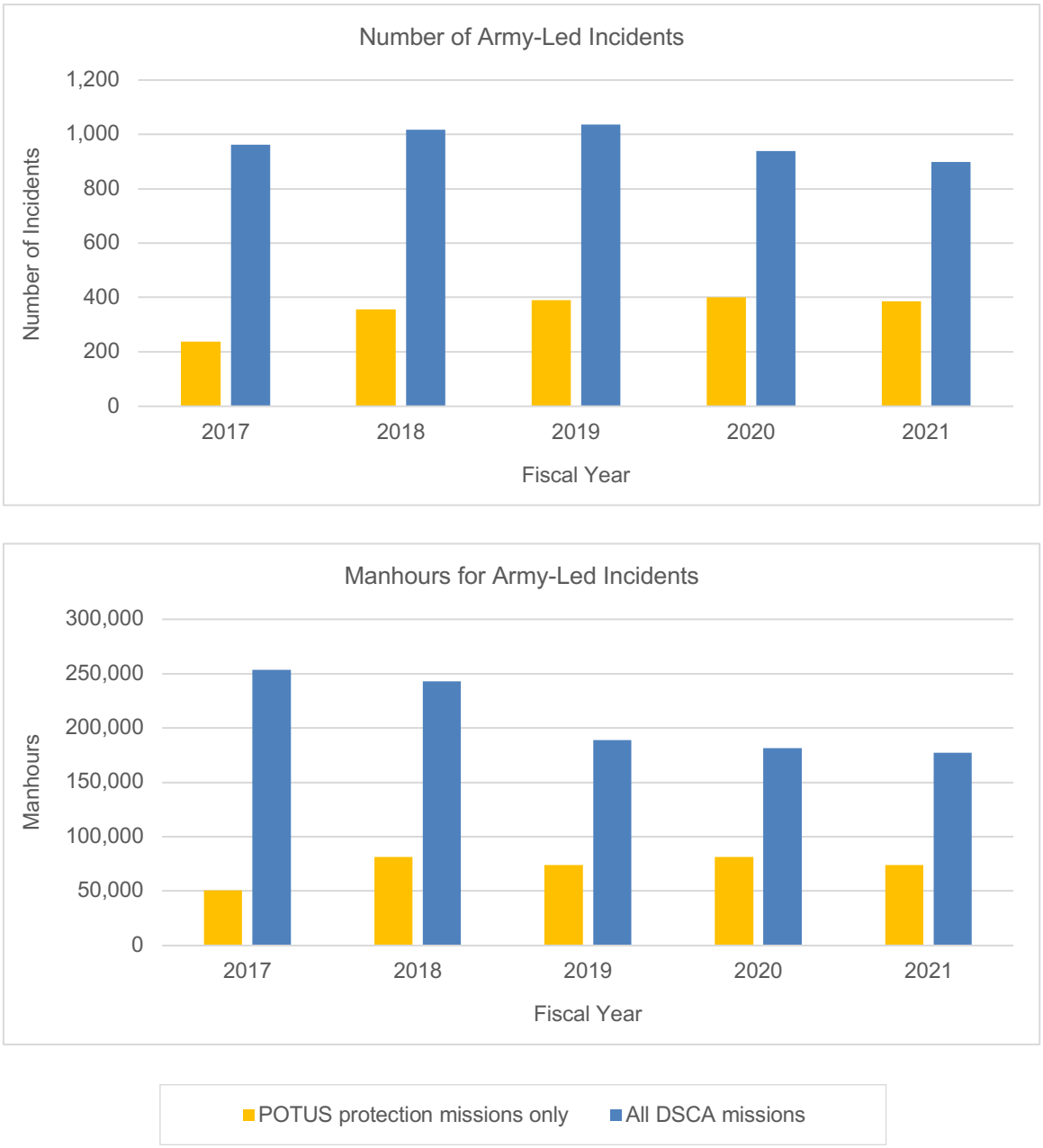
To estimate the number of units needed to perform DSCA missions, we examined the workload associated with these missions over the last five FYs. Figure 3.1 presents both the number of Army-led incidents (top panel) and the manhours expended during these incidents (bottom panel). The yellow bars indicate POTUS protection missions only, and the blue bars indicate all DSCA missions, including POTUS protection missions, other VIP support missions, and other (non-VIP support) DSCA missions. We present both the yellow and blue bars to establish a range for our estimates. At the lower end of the range, we assume that, during LSCO, Army EOD forces would perform POTUS protection missions only; support for all other DSCA missions would be provided by non-DoD EOD teams. At the upper end, we assume that Army EOD forces would respond to all DSCA missions as they would during peacetime.[44]

In FYs 2017–2021, there were an average of 354 Army-led POTUS protection missions per year, which expended 204 manhours each on average. Our analysis suggests that five companies would be needed to cover a workload of this magnitude.[45] Over the same period, there were an average of 971 Army-led DSCA missions per year, which expended 215 manhours each on average. Our analysis suggests that 13 companies would be needed to cover a workload of this magnitude.

[44] Specifically, we assume that the workload associated with these missions is equal to the average annual number of manhours expended during Army-led DSCA missions over FYs 2017–2021 (Figure 3.1, bottom panel). Implicitly, we also assume that workloads that have been associated with DSCA missions led by the other DoD services will continue to be borne by those services.

[45] Held et al., 2022 (p. 120) found that over a similar period (FYs 2017–2020) manhours expended on EOD incidents accounted for 16 percent of available manhours for Army EOD personnel. Applying the same percentage to the 72,347 manhours per year expended on Army-led POTUS protection missions in FYs 2017–2021 and assuming 1,752 available manhours per year per person, we find that 258 Army EOD personnel would be needed to perform these incidents. Using the structure of a CONUS Support company (56 personnel) as a benchmark, we convert the 258 Army EOD personnel to five companies. An analogous process was used to estimate the number of companies needed to perform all DSCA missions.

Figure 3.1. Demands Imposed by DSCA Missions, FYs 2017–2021



SOURCE: EODIMS.

NOTE: The blue bars include POTUS protection missions, other VIP support missions, and other (non-VIP support) DSCA missions.

Table 3.3 builds on the doctrinal force shown in Table 3.2, adding the units necessary to support civil authorities. If a conflict were to occur, DSCA would be subsumed by the homeland defense mission. Accordingly, we assume the eight companies in the doctrinal force that support homeland defense—one in the Regular Army and seven in the ARNG—would perform DSCA missions during LSCO. Because the POTUS protection workload would require only five companies, no units were added in those columns.[46] Covering all DSCA missions would require a total of 13 companies, and therefore, we added five companies in the Regular Army column (blue circle) for a total of six.

We assigned these five companies to the Regular Army, rather than the ARNG, to address accessibility concerns. The current legal framework makes it challenging for the Army to access ARNG EOD forces for DSCA missions. Because these missions are federal, they must be performed by units operating under Title 10 of the U.S. Code (U.S.C.). When not mobilized, ARNG forces operate under either State authority or Title 32 U.S.C.

Table 3.3. EOD Force to Support the Army under Doctrinal Allocation Rules and Provide Defense Support to Civil Authorities, FY 2028

		Doctrinal Force		Doctrinal Force + POTUS Support		Doctrinal Force + All DSCA Support	
Supported Unit Type	**EOD Unit Type**	**Regular Army**	**ARNG**	**Regular Army**	**ARNG**	**Regular Army**	**ARNG**
Theater (or Field) Army	Group	10	0	10	0	10	0
Corps							
Division	Battalion	10	8	10	8	10	8
BCT	Company	37	29	37	29	37	29
SFG							
Ranger Regiment							
N/A	WMD Company	1	0	1	0	1	0
Homeland Defense	Group	0	1	0	1	0	1
	Battalion	0	2	0	2	0	2
	Company	1	7	1	7	6	7

SOURCE: Features information based on data on force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022; ATP 4-32, 2022, Table 1-1; and EODIMS.
NOTES: The blue circle marks the addition of five companies to support civil authorities. The five companies were assigned to the Regular Army, rather than the ARNG, to address accessibility concerns. The EOD companies in the Regular Army that support homeland defense are CONUS Support companies.

[46] However, we note that the EOD force planned for FY 2028 does not include the seven ARNG companies for homeland defense, and therefore, the planned force could not provide sufficient support to civil authorities—even if the workload were to consist solely of POTUS protection missions.

Implications of Defense Rotation Policy for EOD Support

In the past 20 years the relative demand for EOD units (as a factor of available force structure) has typically been greater than for most other unit types. In general, EOD units are not able to meet those demands without enduring deployment-to-dwell (BOG:Dwell) or mobilization-to-dwell (MOB:Dwell) ratios above what is permitted by DoD policy or above what the units they typically support experience.[47] A 2022 RAND report showed that between FY 2003 and FY 2014, Army EOD personnel experienced more deployments, on average, than did Army personnel with no EOD experience.[48]

Rotation rates capture demand for EOD units relative to EOD force structure in overseas missions but do not account for the many demands for EOD forces when at home station—some in statute and regulation. These are important missions that must be performed.[49] We provide analysis of some aspects of this demand in the previous section, where we discuss the demands imposed by DSCA missions, and in Chapter 5, where we discuss EOD governance.

DoD policy states that during rotational operations—i.e., operations that require forces to rotate into a theater of operations to perform assigned missions then home to reset and prepare for future missions—the desired BOG:Dwell ratio for Regular Army units is 1:3 (one year deployed followed by three years dwell), and the desired MOB:Dwell ratio for reserve component units 1:5, with "threshold" levels of 1:2 and 1:4 or less, respectively, when authorized by the Secretary of Defense.[50] To examine how the different force structures presented above would affect EOD rotation rates, we make the following assumptions:

- The Office of the Secretary of Defense and the Army will keep BOG:Dwell and MOB:Dwell ratios for major combat units within the approved rates (e.g., BCTs were the unit of action for most of OEF and OIF; divisions now are).

[47] BOG stands for boots on the ground, or the time that units are deployed in theater; dwell is the time between deployments or mobilizations. The BOG:Dwell rate is used as a metric to assess Regular Army forces' rotation rates. MOB stands for mobilization time, or the time reserve component (in our case, ARNG) units are activated. Their time in theater is always shorter than their mobilization time.

[48] Held et al., 2022, pp. 17–18.

[49] Army Regulation 75-15 lists EOD Operations and Response requirements. See also DoDD 3025.18, 2018; DoDD 3025.13, 2017; DoDI 3025.21, 2019; Joint Publication 3-42, 2016; Pub. L. 94-524, 1976.

[50] Directive Type Memorandum 21-005, 2022. We note that this memorandum states that it is not meant "to be used as a force-shaping tool." Our analysis adopts these policy constraints to illustrate the sufficiency of the force. In this analysis we consider only rotational force deployment schemes, as this seems to be the analytic framework used in DoD Army force sizing scenarios and constructs. However, one must also note the potential for conflicts that require deployment of most if not all the available force, and even national mobilization to meet the demands. A war with China could be such a conflict. We do not examine these situations in detail, other than to note that developing EOD technicians takes more time than developing personnel in most other military occupation specialties (MOSs).

- The major headquarters and maneuver forces that EOD supports will be operating at threshold rotation rates, as defined by DoD policy for BOG:Dwell and MOB:Dwell ratios.[51]
- EOD units will deploy to support the major combat units they are doctrinally designated to support and will not be asked to support additional missions in the theater of conflict. senior EOD commanders may allocate EOD forces in theater as needed, but additional forces will not be deployed specifically for these other missions.[52]
- DSCA missions will continue during a conflict, as they did during OEF and OIF; while these missions will not increase EOD rotation rates, DSCA missions in theater will place additional demands on deployed EOD forces, and DSCA missions in the United States will place demands on EOD forces during dwell.
- EOD units with special missions that require them to be in CONUS will not be part of a rotation schedule.

In what follows, we examine the effects of having units perform the homeland defense mission during dwell, as well as the effects of fencing specific units for that mission. We note that the experience of OEF and OIF suggests that EOD units will be only partially available during dwell because of the challenges they face when returning home from deployment. Assuming these units will be available for the homeland defense mission represents the most optimistic case.

Rotation Analysis for the Planned EOD Force

In this section we analyze the implications of defense rotation policy for EOD support given current doctrine and the EOD force planned for FY 2028. As previously noted, we consider the effects of having some units dedicated to the homeland defense mission, and hence not available to rotate into theater. Chapter 5 provides a more detailed discussion of the benefits and drawbacks of this approach.

Rotation Analysis for EOD Groups

EOD groups support theater armies and corps. Because there are so few EOD groups, the analysis is straightforward. We assume that in INDOPACOM EOD would support two armies, U.S. Army Pacific (USARPAC) and Eighth U.S. Army and that in every other theater, EOD would support the theater army only. We further assume that each army would supervise two corps, for a total of as many as four corps in INDOPACOM and two corps in any other theater.[53]

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[51] That is, the major headquarters and maneuver forces for which ATP 4-32 defines EOD support in Table 1-1. Although forces have rotated faster than the threshold rate when needed, we adopt this rate to illustrate the sufficiency of the force.

[52] While this assumption might not hold in practice, our analysis gives Army decisionmakers an understanding of the implications of force structure decisions on EOD units and personnel.

[53] We assume LSCO would involve more than one Army Corps headquarters. This assumption is based on historical precedent rather than current plans. The relatively small conflicts in Afghanistan and Iraq (OEF and OIF) included

If an army were to command more than two corps, additional EOD groups would be needed. Finally, we assume that either (1) there would be no JTFs to support or (2) the army or corps headquarters would serve as the core element of the JTF headquarters and make its EOD group available for JTF support—again, the least demanding scenario.

For INDOPACOM, EOD forces would be tasked to provide six groups. However, there are only three groups in the planned force (Table 3.2), and one would need to remain in the United States for the homeland defense mission. Even if the ARNG group were activated for the duration of the conflict, EOD could not meet the demand. If all three groups were to rotate into theater with one remaining in the United States for homeland defense, their BOG:Dwell ratio would be 2:1; that is, each group would spend twice as much time deployed as at home station, and the force would still be unable to support the engaged armies and corps.

In any other theater, EOD forces would be tasked to provide three groups, rather than six, but the analysis would still yield a 2:1 BOG:Dwell ratio with the ARNG group activated. In all theaters, the same results would obtain even if only two major headquarters (army or corps) required EOD support. In sum, the EOD force planned for FY 2028 would be unable to meet the doctrinal demands for EOD groups for even the least demanding LSCO conflict.

Rotation Analysis for EOD Battalions

EOD battalions doctrinally support divisions.[54] We assume the Army will not distinguish between components when allocating EOD support to divisions (e.g., an EOD battalion of either component could support a division of either component, as the demands of the rotation schedule permit), thus minimizing the requirement for EOD battalions. As before, we use the rotation rate for major maneuver units as the basis for comparison so that we can assess the burden placed on EOD in relation to the burden placed on the major maneuver forces of the Army. A detailed description of the analysis and calculations can be found in Appendix B.

Table 3.2 highlights the disparity between the number of EOD battalions in the planned force (six in the Regular Army and three in the ARNG) and the number of EOD battalions in the doctrinal force (ten in the Regular Army and eight in the ARNG). If the force were to rotate at a

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corps-sized headquarters to oversee operations (International Security Forces Joint Command and Multi-National Corps-Iraq), and the larger, but still smaller than LSCO, conflict in Vietnam had four corps in South Vietnam. Conflict with a peer competitor, such as China, would almost certainly require a multi-corps force. For example, during the Korean War, which was a limited but large conflict, U.S. ground forces consisted of the Eighth Army, three U.S. corps, eight U.S. Army divisions, the 1st Marine Division, and several separate brigades from the U.S. Army and other United Nations members, as well as Republic of Korea forces, all under U.S. command. In addition, we note that the Army of 2028–2032 will have only four corps in total. Moreover, doctrine stipulates that when U.S. forces include more than one Army corps, the theater army will ask that a field army be constituted (FM 3-94, 2021, para. 3-113, p.3-21). However, we do not consider the possibility of additional field armies in our analysis.

[54] By Army doctrine (ATP 4-32, Table 1-2), EOD battalions may also support corps if no EOD group is in theater. Even if a group were deployed, this support arrangement would allow the EOD force to support more armies and corps than the current assignment of groups permits. However, the arrangement would place additional stress on EOD battalion units, which, as shown in this section, would already be subject to unsustainable demands in LSCO.

Regular Army BOG:Dwell rate of 1:2 and an ARNG MOB:Dwell rate of 1:4, the planned EOD force could provide just 56 percent of what would be needed for EOD battalions to support the divisional force at the same BOG:Dwell rate as the supported divisions. Alternatively, EOD battalions could provide all the requisite support; but to do so, they would have to rotate at 178 percent—or almost twice the rate—of what the supported units would experience.

This calculation assumes that all nine EOD battalions would rotate into theater, with homeland defense missions performed during dwell. If, instead, two EOD battalions were taken out of the rotation and reserved for the homeland defense mission, the rotational demands on the EOD force would be even higher. At BOG:Dwell and MOB:Dwell rates of 1:2 and 1:4, respectively, EOD battalions could provide about 42 percent of the requisite support while maintaining the same rotation rates as the supported maneuver force. To provide all requisite support, EOD battalions would have to rotate at a rate that is 241 percent of the rate experienced by the supported units; that is, EOD battalions would be deployed nearly two and half times as often as their supported units.[55]

Repeating the analysis using a Regular Army BOG:Dwell rate of 1:3 and an ARNG MOB:Dwell rate of 1:5 yields identical results (after rounding). With all nine EOD battalions rotating into theater and homeland defense missions performed during dwell, EOD battalions could provide 56 percent of the support needed while maintaining the same rotation rates as the supported divisional force. With two EOD battalions taken out of rotation and reserved for the homeland defense mission, EOD battalions could meet only 42 percent of demand.

This analysis indicates that LSCO would place unsustainable demands on the EOD battalions planned for FY 2028. Consequently, some deployed maneuver units and major headquarters would not have EOD support in a major conflict, and the EOD force might have to operate well beyond what DoD policy considers safe practice.

Rotation Analysis for EOD Companies

EOD companies would be less stressed than the EOD battalions or groups, but more stressed than their supported units. The EOD force planned for FY 2028 has one company dedicated to supporting the Ranger Regiment, so we discount that unit from the rotation analysis. Similarly, we exclude the WMD company and the CONUS support company from the rotation analysis. We assume that the remaining 49 companies would rotate into theater, with homeland defense missions performed during dwell.

At BOG:Dwell and MOB:Dwell rates of 1:2 and 1:4, respectively, EOD companies could provide 89 percent of the support required by doctrine while maintaining the same rotation rates as the supported maneuver force. Alternatively, EOD companies could provide all of the

[55] It is worth noting that these ratios and percentages are based on an availability equivalency metric that represents the entire force—active and reserve. This does not accurately estimate the BOG:Dwell ratios for any unit in the force, but it does permit macro-level comparisons between the stress on the EOD force and the stress on the major maneuver units it supports.

requisite support, but to do so, they would have to rotate at 112 percent of the rate experienced by the supported units. Repeating the analysis using a Regular Army BOG:Dwell rate of 1:3 and an ARNG MOB:Dwell rate of 1:5 yields similar results. EOD companies could meet 88 percent of demand while maintaining the same deployment-to-dwell rates as those of the units they support or meet all of the demand but rotate at 113 percent of the rate experienced by the supported units.

If, instead, we assume that eight EOD companies, including the CONUS Support company, were taken out of the rotation and were reserved for the homeland defense mission, the rotational demands on the EOD force would be even higher. At BOG:Dwell and MOB:Dwell rates of 1:2 and 1:4, respectively, EOD companies could provide only 73 percent of the requisite support while maintaining the same rotation rates as the units they support. At rates of 1:3 and 1:5, 72 percent of the demand would be met. Table 3.4 summarizes the results for EOD companies and battalions.

Table 3.4. Percentage of Demand for EOD Support Met at Equivalent EOD and Maneuver Force Deployment-to-Dwell Ratios

	1:2 RA BOG:Dwell / 1:4 ARNG MOB:Dwell	1:3 RA BOG:Dwell / 1:5 ARNG MOB:Dwell
EOD Battalion without Homeland Defense Mission	56%	56%
EOD Company without Homeland Defense Mission	89%	88%
EOD Battalion with Homeland Defense Mission	42%	42%
EOD Company with Homeland Defense Mission	73%	72%

SOURCE: Features information based on data from Department of the Army 2022, p. 11; ATP 4-32, 2022, Table 1-1.
NOTE: RA = Regular Army.

Rotation Analysis for the Doctrinal EOD Force Augmented for DSCA

By design, the doctrinal EOD force would rotate at the same pace as the units it supports. However, augmenting the doctrinal force with additional units to support DSCA missions, which would be mostly homeland defense missions in wartime, would create additional choices for Army leaders on how to manage the force. Of particular relevance to the rotation analysis is the decision of whether to fence the additional units to perform DSCA missions exclusively or to integrate these units into the rotational force flow.[56]

[56] Another option would be to augment the doctrinal force with additional EOD teams, rather than units, so that the EOD force could meet the demand for DSCA without detracting as much from unit training. If this option were adopted, the force management challenge would be what to do with the additional EOD teams when the unit deployed. For evidence that providing DSCA support detracts from unit training, see U.S. Government Accountability Office, 2019.

If the former option were adopted, the additional units would not be considered in the force flow, and the results of our analysis would remain unchanged; that is, the doctrinal EOD force and supported maneuver units would rotate at the same rates. As we explain in Chapter 5, this option offers two benefits. First, the dedicated units would be available to provide the EOD support needed by the Department of Homeland Security, the Bureau of Alcohol, Tobacco, Firearms, and Explosives, the Federal Bureau of Investigation, the U.S. Secret Service, the Department of State, and various other civil authorities. Second, EOD units in the force rotation would be able to concentrate on their wartime missions and available to work with their supported maneuver units in training and home station activities.

If the latter option were adopted, the EOD force would appear to be overstructured based on deployment-to-dwell rates alone, but in reality the force would be fully committed because of the sizable workload associated with the DSCA (homeland defense) missions. The implication is that BOG:Dwell and MOB:Dwell rates are not sufficient for assessing the stress on the force when EOD force requirements are determined by both deployments and DSCA missions.

To illustrate this phenomenon, we offer the following analogy. Most government organizations are similar to the police department in that employees perform a standard set of functions on a regular basis with an occasional need to respond to extraordinary circumstances. However, the Army, and DoD more generally, is more like the fire department in that Army personnel must be ready to respond when threats present themselves. For the Army, the threats are to national security; for the fire department, the threats include fires, hazardous materials, and emergency medical situations.

The EOD force exists at the intersection of these two models. Like the fire department, the EOD force must be ready to respond to threats when they arise. These include LSCO and other conflicts that require deployment. However, the EOD force also performs DSCA missions, which include support for POTUS protection and National Special Security Events like the United Nations General Assembly, on a regular basis. These activities are more similar to those performed by the police department. During times of relative peace, DSCA missions generate a significant workload for the EOD force (Figure 3.1) and detract from its ability to conduct unit training.[57] During times of war, these missions add to the already significant stress on the EOD force beyond what is captured by deployment-to-dwell metrics.

Conclusion

If the Army were to operate according to its current doctrine, the EOD force structure planned for FY 2028 would not be sufficient for LSCO contingencies in which the force is rotating at maximum rates or deployed in whole. Army doctrine has EOD forces supporting

[57] The senior EOD personnel we interviewed for this research frequently made this point. For evidence that providing DSCA support detracts from unit training, see U.S. Government Accountability Office, 2019.

major commands and large maneuver and SOF units, with EOD units allocated according to well-defined allocation rules (Table 3.1). These allocation rules, if rigorously applied, have strong implications for how the EOD force will operate in future contingencies.

An examination of the allocation rules and planned structure of EOD forces (Table 3.2) suggests that all EOD teams, which reside in EOD companies, would be dedicated to BCTs, SFGs, or the Ranger Regiment. However, unlike in OEF and OIF, in which most of the area of operations was "owned" by a BCT, in LSCO there would be large parts of the battlefield outside the assigned areas of responsibility for BCTs. If current doctrine were rigorously followed, there would be no EOD companies or teams assigned to handle such critical missions as ammunition supply point assistance, corps and division rear area support, support for non-BCT units, such as MEBs, and support to theater-level assets, such as ports. These are critical missions which must be accomplished.

Fortunately, doctrine provides flexibility to senior EOD commanders in the form of command relationships. EOD companies would remain under the command of EOD battalions in most cases, and EOD battalions under EOD groups.[58] These relationships would provide EOD commanders with the flexibility to manage forces in theater. Because these missions must be performed, EOD leaders could allocate support from the units available in theater. However, this would leave some commands without dedicated EOD support, even though doctrine suggests the commands should expect such support.[59]

Detailed analysis of how doctrine could address these shortfalls—assuming force structure were available to execute it—is not straightforward because the geometry of the battlefield would be different for LSCO in the U.S. European Command (EUCOM) than in INDOPACOM.[60] We offer no recommended changes to doctrine other than to note that past approaches, which offered more flexibility in providing EOD support, might be worth revisiting.

The bottom line is that there will be more demands for EOD forces than a direct application of the allocation rules would account for and that planned EOD forces, already too small for LSCO contingencies in which the force is rotating at maximum rates or deployed in whole, will need to adapt for these situations. In the words of one retired EOD senior leader, current EOD doctrine "will not scale" given planned force structure.[61]

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[58] ATP 4-32.1, p.1-4, para. 1-28.

[59] Older EOD doctrine, such as FM 9-15, 1996, provides some indication of the resources required to perform these missions. See, for example, Chapter 1, "EOD Command and Control," pp. 1-8 and 1-9.

[60] The battlefield in the EUCOM area of responsibility would be a traditional one on a major landmass with a small number of well-defined ports and airfields, contiguous and well-defined rear areas, land-owning units as the primary unit type requiring EOD support (covered in ATP 4-32), and clear EOD missions. INDOPACOM, on the other hand, could have battlefields spread across several islands and thousands of miles of water, with many ports and airfields, atypical rear areas, and Army units of various types requiring EOD support (some covered in EOD doctrine and some not).

[61] Retired senior EOD leader, interview with authors, August 5, 2002.

Furthermore, the estimated shortfall in force structure to support LSCO does not account for DSCA, which includes support to POTUS and accounts for nearly half of all manhours expended during Army-led EOD incidents over the last five years. These demands will likely persist not only in peacetime but also in wartime, with the domestic missions falling under the homeland defense mission category during a conflict.

Chapter 4. Manning the EOD Force

In this chapter, we address the question of whether the EOD force will be sufficiently manned in the future to meet mission requirements. To make this determination, we constructed and compared four distinct personnel profiles:

- **Required inventory** captures demand by computing the number of personnel needed to man the units in the doctrinal EOD force augmented for DSCA.
- **Current inventory**, or the number of EOD personnel at the end of FY 2021, serves as a benchmark for measuring the changes needed over the next five to ten years to meet future demand.
- **Planned inventory** is the number of EOD personnel needed to man the units in the EOD force planned for FY 2028—i.e., the EOD force specified by the TAA.
- **Forecasted inventory** is a statistical prediction of the number of EOD personnel the Army will have in its inventory at the end of FY 2028 if current policies and trends continue.

All four profiles were computed by grade and component and include margins for personnel in TDA and TTHS units.[62]

To assess the sufficiency of the planned supply of EOD personnel, we compared the planned and required inventories and identified the most salient deficiencies. To determine whether any of the deficiencies might be due to implicit policy changes embedded in the TAA, we compared the forecasted inventory to the planned and required inventories. Together, these analyses shed light on how the inventory of EOD personnel might evolve over the next five to ten years, providing insights the Army should consider as it formulates and adjusts its personnel management policies.

Sufficiency of the Planned Supply of EOD Personnel

In Chapter 3, we identified the EOD units needed to support a major commitment of U.S. forces and added units to provide support for civil authorities. Table 3.3 summarized the results, laying out three distinct force structures:

- The doctrinal force, which uses doctrinal allocation rules to ensure support for LSCO
- The doctrinal force augmented for POTUS, which can support LSCO and cover POTUS protection missions

[62] Chapter 2 includes a comparison of the current and planned inventories (Figure 2.1), as well as an explanation of how we computed the TDA and TTHS margins.

- The doctrinal force augmented for DSCA, which can support LSCO and cover all DSCA missions, including POTUS protection missions, other VIP support missions, and other (non-VIP support) DSCA missions.

The number of personnel needed to man the units comprising the first and last force structures is depicted in Figures 4.1 for the Regular Army and 4.2 for the ARNG. We omit the doctrinal force augmented for POTUS because the doctrinal force (without augmentation) includes enough units to cover the POTUS protection workload, as explained in Chapter 2.

In the figures, the green bars represent the personnel associated with the EOD force planned for FY 2028—i.e., the **planned inventory**. The additional personnel needed to comply with doctrinal allocation rules are represented by the orange bars, such that the sum of the green and orange bars yields the personnel associated with the doctrinal force. The doctrinal force in the Regular Army does not include enough units to cover all DSCA missions, and accordingly, the blue bars in Figure 4.1 indicate the additional personnel needed to perform the DSCA workload that remains. Hence, for the Regular Army, the sum of the green, orange, and blue bars yields the **required inventory**. The doctrinal force in the ARNG can cover the DSCA missions, so there are no blue bars in Figure 4.2. Hence, for the ARNG, the **required inventory** is given by the sum of the green and orange bars.

For both components and at every grade except E4 and O1 (for which there are no requirements), the planned inventory is not sufficient to meet the expected demands of LSCO over the next five to ten years. To meet the doctrinal requirements for EOD forces to support major units, the Army would need an additional

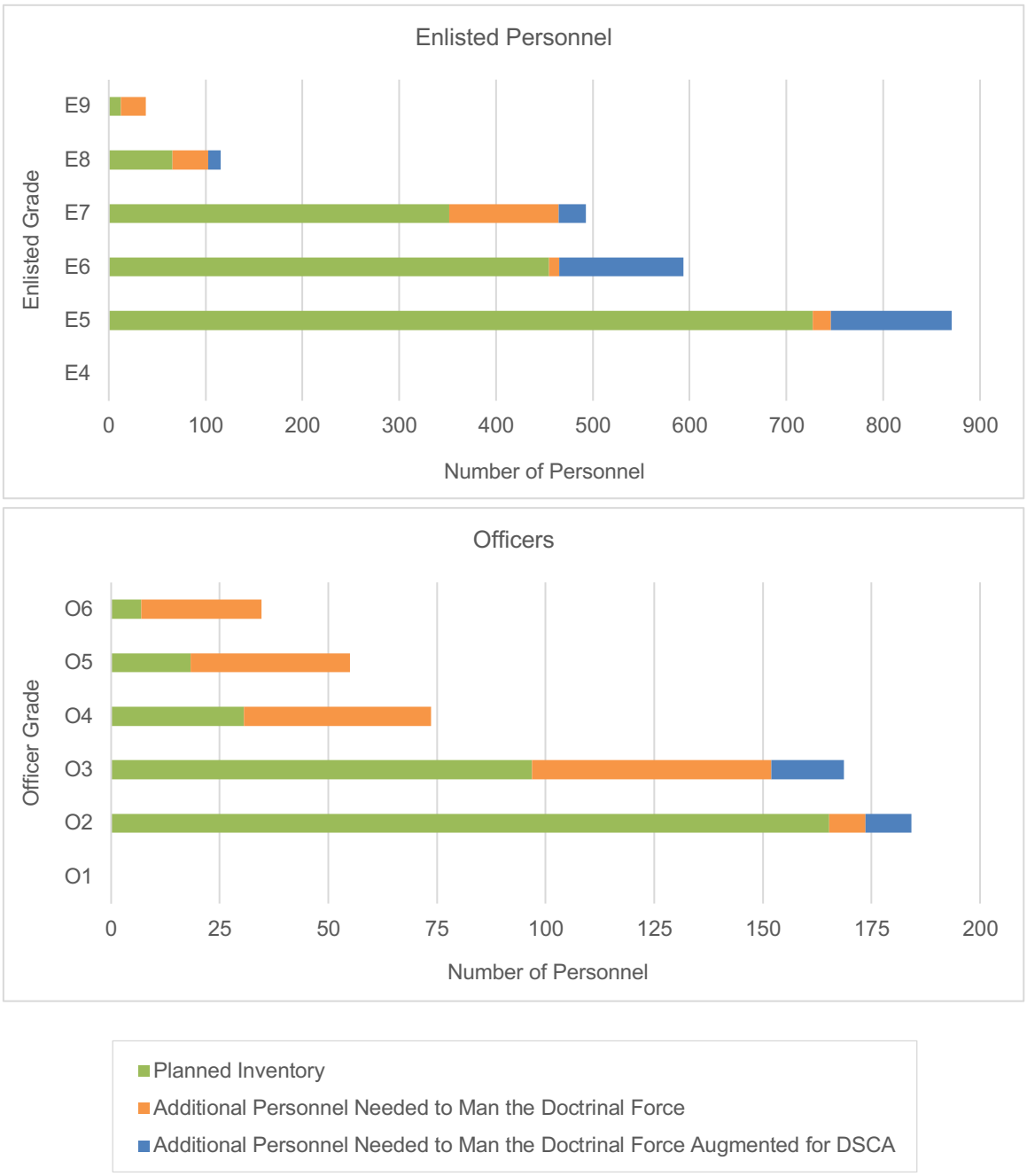
- 205 active duty enlisted personnel (a 13 percent increase)
- 171 active duty officers (a 54 percent increase)
- 970 enlisted personnel in the ARNG (a 184 percent increase)
- 163 officers in the ARNG (a 152 percent increase).

With these increases, the Army's inventory of EOD personnel could man the units needed to support LSCO and perform POTUS protection missions. Additional active duty personnel that would be needed to support civil authorities beyond POTUS protection missions include

- 294 active duty enlisted personnel (an 18 percent increase)
- 27 active duty officers (a 9 percent increase).

Percent increases are in relation to the planned inventory.

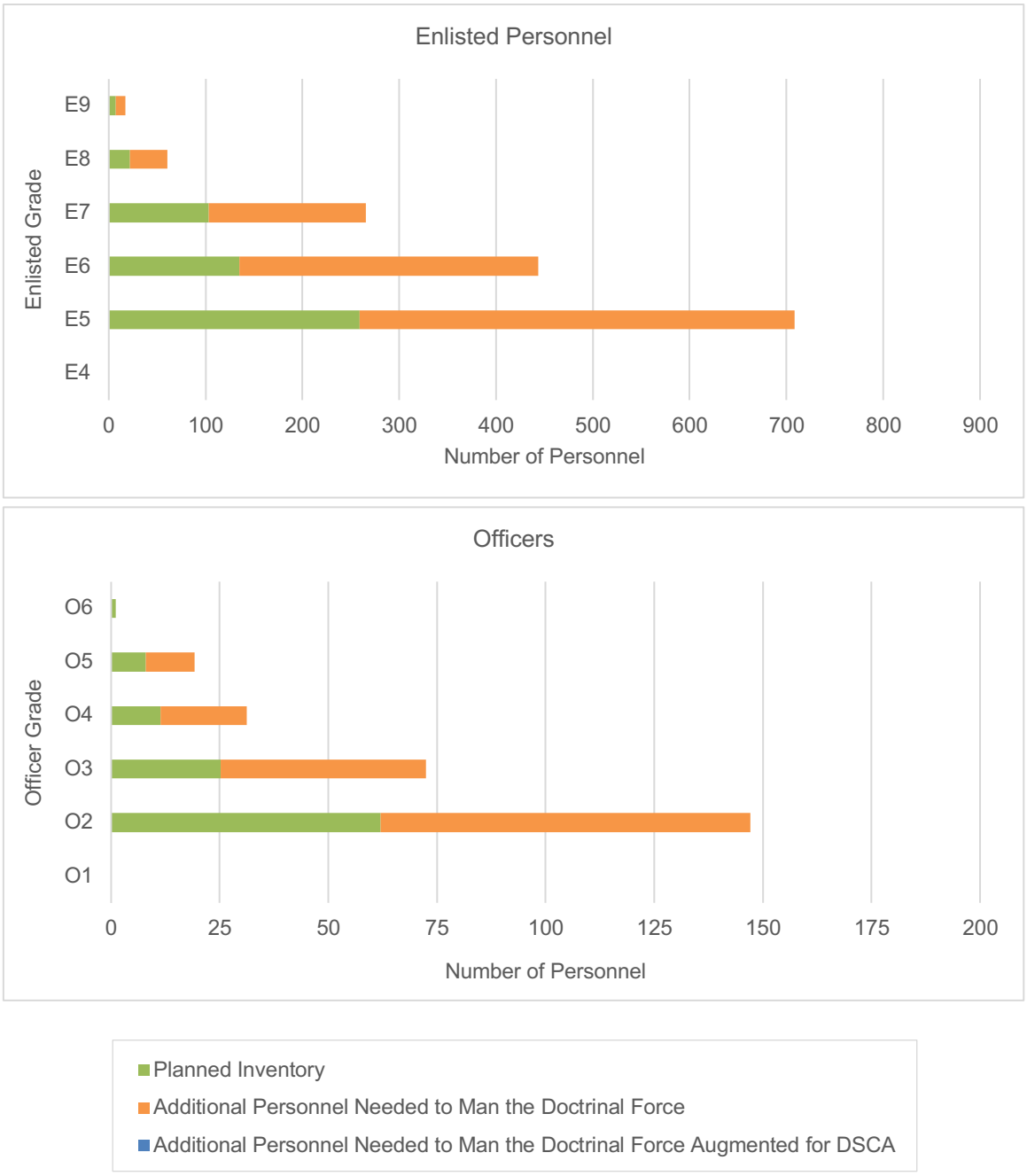
Figure 4.1. Regular Army EOD Personnel Needed to Meet the Demands of LSCO and DSCA in FY 2028



SOURCE: Features information from data on force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022; ATP 4-32, 2022, Table 1-1; EODIMS; and TAPD.

NOTE: Personnel counts include enlisted EOD personnel who fall within CBRNE companies identified in force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022, as well as margins for personnel in TDA and TTHS units.

Figure 4.2. ARNG EOD Personnel Needed to Meet the Demands of LSCO and DSCA in FY 2028



SOURCE: Features information from data on force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022; ATP 4-32, 2022, Table 1-1; EODIMS; and DMDC Reserve Master File.

NOTE: Personnel counts include margins for personnel in TDA units. Because the reserve component does not have a TTHS account, the TTHS margins for the ARNG were set to zero.

These figures indicate that the largest deficiencies in the planned inventory lie within the ARNG. The number of personnel needed to man the ARNG's planned force is about one-third of the number needed to man the ARNG's doctrinal force. The gaps in the Regular Army are smaller, but they are not uniformly distributed across the grades. For example, the planned inventory of E5s is more than 80 percent of the number needed, but the planned inventory of O4s is about 40 percent of the number needed. The shortage in active duty officers is driven, in part, by planned reductions: In FY 2021, there were 540 active duty EOD officers, but only 318 are planned for the EOD force of FY 2028 (see Figure 2.1).

Impact of Omitting DSCA Missions from the Total Army Analysis Process

We conclude our assessment of the planned supply of EOD personnel by estimating the extent to which the omission of DSCA missions from the TAA process accounts for the gap between the planned and required inventories. To construct the estimates, we began with the EOD force planned for FY 2028, adding the units needed to perform DSCA missions *first* and the units needed to support LSCO per current doctrine *thereafter*.

Table 4.1 provides the results. The units shown in the "Planned Force" columns are identical to those shown in Table 3.2, and the units shown in the "Doctrinal Force with DSCA Supplement" columns are identical to those shown in Table 3.3. The intermediate columns titled "Planned Force with DSCA Supplement" show the planned force with units added to support civil authorities; changes are marked with a blue circle. As explained in Chapter 3, covering the DSCA workload would require 13 companies in total (six in the Regular Army and seven in the ARNG). We added one battalion to the Regular Army because current doctrine requires that there be one EOD battalion for every three to seven EOD companies.[63]

[63] ATP 4-32, 2022, Tables 1-1 and 1-2.

Table 4.1. EOD Force to Provide Defense Support to Civil Authorities and Support the Army under Doctrinal Allocation Rules, FY 2028

		Planned Force		Planned Force with DSCA Supplement		Doctrinal Force with DSCA Supplement	
Supported Unit Type	**EOD Unit Type**	**Regular Army**	**ARNG**	**Regular Army**	**ARNG**	**Regular Army**	**ARNG**
Theater (or Field) Army	Group	2	1	2	1	10	0
Corps							
Division	Battalion	6	3	7	3	10	8
BCT	Company	36	14	36	14	37	29
SFG							
Ranger Regiment							
N/A	WMD Company	1	0	1	0	1	0
Homeland Defense	Group	0	0	0	0	0	1
	Battalion	0	0	0	0	0	2
	Company	1	0	6	7	6	7

SOURCE: Features information from data on force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022; ATP 4-32, 2022, Table 1-1; and EODIMS.
NOTES: The blue circles mark the addition of units to support civil authorities. Five companies and one battalion were added to the Regular Army, and seven companies were added to the ARNG. The EOD companies in the Regular Army that support homeland defense are CONUS Support companies.

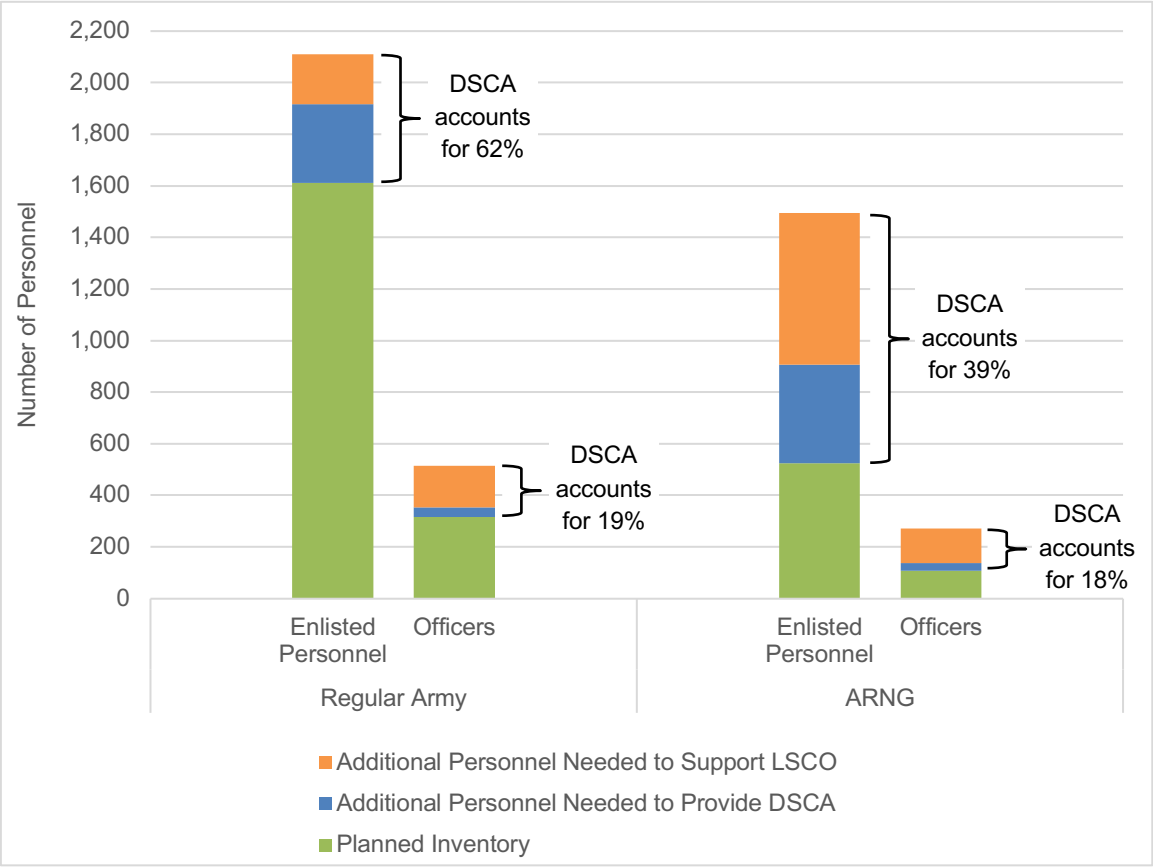
We computed the number of personnel needed to man each of the three force structures shown in Table 4.1; the results are presented in Figure 4.3. For the Regular Army, the omission of DSCA missions from the TAA process accounts for a large share of the gap between the planned inventory (green bars) and required inventory (orange bars): Including these missions would close 62 percent of the gap for enlisted personnel and 19 percent of the gap for officers. The omission of DSCA creates shortfalls in the ARNG as well. For the enlisted force, it accounts for 39 percent of the gap, and for officers, 18 percent.

Two prior studies, one by the U.S. Government Accountability Office and another by RAND, have recommended that service-level manpower guidance across DoD be updated to ensure that force structure calculations for EOD personnel include DSCA missions.[64] This recommendation is made more critical by the elevated importance of the homeland defense mission in the 2022 National Defense Strategy.[65] Our analysis provides additional support for including DSCA missions in EOD manpower planning processes and suggests that, for the Army, the change would have a significant impact on the enlisted force in particular.

[64] Held et al., 2022; U.S. Government Accountability Office, 2019.

[65] U.S. Department of Defense, 2022.

Figure 4.3. Effect of Including DSCA Missions in the Total Army Analysis Process on Closing the Gap between the Planned and Required Inventories of EOD Personnel, FY 2028



SOURCE: Features information from data on force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022; ATP 4-32, 2022, Table 1-1; EODIMS; TAPDB; and DMDC Reserve Master File.

NOTE: Personnel counts for the Regular Army include enlisted EOD personnel who fall within CBRNE companies identified in force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022, as well as margins for personnel in TDA and TTHS units. Personnel counts for the ARNG include margins for personnel in TDA units; because the reserve component does not have a TTHS account, the TTHS margins for the ARNG were set to zero.

Sufficiency of the Forecasted Supply of EOD Personnel

In the previous section, we examined the planned inventory and assessed its sufficiency in relation to the required inventory. In this section, we develop a statistical model to forecast the number of EOD personnel that will be in the force through FY 2032 assuming current policies and trends continue. We then assess the sufficiency of the forecasted inventory, instead of the planned inventory. In addition, we compare the forecasted inventory to the planned inventory to determine whether any of the deficiencies identified in the planned inventory are due to implicit policy changes embedded in the TAA.

Our approach to forecasting the inventory of EOD personnel was driven by our analytic objectives and the available data. Our primary goal was to generate accurate forecasts of the

number of EOD personnel, by grade and component, through FY 2032. To achieve this goal, we used a vector autoregression (VAR) model—a statistical model that estimates the relationships among variables that evolve together over time and is generally associated with high forecast accuracy.[66] In our case, it is the numbers of personnel across grades that are correlated within and over time.

However, the VAR model alone was not sufficient because it did not account for a large number of additional factors that likely influence the inventory of personnel in each grade in any given year. These factors include, but are not limited to, deployment tempo, special and incentive pay, and conditions in the civilian labor market. The challenge was in determining how to incorporate the multitude of factors when the available data were limited by a small population (Army EOD personnel) and a short time series (FYs 2002–2021). Our solution was to use a principal component analysis (PCA) to capture most of the predictive information contained within the factors and then embed the "summarized" information in the VAR model.[67] Methodological details can be found in Appendix A.

Figures 4.4 (Regular Army) and 4.5 (ARNG) present the forecasted inventory of EOD personnel for FY 2028 (gray bars) alongside the required inventory (green, orange, and blue bars), which was also shown in Figures 4.1 and 4.2. Grades E4 and E5 are combined because the planned EOD force includes E5 positions only, but these can be filled by E4 or E5 personnel.

Figure 4.4 shows that if current policies and trends were to continue, including the ongoing return to three-person EOD teams, the forecasted inventory of active duty enlisted personnel would be sufficient to (1) support LSCO per doctrinal allocation rules and (2) perform DSCA missions as required by statute and regulation. A comparison of all four personnel profiles provides additional insights:

- The forecasted inventory of active duty enlisted personnel represents a 78 percent increase over the current (FY 2021) inventory.
- However, the planned inventory of active duty enlisted personnel exceeds the current inventory by only 32 percent, as shown in Figure 2.1.
- The planned inventory falls short of the required inventory, as shown in Figure 4.1.

These observations suggest that the TAA process and resulting force structure might constrain the increase in active duty enlisted personnel that would occur if current policies and trends were to continue—an increase that would be needed to support LSCO and perform DSCA missions.

The bottom panel of Figure 4.4 indicates that current policies and trends would likely yield more active duty officers (gray bars) than are needed to meet the full set of mission demands

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[66] James H. Stock and Mark W. Watson, "Vector Autoregressions," *Journal of Economic Perspectives*, Vol. 15, No. 4, 2001.

[67] M. Hashem Pesaran, Andreas Pick, and Allan Timmerman, "Variable Selection, Estimation and Inference for Multi-Period Forecasting Problems," *Journal of Econometrics*, Vol. 164, No 1, 2011; Ben S. Bernanke, Jean Boivin, and Piotr Eliasz, "Measuring the Effects of Monetary Policy: A Factor-Augmented Vector Autoregressive (FAVAR) Approach," *The Quarterly Journal of Economics*, Vol. 120, No. 1, 2005.

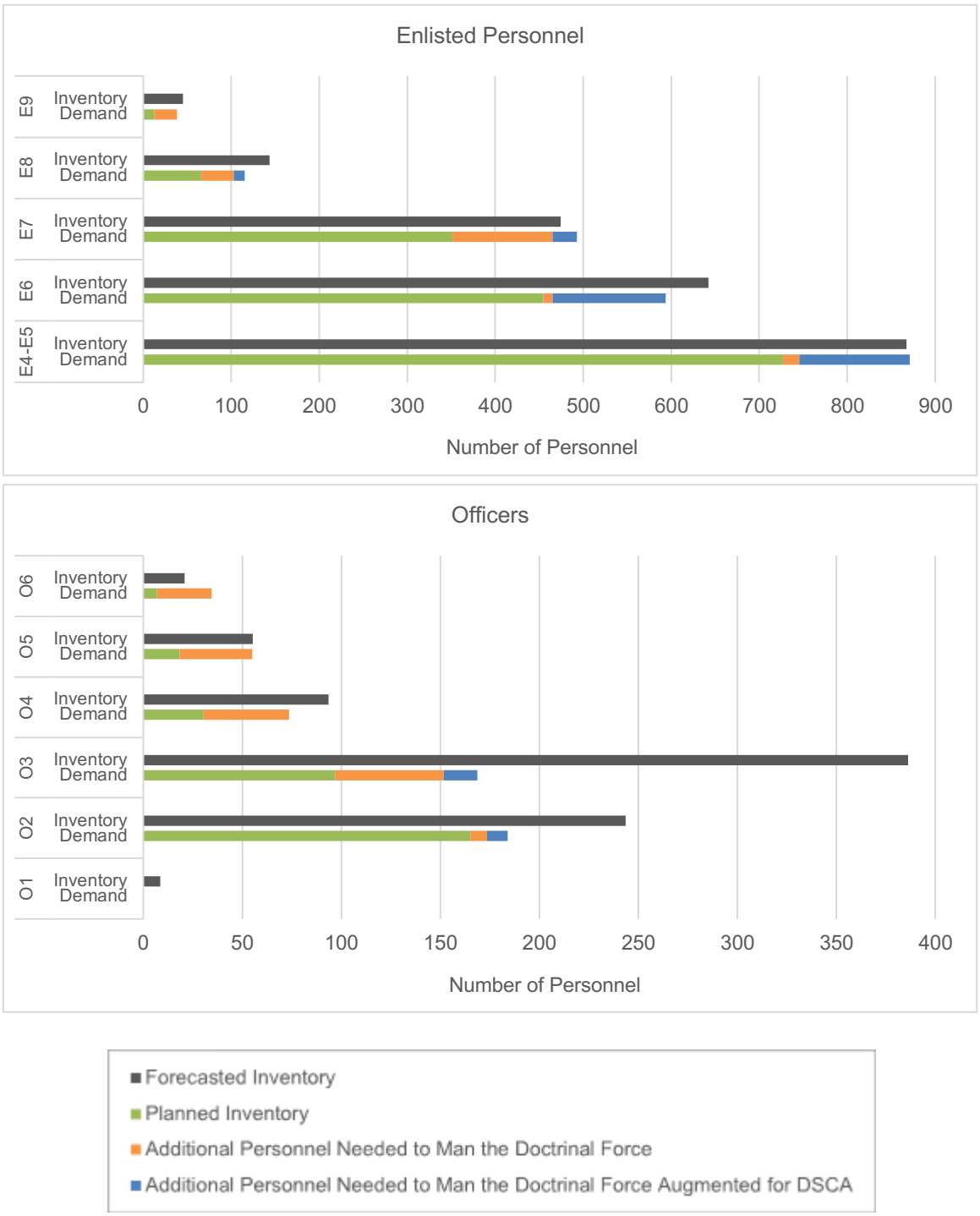
(green, orange, and blue bars), especially at the grade of O3.[68] The projected surplus might explain the planned reduction in active duty officers: a 41 percent decrease between FY 2021 and FY 2028, as shown in Figure 2.1. However, this reduction is too severe. If the active duty EOD force must support LSCO and perform DSCA missions, the reduction should be closer to 5 percent with cuts concentrated at the O3 grade.

Unlike the Regular Army, the ARNG would experience significant manning shortages if current policies and trends were to continue. As shown in Figure 4.5, the forecasted inventory of enlisted personnel would need to be 4.5 times larger to support LSCO and perform DSCA missions. The Army plans to increase the ARNG's enlisted inventory by 83 percent between FY 2021 and FY 2028, as shown in Figure 2.1, but the increase is not sufficient to meet the demands imposed by LSCO and DSCA.

The bottom panel of Figure 4.5 indicates that, if current policies and trends were to continue, the ARNG would likely be short on officers as well. The number of officers needed to support LSCO and perform DSCA missions is more than twice the forecasted inventory. Of particular concern is the projected absence of O5s and O6s, which would leave the ARNG EOD group and battalions without EOD-qualified officers to command them. This is a critical shortfall. The Army plans to increase its inventory of ARNG officers by 27 percent between FY 2021 and FY 2028, as shown in Figure 2.1, but the increase is not enough if the ARNG must provide support for LSCO and civil authorities.

[68] EOD officers also fill general logistics billets (MOS 90A), and our demand estimates do not account for these.

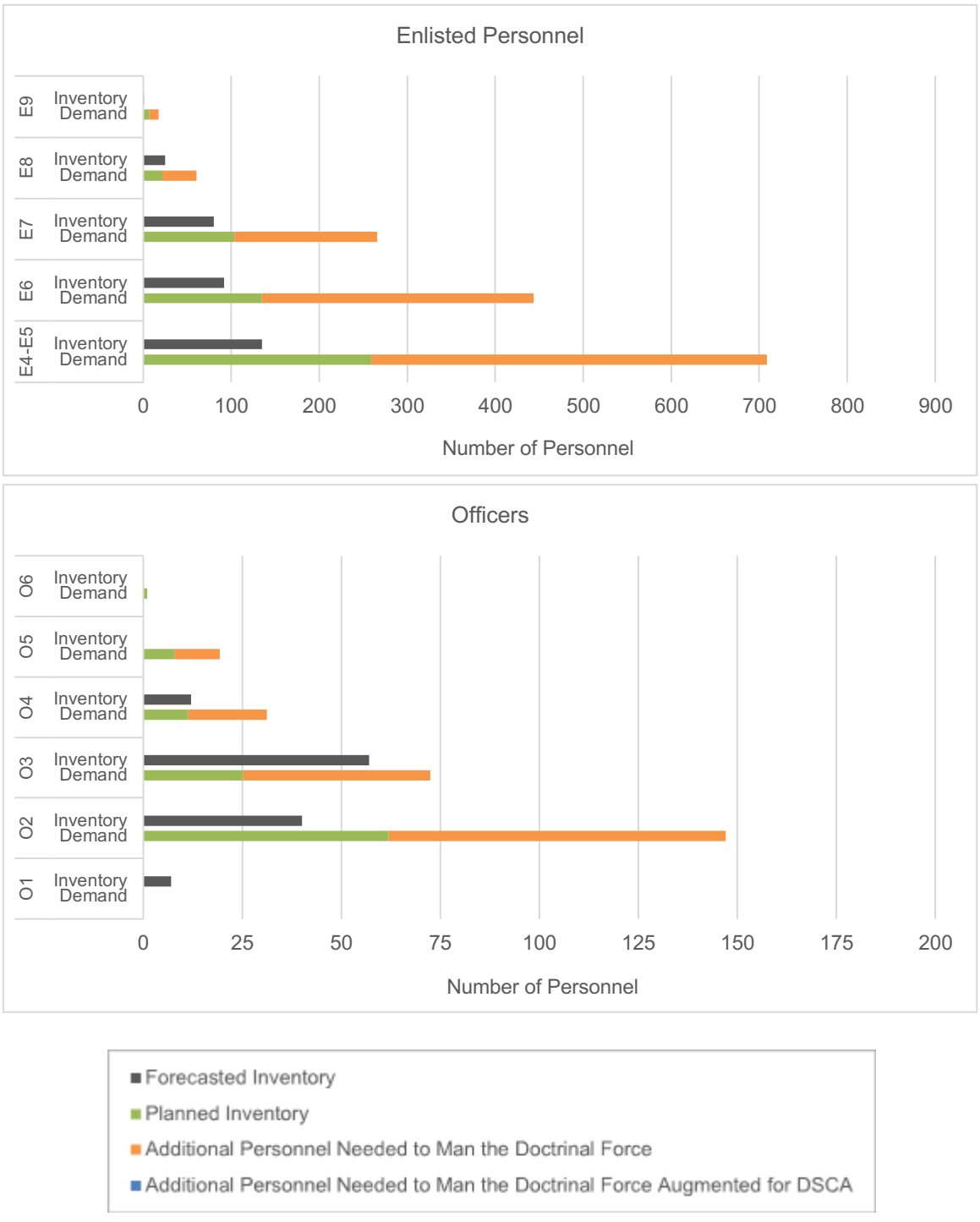
Figure 4.4. Forecasted Inventory of Regular Army EOD Personnel Compared to EOD Personnel Needed to Support LSCO and Provide DSCA, FY 2028



SOURCE: Features information from data on force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022; ATP 4-32, 2022, Table 1-1; EODIMS; TAPDB; and DMDC.

NOTE: Counts include personnel in TDA and TTHS units.

Figure 4.5. Forecasted Inventory of ARNG EOD Personnel Compared to EOD Personnel Needed to Support LSCO and Provide DSCA, FY 2028



SOURCE: Features information from data on force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022; ATP 4-32, 2022, Table 1-1; EODIMS; and DMDC.

NOTE: Counts include personnel in TDA units. Because the reserve component does not have a TTHS account, the TTHS margins for the ARNG were set to zero.

Chapter 5. Governance of the Army EOD Force

Army EOD's experiences over the past 20 years have led to questions about its organization and governance. In this chapter we focus on congressional issues and concerns raised in legislation, other congressional documents, and speeches and considered perspectives from current and retired EOD leaders.[69] We also consider the governance questions should additional force structure be created for the DSCA missions, which will remain a requirement even during wartime.

We begin by outlining issues raised recently by legislators and senior EOD leaders. The legislative questions fit into three major questions and subordinate considerations that inform them, as noted below, and the DSCA questions follow:

- *Should the Army EOD force be designated as SOF?* While the legislative proposals we examined from 2018 to 2022 do not stipulate that it should be, there is support from some members of Congress for designating EOD as a Special Operation Activity, and existing legislation makes the Assistant Secretary of Defense for Special Operations and Low Intensity Conflict the cognizant official in the Office of the Secretary of Defense for overseeing EOD across the DoD (as outlined in Appendix C). Relevant considerations for examining this issue include the following:
  - How would designating EOD as SOF affect how it is managed and modernized?
  - Do EOD forces primarily support general purpose forces (GPF) or SOF?
  - Are EOD tasks primarily aligned with GPF or SOF?
  - Are EOD tasks inherently SOF tasks?
- *Should EOD be a separate branch of the Army, and if not, should EOD remain within the Ordnance branch?*
  - If EOD should be a separate branch, should it remain under the Sustainment Center of Excellence (COE) or move to the Maneuver Support (Protection) COE?
  - If EOD should not be a separate branch, would placing it in a branch other than Ordnance be more advantageous to the Army?
- *If EOD force structure is increased to address the DSCA missions, how should these missions be managed?*
  - Should the new units be fenced for these missions or put into the pool of available forces for deployments?

In considering these questions, we assume that EOD leaders will work wherever they are in the Army or U.S. Special Operations Command (USSOCOM) force structure to develop the

[69] A summary of pertinent legislation and legislative proposals from the post-OEF and OIF period is contained in Appendix C.

capabilities needed to the best of their ability. If we consider the governance issue from an Army doctrine, organizations, training, materiel, leader development, personnel, and facilities (DOTMLPF-P) perspective, no matter where EOD capabilities fall in the force, EOD personnel will continue to develop EOD doctrine, train its soldiers on EOD-specific tasks (along with the Navy, whose EOD course all EOD technicians must graduate from), and recruit and develop EOD personnel.

Additionally, we assume that where the EOD force resides in the Army's organization will not directly affect its force structure or how it supports the force. That is, EOD end strength and force structure will fit within the options outlined in previous chapters. Specifically, we do not consider a major restructuring of the operational EOD force that could be adopted should its governance model change.[70] Some of the options considered in this chapter might require additional facilities, but we do not analyze how the facilities would be provided or the cost of doing so; instead, we note simply that the need for facilities would make these options more expensive. Finally, policy that affects EOD could change depending on where it resides in the Army structure, should it become a basic branch of the Army or be moved out of Ordnance to another branch.

As such, the primary considerations for governance from a DOTMLPF-P perspective are materiel (M), leader development (L), and those aspects of personnel not addressed by recruiting and internal EOD efforts at the schoolhouse.

Analytic Framework

The institutional Army creates, trains, and modernizes forces of all types through its branches and COEs.[71] Branches fall under a COE, though in some cases a COE contains just one branch, such as with Aviation (though the COE does things beyond what the branch does). However, many contain multiple branches, to include the two we will discuss in this chapter: (1) the Sustainment COE, which contains the Ordnance, Quartermaster, and Transportation branches (among several) and (2) the Maneuver Support Center of Excellence (MSCOE), which contains the Engineer, Chemical, and Military Police branches and schools.[72] EOD is currently part of the Ordnance branch, which falls under the Sustainment COE.

The branch proponent, typically the Chief of the Branch, is responsible for institutional training, doctrine development, and other related matters, and the operational units associated with a branch are modernized by its force modernization proponent, typically the commander of

[70] It is worth noting that, should EOD be moved to a different branch of the Army, that branch could have a major role in determining EOD force structure if it so chose. We do not examine this possibility.

[71] COEs, while part of U.S. Training and Doctrine Command (TRADOC), incorporate both TRADOC and Army Futures Command functions. We will not make these distinctions unless they are needed for the analysis.

[72] COEs may also have other subordinate entities. For example, the Sustainment COE oversees the Army Logistics University and the U.S. Army Soldier Support Institute.

the COE that oversees the branch. These two actors—the branch proponent and the force modernization proponent—have large if not primary effects on the items that are critical for our analysis: modernization, leader development, and personnel. It is in the context of these institutional Army constructs and organizations that EOD forces are trained, designed, developed, and modernized, and in which doctrine is developed. How EOD and its branch and modernization proponent align are major factors in this analysis.

Where EOD forces are placed in the Army force structure can have significant implications for how EOD might be supported and modernized. In the time period we are examining, all Regular Army EOD forces will be assigned to FORSCOM (five of six Regular Army EOD battalions), USARPAC (one of six EOD battalions), or U.S. Army Europe and Africa (USAREUR-AF) (two of 36 EOD line companies), and ARNG EOD forces are assigned to their respective Guards—three EOD battalions and 14 EOD companies. Only one EOD company out of 51 is designed to support U.S. Army Special Operations Command (USASOC)—the 75th Ranger Regiment—although it is assigned to FORSCOM rather than USASOC.

A secondary issue we consider is the effect of EOD placement in the force on the opportunities for command and promotion for EOD officers.[73] Placement directly affects the leader development opportunities and careers of senior EOD personnel, particularly officers.

We will also look briefly at how EOD is managed and placed in the other services. While these organizations are significantly different from Army EOD, they provide points of comparison for some considerations that are important to this analysis.

We begin by considering examples that provide insights into possible courses of action. The first, the experiences of the Civil Affairs branch, provides insights into designating EOD a Special Operations Function and SOF and the implied move to USSOCOM (USASOC). It also sheds some light on the question of making EOD a basic branch of the Army. Next, we consider whether EOD should be a separate branch and, if so, where it should sit in the institutional Army and whether it should remain part of the Ordnance branch. Specifically, we look at the Chemical, Engineer, and Military Police (MP) branches as potential homes for EOD should it leave the Ordnance branch, as they are the primary elements of the protection warfighting function (WfF), which aligns closely with what EOD does.[74]

Should EOD Be Part of SOF?

Members of Congress have expressed interest in designating EOD as SOF because they are concerned that EOD personnel supporting SOF might not have the requisite skills to do it well

[73] Unlike some other branches, EOD senior noncommissioned officers (NCOs) do not typically serve outside of the branch, though a few Sergeants Major do. As such, we do not consider the implications of branch placement on senior NCOs.

[74] Army warfighting functions are general categories of activities that, when synchronized, generate combat power. See Army Doctrinal Publication 3-0, *Operations*, Headquarters, Department of the Army, July 2019, Chapter 5.

and with minimum risk to EOD soldiers.[75] Congress can do that by designating EOD as a special operations activity—a designation in Title 10 of the U.S. Code that has implications for where forces reside in the institutional and operational Army.[76] Once so designated, it is possible for the Secretary of Defense to direct that these forces not be designated as SOF (as noted in the Civil Affairs vignette below). However, if the goal is to ensure EOD can work effectively with SOF, rather than be designated as SOF, there are other options, such as the U.S. Marine Corps (USMC) approach, which we discuss later in this section.

Lessons from the Civil Affairs Branch

The Civil Affairs branch provides an interesting example of governance with lessons that are relevant to EOD. The Civil Affairs branch shares some characteristics with EOD, and its experiences illustrate some key points with respect to the proposed EOD governance changes.[77] It has experienced governance changes over the past 20 years that illustrate why moving EOD to USASOC must be carefully considered before pursuing.

Civil Affairs, as it existed prior to the mid-2000s, had a governance profile not unlike what has been proposed by some for EOD. Specifically, it was a small branch with some Regular Army and some reserve component units that mostly supported GPF but also supported SOF.[78] Civil Affairs had been designated as SOF by Secretary of Defense Les Aspin in 1993.[79] As with EOD, demands for Civil Affairs were significantly heightened during the conflicts in Iraq and Afghanistan. Its forces fell under U.S. Army Civil Affairs and Psychological Operations Command (USACAPOC), which was a subordinate command of USASOC prior to FY 2007, and its training, doctrine, and force modernization were done at the John F. Kennedy Special Warfare Center and School (JFKSWCS). Although Army proponency was structured somewhat differently in 2006 than it is in 2023, in today's language we would say its branch and force

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[75] See Public Law 116-283, William M. (MAC) Thornberry National Defense Authorization Act for Fiscal Year 2021, Sec. 593, Postponement of Conditional Designation of Explosive Ordnance Disposal Corps as a Basic Branch of the Army, January 1, 2021; and the discussion on the FY 2021 National Defense Appropriation Act in Appendix C.

[76] See U.S. Code, Title 10, Section 167, Unified Combatant Command for Special Operations Forces.

[77] Military Information Support Operations branch, formerly Psychological Operations, had an experience similar to that of Civil Affairs and could have been chosen also as a case study from which to extract lessons learned. However, because the decisions that affected Civil Affairs also affected Military Information Support Operations, we chose to present only the Civil Affairs example.

[78] Civil Affairs support to SOF was and is much larger than the EOD support to it, as the 95th Civil Affairs Group (an O6 level command) supports USASOC whereas only one EOD company is specifically designed to support USASOC (the Ranger Regiment). Furthermore, the 95th Civil Affairs Group is the only significant Regular Army Civil Affairs command.

[79] Secretary of Defense Les Aspin, "Designation of Phycological Operations and Civil Affairs Forces as Special Operations Forces," memorandum for Secretaries of the Military Departments and Chairman of the Joint Chiefs of Staff," March 1, 1993.

modernization proponents were USASOC—specifically, the JFKSWCS commanding general, who was and is usually a general officer from the Special Forces community.[80]

These arrangements changed in November 2006, when Deputy Secretary of Defense Gordon England directed that all U.S. Army Reserve Civil Affairs units (that portion of the Civil Affairs force that did not directly support SOF, i.e., all but the 95th Civil Affairs Group) be transferred from USASOC to U.S. Army Reserve Command, a subordinate command of FORSCOM that oversees Army Reserve forces, and that they would no longer be designated as SOF.[81] This came about because Secretary of Defense Donald Rumsfeld had become concerned that a major subordinate command in USASOC—USACAPOC—primarily supported GPF, and so directed the change.[82] However, after the change USASOC still retained proponency over Civil Affairs forces, and the JFKSWCS still contained the Civil Affairs school even though most of these forces did not fall under USASOC.

This arrangement, under which proponency was with USASOC but most Civil Affairs forces were under FORSCOM, led to challenges for the Civil Affairs branch and forces. For example, USSOCOM regulations forbade USASOC from carrying out some of the functions for Civil Affairs that a force modernization proponent would normally do for a subordinate branch because most Civil Affairs forces were not part of USASOC/USSOCOM and so could not be supported by USSOCOM funding (most SOF modernization comes from USSOCOM funds).[83] Specifically, the force modernization proponent did not believe it was authorized to execute

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[80] Unlike most other branches in the Army, Civil Affairs did not have a branch chief from its branch. Senior civil affairs official, interview with the authors, November 4, 2022; and U.S. Army Civil Affairs and Psychological Operations Command, "USACAPOC(A) Proponency Issues," briefing slides, October 10, 2007.

The Army's concept of proponents has changed since 2006. At that time, Army Regulation 5-22, *The Army Proponent System*, October 3, 1986, designated "Branch proponents" and "Specified proponents." Since that time, AR 5-22 has been retitled *The Army Force Modernization Proponent System* (October 28, 2015). This new version of the regulation differentiates between "branch proponents" and "force modernization proponents." It states that "The branch proponent is the commandant or the chief of a branch of the Army with execution of training, leader development, education, and personnel responsibilities for their designated branch. Branch proponents support the role of the force modernization proponent… The key difference—force modernization proponents are responsible for developing DOTMLPF–P requirements; branch proponents support force modernization proponents in developing those requirements and executing approved training, leadership and education, and personnel programs."

[81] Deputy Secretary of Defense Gordon England, "Reassignment and Designation of Army Reserve Civil Affairs and Psychological Operations Forces," memorandum for Secretaries of the Military Departments Chairman of the Joint Chiefs of Staff, November 14, 2006.

[82] Conversation with former colonels who worked this action while on the Joint Staff at that time. Under 10 U.S.C. § 167j(3) the Secretary of Defense can make this designation.

[83] USSOCOM acquisition is funded out of Major Forces Program (MFP) 11. Specifically: "Congress has … provided USSOCOM with the specific appropriation funding, Major Force Program-11, to support the development, acquisition, and sustainment activities for SO [special operations]-peculiar equipment" (United States Special Operations Command, Special Operations Forces Acquisition, Technology, and Logistics, "Acquisition Authority," webpage, undated.)

GPF, which includes most Army forces not in USASOC, are funded out of MFP-2. Making the USASOC (part of USSOCOM, and so modernized using MFP-11 funding) the proponent for Civil Affairs made it challenging for USASOC to modernize FORSCOM (GPF) Civil Affairs units, as MFP-11 funds cannot be used to modernize them.

some of its normal functions for Civil Affairs units, and no other official or agency in the Army could either.[84] Today, some of these challenges have been resolved, but the Civil Affairs branch still has to work to navigate a system that has its branch and force modernization proponents in USASOC and who is not a Civil Affairs officer, and most of its forces in U.S. Army Reserve Command under FORSCOM.

Should EOD be designated a special operations activity it would likely find itself in a similar situation.[85] Even more so than Civil Affairs, most of its forces support GPF; there is currently only one EOD company designated to support the USASOC (the Ranger Regiment). While this would not necessarily require that the Army make EOD a separate branch—it could leave it in Ordnance or make other arrangements as discussed in a later section—the 2021 National Defense Authorization Act (NDAA) directs that it be made a basic branch of the Army by October 1, 2025 (subject to the Secretary of the Army certifying the items listed in Appendix C). As such, EOD as a part of USASOC would probably imply that USASOC would take on force modernization proponency and that the new branch would fall under the JFKSWCS, creating some of the same complex arrangements that Civil Affairs faces. Furthermore, if the Secretary of Defense follows the precedent set by Secretary Rumsfeld and does not designate EOD as SOF, it would face the same force modernization challenges as the Civil Affairs branch faced.

EOD Tasks and SOF Tasks

Another important consideration on whether EOD should be designated a special operations activity is whether a significant portion of EOD tasks are specific to special operations, or simply contribute to special operations forces' missions in ways similar to how they contribute to GPF missions. The Army Universal Task List (ADRP 1-03) sections on EOD indicate only a general connection between EOD tasks and SOF missions and tasks, and SOF tasks do not include EOD tasks.[86] Specifically, EOD supports SOF operations in the same way it supports GPF operations (the language on support to SOF is essentially identical to how it supports forces in general).[87] This indicates that what EOD does is not inherently a special operations activity and so argues against it being designated SOF.

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[84] Interview with retired Civil Affairs expert with experience at both USACOPOC and USASOC. Although USASOC is the Army Service Component Command for USSOCOM and so part of the Army, much of USASOC modernization is funded through USSOCOM resources rather than Army resources, and in this case USSOCOM regulations govern the expenditure of these funds.

[85] Special Operations Activities are enumerated in 10 U.S.C. § 167k.

[86] Army Doctrine Reference Publication 1-03, *The Army Universal Task List*, U.S. Department of the Army, October 2015.

[87] ART 6.11.1.4, Coordinate Explosive Ordnance Disposal Support to Special Operations Forces of ARDP 1-03, is the closest this publication comes to an explicit association between EOD and SOF. However, the support characterized here is almost verbatim that EOD is tasked to give to other elements of the Army in this same ARDP.

In summary, the Civil Affairs example strongly implies that designating EOD as SOF would create significant complications for getting support from its parent organization, and all but necessitate making it a stand-alone branch or integrating it into some other SOF branch (for which there are no good candidates). We discuss branch options, to include EOD as an independent branch, in the next section. Rather than lead to greater integration with the force it primarily supports (overwhelmingly Army GPFs), designating EOD as SOF would create bureaucratic hurdles to doing this. Furthermore, there do not appear to be any compelling functional reasons to make this designation.

EOD in U.S. Marine Forces Special Operations Command

Creating the institutional conditions in which EOD can effectively support SOF without being at undue risk from a lack of training or preparation may not require designating EOD as SOF.[88] The USMC has accomplished this by creating EOD billets in selected Marine Force Special Operations Command units and providing EOD technicians assigned to those billets with training to prepare them for SOF support.[89] This approach differs from the Army's, which typically provides EOD support by assigning units to support a command rather than placing EOD billets in their organization tables. However, a similar result could be created by establishing strong support relationships between EOD and SOF units (e.g., making EOD units organic to currently supported commands or assigning them to those commands), while ensuring that personnel in those commands receive the appropriate training (which the Army does for EOD personnel assigned to the EOD company that supports the Ranger Regiment).

Should the Army approach an EOD force structure similar to the doctrinal force discussed in Chapter 3 and create this strong habitual relationship between those EOD units supporting SOF, they would then habitually train with their parent organizations and potentially receive support from them. It would then be likely that most of the benefits from designating EOD as SOF forces could be realized without the downsides of actually making that designation, as discussed in the Civil Affairs case study.

Placing EOD under USASOC, likely as a separate branch, would not make it easier for EOD to fulfill its missions or support the Army broadly. This split between where proponency is located and where the majority of forces operate would, as a minimum, create significant coordination and management challenges for EOD to overcome.[90] However, that does not imply that the status quo is the best option. In the next section, we examine other options.

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[88] USMC subject matter experts, interview with authors, February 2, 2023.

[89] The USMC runs an EOD SOF course for Marines assigned to Marine Force Special Operations Command billets. USMC subject matter experts, interview with authors, February 2, 2023.

[90] Note that the SOF aviation and infantry soldiers in the Ranger Regiment have a form of split proponency, too. The soldiers in these units are Army aviators and infantrymen, respectively, rather than some branch specifically part of SOF. As such, their branch proponents are the Aviation and Infantry branch chiefs, respectively, but their

Should EOD Be a Separate Branch?

Congress has directed the U.S. Army to make EOD a basic branch by October 1, 2025.[91] The legislation was a response to significant reductions in the size of the Army's EOD force following the wars in Iraq and Afghanistan—reductions that some members of Congress believed would not have occurred if the EOD community had had better representation in the Army's institutional structure.[92] It is thought that a general officer branch chief could have positively affected the Army's understanding of, and planning for, EOD missions.

In our interviews with senior officer and enlisted EOD leaders, none thought that establishing a separate EOD branch was a good idea, though some retired EOD personnel did.[93] Their objections were primarily that as a branch it would be very small and would need significant additional manning and resources to be able to function. Furthermore, it would take time to grow the additional field grade officers and senior NCOs to fill the new billets that would be needed to conduct the branch functions.

However, what EOD does is distinct from what other branches do in important ways. Its missions are focused on those aspects of explosive ordnance that they alone do—that is, not on its supply and maintenance, as the Ordnance Corps does, nor on implanting it to limit enemy maneuverability or destroying it to improve friendly mobility, as the Corps of Engineers does. That said, there is some overlap with these and other branches. As such, it appears that size and resources are the key issues that bear on whether EOD should be a separate branch. To examine this, two cases are illustrative—EOD as a separate branch associated with the Sustainment COE and EOD as a separate Protection branch associated with the MSCOE.

EOD as a Separate Sustainment Branch

Establishing EOD as a separate Sustainment branch would be the least disruptive of the options to make EOD a separate branch. Under this scenario, EOD soldiers would, like the soldiers of other Sustainment branches, be logisticians. As such, EOD officers, in particular, would retain one of the important characteristics of logistics officers: the ability to fill logistics generalist billets when not in EOD jobs and compete for logistics commands and staff

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force modernization proponent, as SOF, is USASOC (i.e., the special training and material requirements of the SOF aviation and Ranger units are managed by USSOCOM through USASOC).

[91] Public Law 115-91, National Defense Authorization Act for Fiscal Year 2018, Section 582, Conditional Designation of Explosive Ordnance Disposal Corps as a Basic Branch of the Army, December 12, 2017, para. (a); updated by Pub. L. 116-283, Sec. 593, 2021.

[92] Congressman Rick Crawford, "EOD Priorities for the FY2018 NDAA," testimony before the House Armed Services Committee, April 27, 2017.

[93] We interviewed 26 EOD leaders and experts from July through November of 2022.

positions.[94] This is particularly beneficial for EOD officers, because logistics officers who are not EOD-qualified cannot compete for EOD-coded positions and commands. As a result, EOD soldiers would still have access to these opportunities if EOD remained associated with the Sustainment COE as a separate branch.

Another consideration is that EOD soldiers—and the soldiers of all logistics Sustainment branches—are currently trained in the Army Logistics University (ALU) rather than branch-specific schools. ALU does all initial entry and career training for all three Sustainment branches, although the branches provide the instructors for branch-specific training, as EOD does for EOD-specific training. As such, little would need to change for EOD training and leader development at Fort Lee should EOD become a basic branch, even if some changes would be preferable. While additional billets would be needed to perform some of the functions of a branch proponent and to support the COE in its role as force modernization proponent, they would be significantly less than if EOD were to become a branch elsewhere in the Army.

EOD as a Separate Protection Branch

Despite these arguments, EOD as an independent branch might fit better under the protection WfF and the MSCOE than remaining in the sustainment WfF and COE. One of the common opinions voiced by senior EOD personnel interviewed for this study is that EOD missions are better aligned with the protection WfF rather than the sustainment WfF. EOD officers interviewed for this effort believe themselves well qualified to fill logistics generalist billets, and their personnel records reflect as much; however, they also believe that what EOD does functionally aligns with the protection WfF.[95]

Creating EOD as a separate branch under the protection WfF with the MSCOE as its Proponent might make sense from a functional perspective, but the personnel and funding needed would likely be significantly larger when compared with leaving EOD under the sustainment WfF. Officers in the logistics branches all attend the same school (ALU) and lose the branch designations they had at commissioning to become logistics officers after completing their career course. Under the MSCOE, each branch runs its own school, develops its own doctrine, and does its own modernization planning and implementation; there is no equivalent of ALU for the protection WfF. As such, creating a basic EOD branch under the MSCOE would require more resources than doing so under the Sustainment COE.

Costs would entail not only the billets to run the school and staff the MSCOE with personnel who could address EOD modernization requirements—costs that would almost certainly be

[94] Sustainment officers become logistician generalists—MOS 90—after graduating from the logistics career course, which they attend as junior captains. Their original MOS is still retained in their records, however. EOD officers receive additional technical training to qualify them as EOD technicians.

[95] Input received in interviews with experts who have access to promotion data indicate that there is no statistically significant difference between the performance of EOD officers in logistics generalist positions than other logistics officers.

smaller at Fort Lee—but also additional facilities and other services. New schools require buildings, uniformed and civilian staff, and support services that do not currently exist at Fort Leonard Wood to the extent they do at Fort Lee, unless they could be taken from other functions and given to the new EOD branch. While providing cost estimates for this option (or the sustainment option) are beyond the scope of this project, it seems evident that creating an EOD branch under the MSCOE would be more costly.

Another argument for moving EOD under the MSCOE, either as a basic branch or as part of one of the existing branches that report to it, is that it would reflect how the Army is currently thinking about the use of EOD forces. Specifically, during the period under consideration for this study (FYs 2027–2032), the Army is slated to have six Regular Army EOD battalions, five of which, in two groups, will be part of the 20th Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) Command, and one—the 303rd—will fall under the 83rd MP Brigade in USARPAC. USAREUR-AF will have two EOD companies, both of which are slated to be part of the 16th Sustainment Brigade; however, the USAREUR-AF EOD staff section is embedded in its Provost Marshal directorate. In other words, the Army has placed the vast majority of EOD units in larger units that are part of the protection WfF.

Developmental and promotion opportunities in protection rather than sustainment are also important to consider. Should EOD become a separate branch under the MSCOE, its soldiers would no longer be logisticians. As logisticians, EOD officers have opportunities for career development and command assignment in logistics billets in addition to EOD-coded billets—a facet of being logisticians that differs from the experiences of officers in most other branches. This provides EOD officers with a relatively large set of opportunities outside of EOD, and hence additional career opportunities. Furthermore, because EOD billets are generally only open to EOD-qualified personnel, being able to serve in logistics billets provides additional opportunities while keeping competition for EOD billets limited.

No similar construct exists in the protection WfF. Opportunities to serve in general protection billets would be open to EOD officers, but these would not be as numerous. For example, there are officer staff billets coded as 01C—an officer immaterial code that is open to any officer in the branches that fall under the MSCOE, to which EOD would presumably be added—but they are fewer than the logistics billets that are currently available to EOD personnel.[96] A comparison of EOD promotion and retention opportunities under sustainment with those under protection would be valuable in examining branch options but would require detailed analysis beyond the scope of this project.[97] Nevertheless, we can say that EOD officers, as logisticians, benefit from this characteristic of the Logistics branch.

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[96] Officer immaterial codes are covered in Department of the Army Pamphlet 611-21 (Smartbook), *Military Occupational Classification and Structure*, Military Personnel Structure & Plans Division, U.S. Army Office of the Deputy Chief of Staff, G-1, December 20, 2022, Chapter 2, Section 2-6.

[97] Doing such a comparison would require creating synthetic branch circumstances for different branch options and calculating hypothetical promotion and retention based on assumptions that could not be created in this effort.

Should EOD Be Placed in a Different Branch?

During our interviews, senior EOD officer and enlisted personnel offered various reasons for why EOD should remain in Ordnance or be moved to another branch. Our primary observation from these discussions was that none of the interviewees thought EOD is well placed in Ordnance, but none offered compelling reasons for placing EOD elsewhere either. Since a big part of what EOD does involves military munitions, there is a reasonable argument for leaving it in Ordnance. However, most interviewees agreed that EOD is misplaced functionally because what EOD actually does falls into the protection WfF, rather than the sustainment WfF. As a result, some thought that EOD officers are better prepared for non-branch assignments that address protection functions instead of sustainment ones, although EOD officers do perform well in logistics generalist billets, as discussed in the previous section.[98]

Given the strong belief that what EOD does is a protection function, the branches that fall under the MSCOE—i.e., the Chemical, Biological, Radiological, and Nuclear (CBRN) branch, the Engineer branch, and the MP branch—would be logical candidates for absorbing EOD. In addition, their operational and functional relationship to EOD argue that they are the ones to consider. Before considering each in turn, a few general points are noteworthy. First, these branches are "regular" branches—that is, they receive oversight and funding from the Army rather than having a split relationship like Civil Affairs has with the Army (FORSCOM) and USSOCOM (USASOC). In each MSCOE branch, the branch proponent is the Branch Chief, who is an officer from that branch and reports to the MSCOE Commanding General, the force modernization proponent for the branch. In each case, it is most likely that the EOD Commandant would have a relationship with the Branch Chief like he currently has with the Ordnance Branch Chief. We assume that, as is the case in the Ordnance School and Sustainment COE, the manpower requirements for EOD to exist in these branches would be similar to what is required as a part of the Ordnance branch, though it would certainly not be exactly the same.

In each case, the branch that absorbed EOD would have to make accommodations to the institutional and operational parts of the branch. Specifically, the branch school would need to incorporate EOD training and develop doctrine, and the MSCOE would need to conduct force modernization with assistance from the branch. Whether and how EOD missions would affect

[98] When one looks at the Army publications that address the conceptual approaches to protection and sustainment—U.S. Army Futures Command PAM 71-20-7 for protection and TRADOC PAM 525-4-1 for sustainment—one notes that references to explosive hazards and EOD are more numerous and detailed in the protection document than the sustainment document. We note as well that the sustainment document pre-dates the creation of Army Futures Command and that these WfF conceptual documents appear to have migrated from TRADOC to Army Futures Command since its creation. We did not investigate what the net effect on promotion and command opportunities would be if EOD were moved out of the sustainment WfF with its general logistics identifier and into the protection WfF. However, in the protection WfF there is no similar branch to which officers matriculate with rank, as they do with logistics. Plans for a Protection Brigade as part of the planned future Army divisions could partially address this issue if EOD battalions were part of it (see the discussion of force structure in Chapter 3), but as plans currently stand, EOD battalions are not planned to be included in the Protection Brigades.

the missions of the branch would need to be examined. On the operational side, decisions would need to be made regarding how EOD force structure would affect the branch's force structure and vice versa. Options range from leaving EOD and the branch units unchanged to creating new structures that would make EOD part of the branch's force structure. Specific changes and their implications are beyond the scope of this study but would need to be considered; here, we assume that force structure would not change significantly.

Each of the three branches is scheduled to play a major part in the planned Protection Brigade in the future division structures (should it be fielded). However, plans indicate that no EOD units are assigned to the Protection Brigades; instead, EOD units will play a direct support or general support role in the brigade.[99] This, too, could change if the doctrinal force outlined in Chapter 3 were adopted and might be stronger if EOD were part of the Protection branch. To some degree, the connection with protection is reflected in how the operational Army already treats the EOD function, with the vast majority of EOD TOE units falling under commands that are part of the protection WfF.

We now discuss each of the candidate branches in turn.

EOD as Part of the CBRN Branch

The argument for placing EOD under the CBRN branch (perhaps, making it the CBRNE branch) reflects how most EOD units are currently positioned in the force. Specifically, the 20th CBRNE Command, a subordinate command of FORSCOM, is the force provider for most CBRN and EOD units and personnel and has training oversight over them. Both Regular Army EOD groups, five of six Regular Army EOD battalions, and 32 of 38 Regular Army EOD companies are assigned to FORSCOM, and most fall under the 20th CBRNE Command. The logic appears to be that because EOD and CBRN forces perform similar functions, they should be overseen by a single command.[100] Furthermore, their missions are similar in that they are both charged with rendering safe threatening materials—CBRN materials for CBRN units and primarily explosives for EOD units. Some CBRN units have EOD soldiers in them to help with this mission, and one EOD company is explicitly designated as a WMD EOD unit. Furthermore, as noted by some EOD leaders interviewed for this study, EOD has the capabilities to render safe some types of CBRN devices.[101]

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[99] For future division structure, see Battle Order, "U.S. Army's Way Forward: 5 New Division Organizations," webpage, April 8, 2023, which is derived from a video TRADOC briefing on this subject from December 2021. Non-public sources were also consulted for this analysis but are not listed here. Based on this information, divisions will have an EOD battalion or company supporting them, but it will be in a direct or general support relationship with the EOD unit provided by the corps the divisions report to. Indications are that it will operate under the Protection Brigade.

[100] Should the Army designate habitual support relationships for EOD forces to maneuver units and major commands, as discussed earlier in this report, then training oversight of these forces would most likely be taken on by that maneuver unit.

[101] Force structure decisions provided by Army G-3/5/7 to the authors on August 11, 2022.

EOD as Part of the Engineer Branch

The Engineer branch was another option mentioned in our interviews with senior EOD personnel. Engineers perform minefield clearance, use explosives to destroy structures, and serve as the Army lead for the C-IED mission. The common mission of dealing with explosives, even though Engineers and EOD personnel have distinct missions when doing so, provides a logical connection. Our interviews indicated that EOD is already considered by many in the Army as subordinate to Engineers; specifically, some EOD planners believe that some Combatant Command Operation Plans assume that Engineer units will perform EOD missions.[102] Furthermore, as noted in the section on EOD in the other services, both of the USMC and the Air Force view EOD as an engineering function.[103] However, there are no Engineer units that currently command EOD forces, so this functional relationship would need to be built.

EOD as Part of the Military Police Branch

The third possible new home for EOD would be the MP branch. As noted above, EOD units sometimes falls under MP unit command (as in USARPAC), and EOD staff in major commands are often in a protection-oriented staff directorate, such as the Provost Marshal (as in USAREUR-AF). However, the functional connection between MP and EOD missions is weaker than the connection between EOD missions and missions performed by either Engineers or CBRN personnel. EOD does not share the military law enforcement function with MPs, and MPs do not address EOD missions. However, EOD and MP both play important, albeit distinct, roles in rear area security and route clearance and maintenance. In addition, MP K-9 teams have dogs that alert on explosives. While not directly related to EOD tasks as currently structured, this is a related capability. Nevertheless, at this level of analysis, it does not appear that the MP branch is the best MSCOE option.

Other EOD Branch Options

Another option proposed by one senior EOD leader interviewed for this effort would be to create a new branch that would have EOD as its core, augmented by related capabilities taken from the Engineer and MP branches.[104] This might be called the Countering Explosive Hazards branch. While we have not conducted a detailed examination of all the functions and capabilities that could be part of this new branch, a few are obvious. These include the Engineer mission of emergency de-mining and unexploded ordnance destruction, and other explosives-related functions Engineer units do as part of their mobility and counter-mobility missions. The MP

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[102] EOD planners, interviews with the authors, July 2022.

[103] Although the USMC and Air Force Engineers have missions that differ from those of the Army Engineers, the missions are sufficiently similar for this point to have relevance.

[104] This option was recommended by one EOD senior leader in November 2022.

mission involving working dogs to detect explosives would also be a candidate. This would make the branch larger than it would be if it were to include EOD alone, but likely not large enough to address the small-branch issues discussed above. Moreover, this option would take important functionality away from the Engineer and MP branches that contribute to their ability to accomplish their missions. Further analysis would be necessary if this option were to be seriously considered.

What Can We Learn from EOD in the Other Services?

In considering how other services treat EOD governance, we sought to inform the major questions outlined at the start of this chapter—should EOD be SOF, should EOD be a separate branch, and, if not, should it be in a branch other than Ordnance. While other EOD communities have different circumstances in which they perform EOD missions (e.g., under water, predominantly on airfields, on a smaller scale than Army EOD), aspects of their governance informed the earlier discussion.

With respect to the question of whether EOD should be SOF, no other service views their EOD forces as SOF, although the USMC has taken steps to ensure EOD Marines who are in Marine Forces Special Operations Command (MARSOC) units are trained and prepared. As such, the other services' approach to the SOF question aligns with the Army's.

EOD governance in the other services sheds some light on the question of EOD as a stand-alone branch or a member of other branches. The most useful insight arises from the fact that, while the other services do not have branches in precisely the same way the Army does, some constructs are similar. For example, the Navy's EOD Strategic Plan 2020-2030 states that Navy EOD is one of only five unrestricted line warfare communities, a status in the Navy akin to an independent branch in the Army. The Army's EOD force is the largest of any of the services (since 2007), so the fact that Navy EOD is a distinct "branch" suggests that this is not out of the question for the Army, though it would require the dedication of additional resources. However, EOD is not an independent branch-like entity in either the Air Force or the USMC.

In the Air Force, EOD is part of Air Force Civil Engineering, and in the USMC, EOD is loosely aligned with Engineers.[105] The Army's Engineer branch has a broader set of missions than Air Force Civil Engineering, but what Air Force Civil Engineers do is similar to some of what Army Engineers do (horizontal and vertical engineering).[106] Furthermore, what EOD does as part of Air Force Civil Engineering—ensure that aircraft can take off and land safely by removing UXO and other explosive hazards from runways—is arguably central to the overall Air Force mission in ways that go beyond what Army EOD or Engineers do for the Army. As such,

[105] Air Force subject matter experts, interview with the authors, March 10, 2021; USMC subject matter experts, interview with the authors, February 2, 2023.

[106] Air Force subject matter experts, interview with the authors, March 10, 2021.

the logic for Air Force EOD being part of its civil engineering function is important in ways that are different from an argument for placing EOD in the Engineer branch of the Army.

From this brief overview we can say that the experience of Navy EOD indicates that making EOD a basic branch in the Army should be possible and could provide benefits. There are less compelling clues to where Army EOD would best fit in the Army institutional force.

If EOD Force Structure Is Increased to Address the DSCA Missions, How Should It Be Managed?

In Chapter 3, we examined different forces structures, motivated by both Army doctrine for EOD support to maneuver units and major commands and actual stress on the force caused by DSCA support missions, as seen in EODIMS. In the analysis presented earlier on BOG:Dwell and MOB:Dwell rotation rates, we highlighted the implications for unsustainably high rotation rates for EOD groups and battalions should the Army's doctrinal EOD allocations rules be followed, but we did not address the implications of the proposed larger force structure to account for DSCA missions in the same detail. There we indicated that, should these forces be adopted and resourced, the Army would need to make decisions about how they would fit into the force before the rotation implications could be examined. In this section, we outline options for doing that.

The first of these options would be to make these units specialized, similar to the CONUS Support company or WMD company. DSCA missions represent a significant strain on the force: They must be conducted by law and regulation, and in many cases, they are manpower-intensive and require EOD teams to be away from home. This not only affects personnel tempo due to the time required and time away but also detracts from units' ability to conduct individual and collective training. These additional burdens are significant in relative peacetime but would be a greater problem during LSCO, during which large portions of the force would be deployed and those at home would be recovering from deployments, remanning, and refitting. As such, the argument for making them specialized units to relieve EOD units in the force flow of DSCA responsibilities is appealing. Additionally, with the 2022 National Defense Strategy elevating the importance of homeland defense, permitting units to specialize in DSCA missions would be in line with DoD's stated priorities (although some DSCA missions are overseas in areas not covered by deployed U.S. forces).[107]

If this new force structure is fielded and the decision made that the newly added units will specialize in DSCA missions, then another important decision would be whether to put these units in the Regular Army or ARNG. While such recommendations would depend on how DoD plans to address the homeland defense mission in response to the 2022 National Defense Strategy priorities, a clear alignment would exist between the role of the ARNG in supporting

[107] U.S. Department of Defense, 2022, p. 7.

state and territorial governors and the Mayor of Washington, D.C. in their homeland defense responsibilities and set of DSCA missions. Other factors would also contribute to that decision, but this one is sufficiently important to bear mentioning.

A final consideration in favor of having DSCA units be a specialized part of the force is that it would create EOD billets outside of the rotation of forces that would help lessen EOD soldiers' exposure to combat. When we considered the rotation rate of forces in LSCO, we assumed that EOD units would not be used in significant ways outside of their doctrinal support missions, as articulated in the EOD allocation rules in ATP 4-32. This would result in EOD units and soldiers facing higher rotation rates than the rest of the force. Having billets in which they could contribute to important missions outside the force flow would help mitigate these higher rotation rates and so maintain the health of the force.

Should the Army decide not to make these new EOD units specialized and, instead, have them be just additional units in the EOD force, two considerations would be important to recognize. The first is that the allocation rules articulated in ATP 4-32 have one significant flaw: They do not provide EOD teams to support Army, corps, and divisional rear area security. All EOD companies are allocated to BCTs, SFGs, and the Ranger Regiment. Unlike during OEF and OIF, in which two-, three-, and four-star commands were most often geographically located in an area controlled by a BCT and for which EOD teams were available, the geometry of the battlefield in LSCO will have large areas not belonging to BCTs. Furthermore, these areas will receive fire, attacks from unmanned aerial systems, and possibly IEDs that will require EOD attention to keep them open and ensure movement in them is relatively safe. This means that either EOD units will need to be taken from BCTs, SFGs, or the Ranger Regiment and provided to those responsible for rear area security, or additional EOD units will need to be provided as part of the force flow. These additional EOD teams would be available for this (and other) missions not covered by the ATP 4-32 allocation rules if they were not designated as specialized units.

The second consideration is that DSCA missions are mandatory and put additional stress on the force but are not captured in BOG:Dwell or MOB:Dwell analysis. While EOD is not the only part of the force that has additional critical missions such as these, they are unusual and do not appear to be adequately captured in existing metrics. Efforts are needed to do this if there is not a clear line between forces that exist for just these missions, as in the first option, and those that are part of the force flow. Failure to account for these additional stressors on the force did not derail efforts during OEF and OIF, but the EOD force was stressed beyond that of most Army forces and LSCO would, by definition, place even more stress on the force than counterinsurgency and stability operations did.

Conclusion

We have found no compelling evidence to support designating EOD as a special operations activity; indeed, the evidence that it should not be seems greater. The administrative challenges it would create, not least of which is the de facto requirement for EOD to be established as a stand-alone branch within USASOC, would be significant. Most important, the functions that EOD performs are not inherently SOF functions; they are important to SOF in exactly the same way they are important to other Army units and commands (and the articulations of them in the Army's universal task list are almost identical). The benefit of such a designation is that it would force the Army to train and prepare EOD units and personnel to better support SOF. However, the Army could gain many, if not all, of these benefits by organizing EOD so that the units that support USASOC commands are either organic or assigned to the units they support, rather than in a supporting role. This implies that EOD personnel assigned to these units would need specific qualifications (e.g., at least some elements of the unit being airborne-qualified) and would regularly train with their parent units.

The argument for making EOD its own branch has merit but also costs. Doing so would require the Army to find resources and senior billets. While detailed analysis of the difficulty and cost of such a move are beyond the scope of this study, it seems that this could most easily and inexpensively be done if it were created and associated with the Sustainment COE. However, this arrangement would not bring EOD under the protection WfF, which aligns more closely with the functions EOD performs. Since legislation requires that EOD become a basic branch of the Army by 2025 unless the Secretary of the Army certifies that certain conditions have not been met, this analysis should be done.

There is an argument for moving EOD out of Ordnance and the sustainment WfF and COE and putting it under the protection WfF and the MSCOE. If the Army were to pursue this course of action, it would have to decide whether to make EOD a basic branch or place EOD within an existing branch under MSCOE. Placing it in the CBRN or Engineer branch seems to make more sense than placing it in the MP branch, as there are clear affinities between the EOD missions and those of CBRN and Engineers, whereas there are fewer clear connections with MP missions.

The suggestion that the Army could create a new branch with EOD as its core that would consolidate most or all Army functions for detecting and addressing explosive threats does not appear strong. It seems unlikely that this would result in a branch that was significantly larger than a branch consisting of EOD alone, which, as noted above, could function as a basic branch if it received additional resources. Furthermore, doing so would take important capabilities away from the Engineer and MP branches that would almost certainly make them less effective at their missions. In addition, pulling EOD-related functions from the Engineer and MP branches would make the new branch's requirements for schools and possibly facilities (e.g., to train dogs) significantly more complex. Without evidence of clear benefits, which we have not identified, this option does not seem worth pursuing.

If the Army resources additional force structure to address EOD's responsibility to provide DSCA, it should consider doing so in a way that fences these units for DSCA missions, which become homeland defense missions in wartime. Per the 2022 National Defense Strategy, DoD has prioritized homeland defense, and fencing the additional units for DSCA missions would likely increase readiness in all parts of the EOD force.

Chapter 6. Findings and Recommendations

Army EOD is examining what it will need to support LSCO in the future and is actively preparing for—and undergoing—that transition. To assist the Army in this endeavor, we assessed the sufficiency of the EOD force planned for FY 2028 to meet both the demands of LSCO and requirements to support civil authorities. The previous chapters examined three areas of relevance: force structure, personnel, and governance. This chapter summarizes the key findings from our analysis and offers recommendations for the Army.

Findings

EOD missions in LSCO are likely to be some version of "back to the future." In other words, the primary EOD missions in future large conflicts will resemble those in previous large conflicts. Unlike in the OEF and OIF period, in which the U.S. Army faced very few military grade munitions, UXO will be numerous, and "first seen" ordnance intelligence could be critical. IEDs will continue to be a problem but will become less important than other missions. Given the prevalence of unmanned systems on modern battlefields and the requirement for EOD to examine downed unmanned aerial systems, loitering munitions that do not explode could also drive requirements.

Current EOD doctrine does not scale well for the most demanding LSCO contingencies. For operations that do not require the force to deploy in full or rotate at maximum rates, EOD doctrine might be executable. However, to execute EOD doctrine in the more demanding cases, the EOD force would need to be larger. The current doctrinal force allocation rules are not realistic for demanding operations with the planned force structure, and there are major missions not considered in the allocation rules, such as rear area security and ammunition supply point support. These missions will need to be performed and will require commanders on the ground to alter the allocations currently in doctrine. Older EOD doctrine envisioned support relationships that did not require formal unit allocation rules and provided EOD commanders with greater leeway on how to employ the force. In sum, the Army has two major sets of variables it can adjust to ensure the EOD force can accomplish its assigned missions: doctrine and force structure. At present, they are out of alignment for contingencies in which the force is fully committed.

DSCA missions, which include VIP support missions, impose significant demands on the EOD force, accounting for nearly half of all manhours expended during Army-led EOD incidents over the last five years. These demands will likely persist not only in peacetime but also in wartime, with the domestic missions falling under the homeland defense mission category during a conflict.

In our effort to estimate the demand for EOD forces over the next five to ten years, the EOD force planned for FY 2028 provided a useful starting point. To meet doctrinal allocation rules given the major units EOD supports, significant additional forces would be needed. Providing sufficient support for the DSCA and homeland defense missions would require even more.

Looking at the size of the force and its ability to support such growth, we found that the planned increase in active duty enlisted personnel (32 percent growth between FYs 2021 and 2028) is not sufficient. To provide the Regular Army with the enlisted personnel it needs to both support LSCO and perform DSCA missions, the inventory of active duty enlisted personnel would need to grow by 73 percent instead. The Army plans to reduce the number of active duty officers by 41 percent between FY 2021 and FY 2028, but this reduction is too severe. If the force must support LSCO and perform DSCA missions, the reduction should be closer to five percent with the cuts concentrated at the O3 grade.

The Army plans to increase the size of the ARNG's EOD force by a significant margin. Between FY 2021 and FY 2028, the ARNG plans to grow the number of enlisted personnel by 83 percent and the number of officers by 27 percent. However, these increases are not sufficient to meet the demands imposed by LSCO and DSCA and would leave the ARNG with shortages across all pay grades. The requisite increases in the size of the ARNG are quite a bit larger: over 400 percent for enlisted personnel and over 200 percent for officers.

Of particular concern are the projected manning shortages in the ARNG's senior ranks. Our forecasts indicate that, if current polices and trends were to continue, there would be no colonels or lieutenant colonels in the ARNG's inventory of EOD personnel to fill the authorizations planned for FY 2028. The implication is that senior ARNG EOD command and staff positions would be vacant, which raises questions about the viability of the ARNG EOD force.

For the Regular Army, the omission of DSCA missions from the TAA process accounts for a large share of the gap between the EOD force needed to support LSCO and perform DSCA missions and the EOD force planned for FY 2028. This shortfall is made more critical by the increased importance of the homeland defense mission per the 2022 National Defense Strategy, as these missions when performed within the United States are synonymous with EOD's role in homeland defense once the nation goes to war. Our analysis shows that, for enlisted personnel, the omission of DSCA from the TAA process accounts for 62 percent of the gap; for officers, the omission of DSCA accounts for 19 percent of the gap.[108]

To further assess the sufficiency of the planned force structure, we examined the implications for the force of a large conflict requiring stressful force rotations into theater, as well as the implications of a more general mobilization. The rotation analysis indicates the planned EOD force is too small to support major commands and maneuver units using the Army's force

[108] The omission of DSCA from the TAA process creates shortfalls in the ARNG as well. For enlisted personnel, the omission accounts for 39 percent of the gap between the planned EOD force and the EOD force needed to execute the full complement of EOD missions; for officers, the omission accounts for 18 percent.

allocation rules as stated in current doctrine. Under the force planned for FY 2028, EOD personnel would have to rotate unsustainably fast or provide EOD support in non-doctrinal ways. Under an augmented force that complies with the doctrinal rules of allocation, major commands and maneuver units would have support. However, missions that fall outside of the allocation rules—e.g., rear area security, ammunition supply point support—would lack EOD support, causing commanders on the ground to take EOD forces from maneuver units to cover these missions. If a non-rotational force were to deploy in LSCO, EOD support would have to be managed by senior commands rather than allocated by doctrine for the same reasons. Additional force structure for DSCA missions would help meet the priorities of the 2022 National Defense Strategy, alleviate stress on the force in both peacetime and LSCO, and provide benefits to the health of the force if the additional units were fenced for the DSCA missions.

Our examination of key governance issues raised by members of Congress indicates that if EOD were to be designated as SOF, it would likely create significant institutional challenges. Altering the way support is provided by Army EOD to SOF could alleviate some concerns but would require additional force structure.

There is a good argument for making EOD a basic branch of the Army, but doing so would require additional resources. Making EOD a basic branch under the Sustainment COE would minimize resource demands because ALU supports all logistics branches. However, this option would not bring EOD under the protection WfF, which aligns more closely with the functions EOD performs. If, instead, the Army were to make EOD a basic branch under the MSCOE, alignment with the protection WfF would occur, but additional resources would be necessary to establish an EOD school and develop the ability within the COE to support EOD force modernization. Finally, the Army could move EOD out of Ordnance to a different basic branch, but the argument for doing so is weak.

Caveats

The findings summarized above rest on several assumptions. Some of these have little bearing on the primary results of our analysis. For example, the assumption that "EOD forces will support forces of the same component whenever possible" affects how our demand estimates are distributed between the Regular Army and ARNG at the margin but does not affect our estimates of the aggregate demand for EOD forces and personnel.

However, there are three assumptions that serve as the foundation for our analysis; relaxing these assumptions would alter our findings significantly. These are:

- The conflict will be large enough to either (1) require the deployment of all available forces or (2) require forces to rotate at the maximum rates stipulated in DoD policy.
- When managing its EOD forces, the Army will adhere strictly to the allocation rules articulated in the most current doctrine, ATP 4-32, with EOD units and the maneuver units they support rotating at similar rates.

- Demands from DSCA missions will persist during LSCO, and the workload associated with these missions will equal the average annual number of manhours expended during Army-led DSCA missions over FYs 2017–2021.

Relaxing the first of these assumptions would be equivalent to assuming that a war with a major power would require only a small commitment of forces. Our view is that this scenario is unlikely and inconsistent with past experience dating back to WWII. It does not seem to be a reasonable planning assumption.

In making the second assumption, we recognized that while enabler forces are often under resourced, the reasons are usually associated with budget constraints rather than articulations of need. Since the goal of this study was to estimate the EOD forces *needed* to support the Army, we found it reasonable to cast aside budgetary concerns and estimate the unconstrained demand for EOD forces per current doctrine.

The third assumption is grounded in the Army's recent experience with providing support to civil authorities. While DoD regulations, policies, and doctrine direct the department to evaluate requests for DSCA in relation to their effects on military readiness, DoD EOD teams are strongly favored for many VIP support missions, especially those that protect POTUS, even in wartime. Limiting the DSCA workload to POTUS protection missions only would reduce the number of EOD companies needed for homeland defense by about 60 percent.

Recommendations

The Army should address the disconnect between EOD doctrine and force structure by either providing more forces so the doctrine can be executed in LSCO or revising the doctrine to permit more flexible concepts of support. In the most demanding LSCO force employment contingencies—i.e., rotational employment or more general mobilization and employment—the EOD force is not large enough to support major commands and maneuver or SOF units as the doctrine indicates it will. Even if more force structure were provided to permit one-to-one support relationships, there are important missions, such as rear area security, port security, and ammunition supply point support, that EOD would have to perform, and which are not accounted for in force allocation rules. While doctrine does give EOD battalion and group commanders the leeway to use forces as missions demand, it sets expectations by its modeling rules of allocation that are not achievable under the LSCO assumptions we use in this analysis. The Army should consider revising its doctrine to emphasize flexible concepts of support in addition to the unit allocation rules currently in place.

The TAA process should account for the DSCA mission set—missions that in wartime will be homeland defense and impose significant demands on the EOD force. These missions are not captured in joint scenarios and planning but are required by legislation and regulation. The omission of DSCA missions from the TAA process results in decreased EOD unit readiness and unreasonable stress on the force.

Army leadership must address the manning shortfalls in the ARNG EOD force, **including the lack of senior EOD leaders to command the ARNG group and battalions**. This part of the force is critical to the overall EOD effort in LSCO but is unable to perform its mission without resolving significant shortages in personnel. While our analysis did not examine in detail how to address this challenge, a few things are clear. Since it takes years to train EOD-qualified personnel and the expected ARNG shortfalls are most significant at the more senior grades, Army leaders likely need at least a two-pronged approach. To address the shortfalls over the long run, the Army must fill the personnel pipeline with EOD-qualified personnel by recruiting and training effectively. In the short run, the Army should address the problem in the senior ranks by encouraging EOD-qualified personnel leaving the Regular Army to serve in the ARNG's EOD force.

The Army should consider options for making ARNG EOD personnel more readily available for DSCA missions to relieve stress on the Regular Army force and provide real-world missions to the ARNG force. Because DSCA missions are federal, they must be performed by units operating under Title 10. When not mobilized, ARNG forces operate under State authority or under Title 32, which presents a challenge to accessing them for DSCA. However, DoD has addressed this challenge in other areas, such as the 49th Missile Defense Battalion in the Alaska National Guard and National Guard pilots who fly combat air patrol missions for Operation Noble Eagle.[109]

EOD should not be made a special operations activity because there is no compelling evidence to justify such a designation and doing so would create dysfunction in EOD and USASOC. Concerns about how EOD supports SOF can be addressed in other ways.

[109] The 49th Missile Defense Battalion operates critical capabilities to keep the nation safe from intercontinental ballistic missiles, relying on a mix of active and reserve National Guard soldiers, while Operation Noble Eagle relies on special authorities to accomplish its mission. See Congressional Research Service, *Operations Noble Eagle, Enduring Freedom, and Iraqi Freedom: Questions and Answers about U.S. Military Personnel, Compensation, and Force Structure*, RL31334, January 27, 2006.

Appendix A. Forecasting the Inventory of EOD Personnel

This appendix contains technical information describing the methodology for forecasting the inventory of Army active duty and National Guard EOD personnel through FY 2032. The forecasts support the analysis presented in Chapter 4, which examines whether current policies and trends are likely to generate the EOD personnel needed to meet future demands.

Overview of Our Forecasting Approach

Our goal is to forecast the number of EOD personnel, by grade and component, through FY 2032 assuming current policies and trends continue. The methodological approach is motivated by the following two observations. First, due to the military's hierarchical workforce structure, in any given year the number of personnel at one grade is a function of the number of personnel at other grades. (For example, a certain number of E5 personnel are needed to support a given number of E3 personnel.) Second, the current-year distribution of personnel across grades is a function of the distribution in previous years. This owes to a combination of time-in-grade requirements and promotion patterns, as well as recruitment and retention behavior. Our base forecasting model—a VAR—is a statistical model structured to estimate the relationship between a set of variables that co-evolve over time; as such, it is well-suited to the forecasting environment described above. For our purposes, the set of variables is the number of personnel at each grade within a certain population (e.g., active duty enlisted EOD personnel). VARs offer a flexible, empirically driven forecasting approach typically associated with high forecast accuracy.[110]

However, there is likely a large set of additional variables that may influence the number of personnel across grades in any given year. For example, high, sustained operations tempo may encourage personnel to exit service. In contrast, increases in base or special and incentive pay may incentivize individuals to join the Army or remain in EOD positions. Given that many factors may contain information useful in predicting the number of out-year personnel, we must decide how best to incorporate them into the forecasting model. Unfortunately, the limited time series at our disposal constrains the degrees of freedom we have to work with—it is not possible to directly add each additional variable to the base model. Our solution is to "summarize" this collection of additional predictors by means of PCA. A small number of principal components serves to capture the majority of the variance in this broad set of variables. Therefore, we choose to compute the first two principal components and embed them into the VAR, creating a factor-augmented VAR (FAVAR). Doing so allows us to capture most of the predictive information

[110] Stock and Watson, 2001.

contained with the wider variable list in a way that works within our degrees of freedom constraints. FAVARs feature prominently in the leading macroeconomics and financial economics literatures for precisely this reason.[111]

Data Used to Support the Analysis

We obtained the requisite data to support the supply forecasting analysis from DMDC, U.S. Army Human Resources Command, the study sponsor, and public sources such as the U.S. Bureau of Labor Statistics and NDAA documents. Our data extend from FY 2002 to FY 2021. DMDC contains the individual-level data necessary to construct the VAR that forms the base of the forecasting model. More precisely, this amounts to calculating the number of EOD personnel at each grade for every FY between 2002 and 2021 (inclusive). From DMDC we also obtained many of the variables used in the PCA portion of the modeling approach. These included a series of deployment- (e.g., the number and length of deployments per person) and pay-related (e.g., regular military compensation, bonus, and incentive pay) variables.

The remainder of the variables incorporated into the PCA come from the other sources listed above. We calculate annual (enlisted) inflows into the Army and EOD specifically from U.S. Army Human Resources Command data originating from U.S. Military Entrance Processing Command. The study sponsor shared historical data on the number of EOD authorizations across grades as well as the dates associated with changes in the size of EOD teams. We extracted information on Army active duty and National Guard authorized end strength from the corresponding NDAAs. Finally, we gathered historical data on the civilian unemployment rate from the U.S. Bureau of Labor Statistics.[112]

Detailed Description of the Empirical Strategy

Our FAVAR can be thought of as a combination of a VAR and PCA. There are multiple ways to estimate FAVAR models; we chose a two-step approach that amounts to the following.[113] First, we compute the first two principal components associated with our dataset of non-personnel count predictor variables and map those data onto the principal components.[114] Second, we estimate a VAR model that includes both the mapped data from the first step and the number of personnel at each grade. Following estimation, we use the fitted coefficients to

[111] Pesaran, Pick, and Timmermann, 2011.

[112] U.S. Bureau of Labor Statistics, Unemployment Rate (UNRATE), retrieved from FRED, Federal Reserve Bank of St. Louis, database, undated. We received access to a range of other data related to EOD personnel recruitment and retention; we excluded from the analysis data that did not span the entire sample window (2002 to 2021).

[113] Bernanke, Boivin, and Eliasz, 2005.

[114] By non-personnel count predictor variables, we mean all predictor variables except the (lagged) number of EOD personnel across grades.

compute recursive forecasts of the number of EOD personnel across grades for each year between 2022 and 2032 (inclusive). For ease of exposition, we begin by describing the VAR construct, as it forms the base of our methodological approach.

We mentioned previously that VAR models are designed to capture how multiple variables affect each other over time. Equations (1) and (2) illustrate this concept in mathematical terms; the two sets of equations represent our baseline VAR models for forecasting the number of enlisted and officer personnel, respectively.

$$\begin{aligned} E3_t &= c_3 + a_{3,1}\, E3_{t-1} + \cdots + a_{3,9}\, E9_{t-1} + u_{3,t} \\ &\vdots \\ E9_t &= c_9 + a_{9,1}\, E3_{t-1} + \cdots + a_{9,9}\, E9_{t-1} + u_{9,t} \end{aligned} \tag{1}$$

$$\begin{aligned} O1_t &= c_1 + a_{1,1}\, O1_{t-1} + \cdots + a_{1,6}\, O6_{t-1} + u_{1,t} \\ &\vdots \\ O6_t &= c_6 + a_{6,1}\, O1_{t-1} + \cdots + a_{6,6}\, O6_{t-1} + u_{6,t} \end{aligned} \tag{2}$$

The variables Ei_t, $i \in \{3, \ldots, 9\}$ and Oj_t, $j \in \{1, \ldots, 6\}$ denote the number of enlisted and officer personnel at grades i and j in year t, respectively. We estimate separate models for Army active duty and National Guard personnel. The baseline VAR model thus posits that the number of personnel at one grade in any given year is a function of the number of personnel at each grade in the previous year. The dynamic nature of the approach—that is, the fact that it relates variable values in one year to values in previous time periods—is what lays the groundwork for its forecasting capability. Moreover, the model predicts personnel counts in year t solely based on prior information (i.e., variables dated $t-1$); this generates a recursive structure that can produce forecasts arbitrarily far into the future.

There are two additional points worth noting before turning to the PCA segment of the approach. First, our model contains one lag. In principle, VARs can contain an arbitrary number of lags; often, researchers leverage a suite of statistical tests to determine the optimal number of lags to include in a given VAR model.[115] We are constrained to using one lag due to the degrees of freedom constraints imposed by the length of our data sample. Second, we restrict attention to enlisted personnel between grades E3 and E9 and limit our analysis of officer personnel to individuals between the grades of O1 and O6. We do not forecast individuals at grades E1 and E2 because those individuals remain in TTHS and are excluded from the analysis. The model does not consider officer personnel above grade O6 due to the lack of EOD personnel at higher

[115] For example, if we chose two lags, our model would include personnel counts from two years prior as independent variables, in addition to values from the previous year.

ranks in the historical data.[116] This arguably constitutes a limitation of our approach—this class of models cannot predict, for example, the number of O6 personnel that may advance to O7 in the future because this dynamic has not occurred historically. Simulation-based approaches have this capability but come with their own drawbacks. They often make explicit assumptions about dynamic behavior, whereas our approach estimates such behavior empirically.

We turn now to the PCA aspect of our modeling strategy. Recall the motivation for our use of PCA: There are myriad other variables that may influence changes in the number of EOD personnel, but we are unable to include them all directly due to degrees of freedom constraints. Put differently, we must reduce the dimension of this auxiliary dataset before appending it to the forecasting model. PCA provides a particularly attractive means to do this in our context. In broad terms, the first principal component represents a line that passes through the data in the direction of the most variance. The second principal component is constructed similarly, with the stipulation that it must be mathematically unrelated (orthogonal) to the first line. This process continues until n principal components have been constructed, where n corresponds to the number of dimensions in the dataset. The principal components can then be used to reduce the dimension of the original dataset. Mapping the original n-dimensional data points onto the first k principal components (where $k < n$) reduces the dimension of the data from n to k. PCA thus provides a method for expressing most of the variation in the data using fewer dimensions. Ultimately, we are interested in understanding how variation in the auxiliary dataset relates to changes in the number of EOD personnel; PCA facilitates this in a way that works within the confines of the time series at our disposal.

We perform PCA on a set of variables that may be grouped into the following themes: EOD authorizations, Military Entrance Processing Station inflows (for enlisted personnel), compensation, deployments, Army authorized end strength, changes to EOD team size, and the civilian labor market. Subsequently, we map the data onto the first two principal components to create two new variables ($PC1$ and $PC2$) that will feature in the FAVAR. We chose to leverage the first two principal components for two reasons. First, degrees of freedom constraints limit the number of principal components we can include in practice. Second, the first two principal components explain the majority of the variance across all populations in the auxiliary dataset. The percentage of variance explained ranges from 64.87 percent (active duty enlisted EOD personnel) to 71.20 percent (active duty officer EOD personnel).

Equations (3) and (4) show how the principal components are incorporated into the baseline VAR to create the final FAVAR forecasting model.

$$PC1_t = c_1 + a_{1,1}PC1_{t-1} + a_{1,2}PC2_{t-1} + a_{1,3}\,E3_{t-1} + \cdots + a_{1,9}\,E9_{t-1} + u_{1,t}$$

[116] We identified only one individual at grade O7 between 2002 and 2021 in our data.

$$
\begin{aligned}
PC2_t &= c_2 + a_{2,1}PC1_{t-1} + a_{2,2}PC2_{t-1} + a_{2,3}\,E3_{t-1} + \cdots + a_{2,9}\,E9_{t-1} + u_{2,t} \quad (3)\\
E3_t &= c_3 + a_{3,1}PC1_{t-1} + a_{3,2}PC2_{t-1} + a_{3,3}\,E3_{t-1} + \cdots + a_{3,9}\,E9_{t-1} + u_{3,t}\\
&\vdots\\
E9_t &= c_9 + a_{9,1}PC1_{t-1} + a_{9,2}PC2_{t-1} + a_{9,3}\,E3_{t-1} + \cdots + a_{9,9}\,E9_{t-1} + u_{9,t}
\end{aligned}
$$

$$
\begin{aligned}
PC1_t &= c_1 + a_{1,1}PC1_{t-1} + a_{1,2}PC2_{t-1} + a_{1,3}\,O1_{t-1} + \cdots + a_{1,8}\,O6_{t-1} + u_{1,t}\\
PC2_t &= c_2 + a_{2,1}PC1_{t-1} + a_{2,2}PC2_{t-1} + a_{2,3}\,O1_{t-1} + \cdots + a_{2,8}\,O6_{t-1} + u_{2,t} \quad (4)\\
O1_t &= c_3 + a_{3,1}PC1_{t-1} + a_{3,2}PC2_{t-1} + a_{3,3}\,O1_{t-1} + \cdots + a_{3,8}\,O6_{t-1} + u_{3,t}\\
&\vdots\\
O6_t &= c_8 + a_{8,1}PC1_{t-1} + a_{8,2}PC2_{t-1} + a_{8,3}\,O1_{t-1} + \cdots + a_{8,8}\,O6_{t-1} + u_{8,t}
\end{aligned}
$$

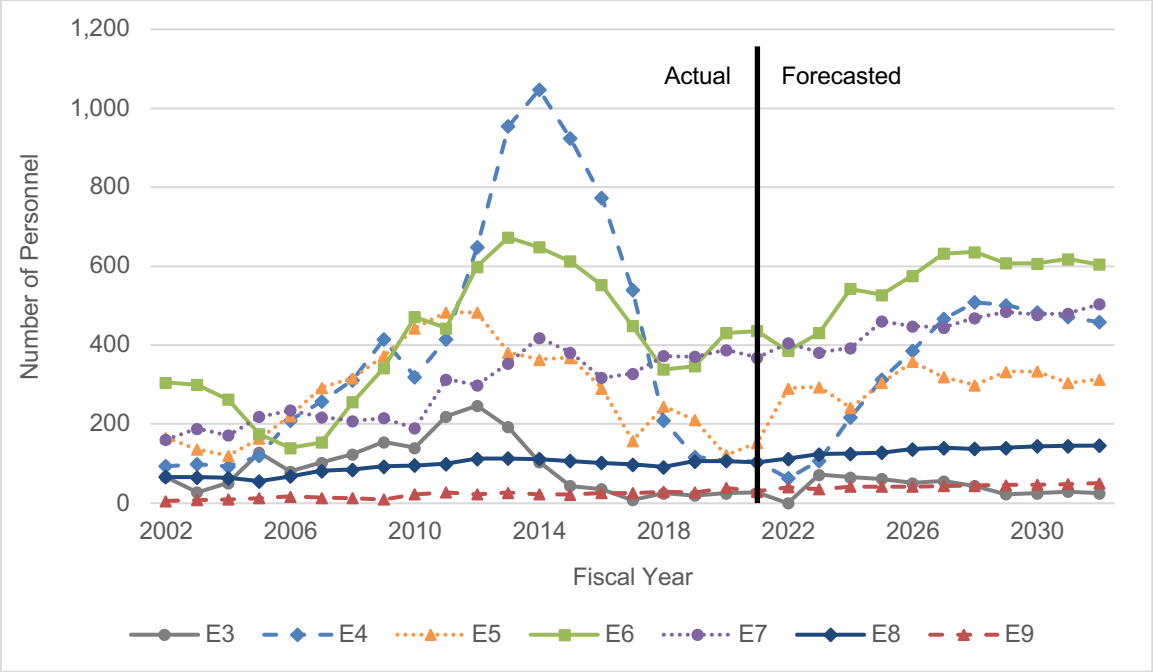
After estimating the model, we use the fitted coefficients in conjunction with FY 2021 data (the last year in our sample) to generate predictions for the number of FY 2022 EOD personnel across grades.[117] Given the recursive structure of the model, this process proceeds iteratively to produce forecasts for each subsequent year through FY 2032. The following section presents the forecasting results.

Forecasting Results

Figures A.1 through A.4 contain historical data on and point estimate forecasts of the number of Army EOD personnel across grades for each population. The black vertical line in each figure denotes the FY (2021) after which the numbers presented represent forecasts; all values prior to (and including) FY 2021 correspond to actual personnel counts as reflected in the DMDC data. Chapter 4 contains a more robust discussion of the implications of the personnel supply forecasts, including a comparison with corresponding estimates of EOD personnel demand.

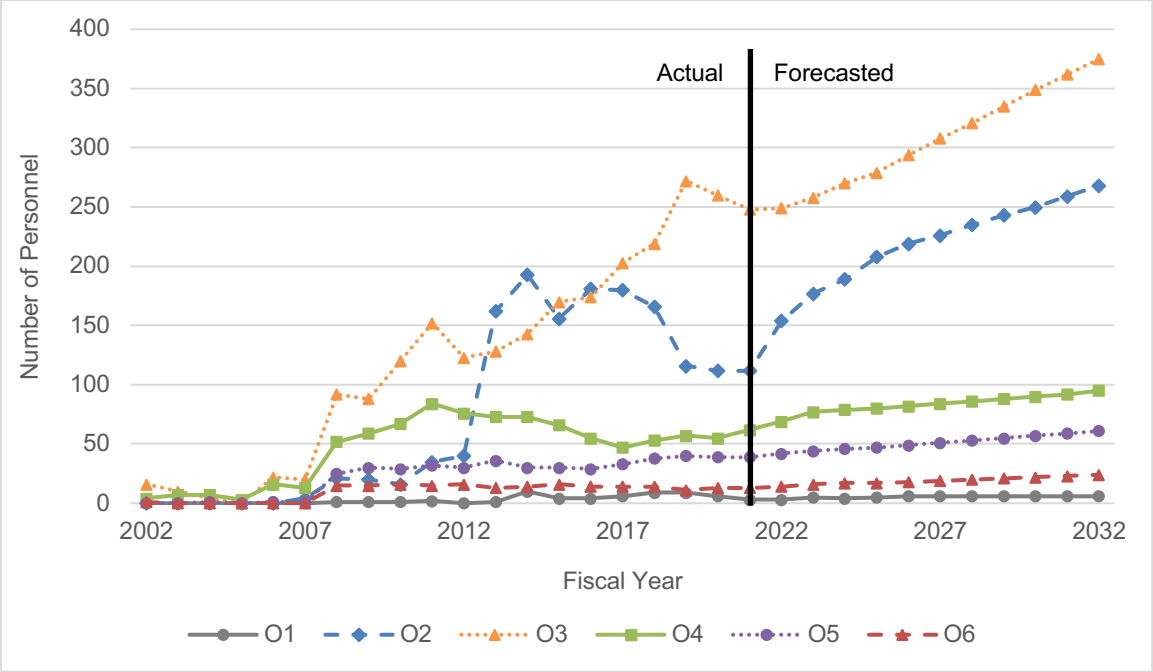
[117] Recall that we estimate separate models for Army active duty and National Guard personnel.

Figure A.1. Historical and Forecasted Army Active Duty EOD Enlisted Personnel



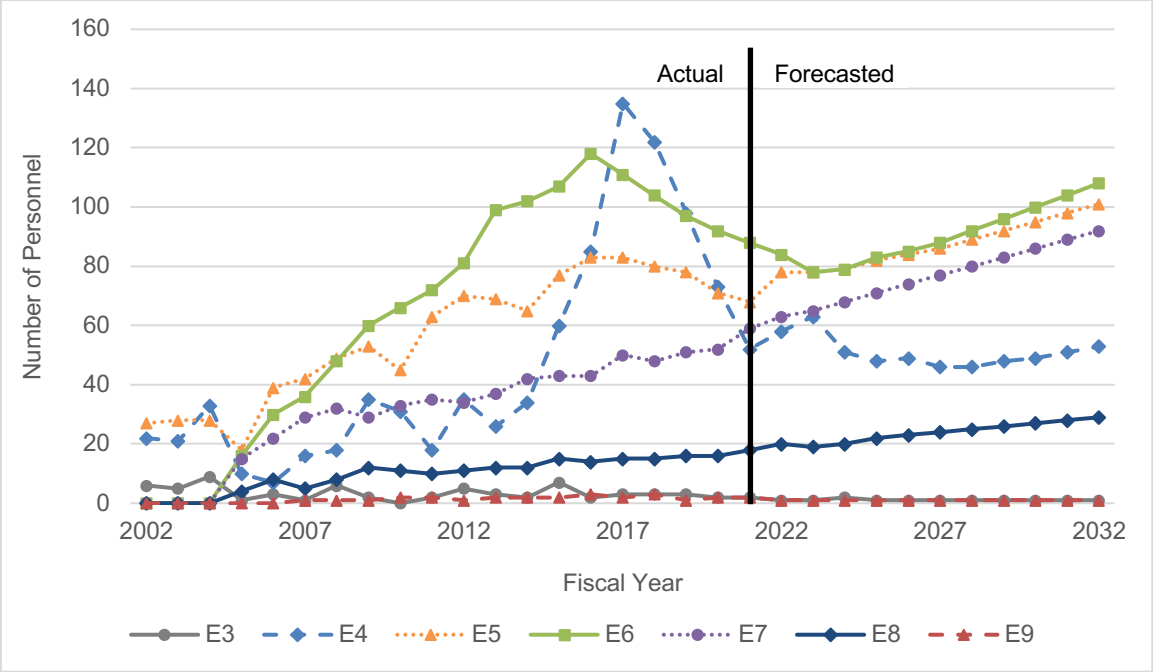
SOURCE: Features information based on data from DMDC.
NOTE: Forecasts begin in FY 2022.

Figure A.2. Historical and Forecasted Army Active Duty EOD Officer Personnel



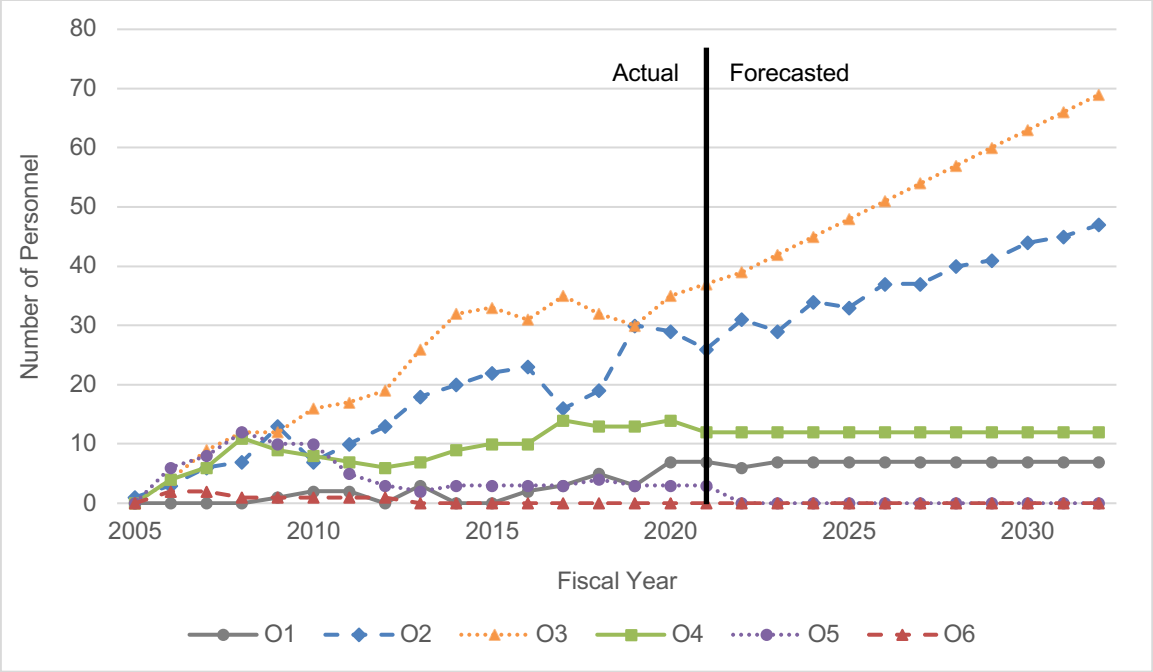
SOURCE: Features information based on data from DMDC.
NOTE: Forecasts begin in FY 2022.

Figure A.3. Historical and Forecasted Army National Guard EOD Enlisted Personnel



SOURCE: Features information based on data from DMDC.
NOTE: Forecasts begin in FY 2022.

Figure A.4. Historical and Forecasted Army National Guard EOD Officer Personnel



SOURCE: Features information based on data from DMDC.
NOTE: Forecasts begin in FY 2022.

The relative scarcity of data (in terms of the length of our time series) makes it difficult to evaluate the accuracy of our forecasting model using standard methods. However, we can conduct a limited assessment by examining how well the model predicts the 2022 grade distribution of the Army EOD force. This is possible because we have access to TAPDB data containing personnel records into FY 2022. In contrast, the variables comprising the forecasting model are only reliably captured through the end of FY 2021.

Tables A.1 and A.2 directly compare the actual and forecasted 2022 grade distributions for enlisted and officer personnel, respectively. Taken together, the tables show that the model produces reasonably accurate forecasts of the 2022 grade distributions, though the margin of error varies across populations and grades. However, a few factors confound the comparison. First, the forecasting model draws on personnel data from DMDC while the comparative figures come from TAPDB. The two sources naturally track each other closely over time but are often numerically different in any given year. Second, the TAPDB data do not extend through the end of FY 2022. Because the forecasting model utilizes data on the number of personnel present at the end of each fiscal year (September), this creates a slight misalignment between the numbers compared in the tables. Nonetheless, the two tables permit a preliminary assessment of model performance.

Table A.1. Actual and Forecasted Grade Distributions for Enlisted Personnel, 2022

	Active Duty		ARNG	
Grade	Actual	Forecasted	Actual	Forecasted
E3	4	0	4	1
E4	84	63	45	58
E5	210	291	60	78
E6	430	386	63	84
E7	365	405	41	63
E8	95	113	17	20
E9	27	41	4	1

SOURCE: Features information based on data from DMDC and TABDB.
NOTES: Column two numbers reflect the number of personnel as of August 2022. Column four figures represent the number of personnel as of March 2022.

Table A.2. Actual and Forecasted Grade Distributions for Officer Personnel, 2022

	Active Duty		ARNG	
Grade	Actual	Forecasted	Actual	Forecasted
O1	10	3	13	6
O2	123	154	26	31
O3	229	249	22	39
O4	68	69	8	12
O5	23	42	4	0
O6	12	14	0	0

SOURCE: TAPDB data, DMDC data, and features information based on of data from DMDC and TAPDB.
NOTES: Column two numbers reflect the number of personnel as of August 2022. Column four figures represent the number of personnel as of March 2022.

Appendix B. Rotation Rate Analysis

Because we examine both Regular Army and ARNG forces, we adopt a unit of measure that permits us do the rotation analysis while accounting for the relative availability of units from each component. We call this unit of measure *equivalent Regular Army (unit) availability* units, or *ERAA*. We convert the MOB:Dwell ratio into a BOG:Dwell equivalent that allows us to use the BOG:Dwell ratio of the supported (Regular Army equivalent) maneuver unit as a basis of comparison. This approach applies no matter the BOG:Dwell or MOB:Dwell policy at a given time because it creates the ERAA based on those policy decisions.

By policy, ARNG units are available for only a fraction of the time that Regular Army units are. Accordingly, we define the variable *a* as the ratio of the amount of time ARNG units are available to the amount of time Regular Army units are available. This approach accounts for two factors:

- The difference between the Regular Army BOG:Dwell ratio and the ARNG MOB:Dwell ratio (i.e., 1:3 – 1:5 or 1:2 – 1:4)
- The availability of ARNG units during a 12-month mobilization.[118]

For example, if Regular Army units were available on a 1:2 BOG:Dwell basis and ARNG units on a 1:4 MOB:Dwell basis, then the ratio of the amount of time that an ARNG unit would be mobilized ($\frac{1}{5}$ of the time) to the amount of time that a Regular Army unit would be available for deployment ($\frac{1}{3}$ of the time) would be $\frac{3}{5}$.

However, the ARNG unit is not available for deployment for the entire time it is mobilized. Reserve component units must bring their personnel onto active duty and conduct post-mobilization training to reach, and be certified as having reached, a level of competency stipulated by the Army before they can deploy. Furthermore, because reserve component units need time to deactivate their personnel after deployment, reserve unit availability is less than the ratio computed above. For this analysis, we assume that for every 12-month period of mobilization ARNG EOD units will be available for 11 months and ARNG divisions will be available for nine months.[119] Given these assumptions, for EOD units we have

[118] We assume mobilization periods last 12 months because this was the policy for OEF and OIF. Longer mobilization periods are possible but not considered here.

[119] When a reserve component unit is activated for a deployment, it has administrative and training activities to complete before it is available to deploy, and when it returns, it has administrative functions to complete before soldiers are released. Previous RAND analysis demonstrates that more complex units require more post-mobilization training time to prepare to deploy and simpler units that operate in small teams require less time to prepare. Here we are using 90 days as the post-mobilization time needed for the more complex units, such as BCTs and Combat Aviation Brigades, within a division. Smaller and less complex divisional units could be made ready

$$a_{EOD} = \frac{3}{5} * \frac{11}{12} = \frac{11}{20}$$

and for a large maneuver unit, like a division or BCT, we have

$$a_{Div} = \frac{3}{5} * \frac{9}{12} = \frac{9}{20}$$

If we apply these coefficients to the rotation analysis for EOD battalions described in Chapter 3, recalling from Table 3.2 that we have six Regular Army and three ARNG EOD battalions, we obtain:[120]

$$ERAA_{unit} = \#\ RA\ Units + a_{unit} * \#\ ARNG\ Units$$

or

$$ERAA_{EOD} = 6 + \frac{11}{20} * 3 = 7.65\ RA\ EOD\ Battalion\ Equivalents$$

Because there are ten Regular Army and eight ARNG divisions in the force for EOD to support we have:

$$ERAA_{Div} = 10 + \frac{9}{20} * 8 = 13.60\ RA\ Divsion\ Equivalents$$

Assuming all EOD battalions are part of the force flow, 7.65 Regular Army Equivalent EOD battalions would support 13.6 Regular Army Division Equivalents. If they were to rotate at the same rate, only $\frac{7.65}{13.60} = 0.5625$, or about 56 percent, of deployed divisions would have an EOD battalion in support. Alternately, if all divisions were to have an EOD battalion in support, EOD battalions would have to rotate at 178 percent of the rate of their supported divisions.

Similar calculations for a 1:3 BOG:Dwell ratio and 1:5 MOB:Dwell ratio yield similar results. Only 56 percent of deployed divisions would have EOD support if they were to rotate at the same rate. If, instead, all deployed divisions were to have EOD support, EOD battalions would rotate at 179 percent of the rate of their supported divisions. The results of these and similar calculations for EOD companies are in Table 3.4.

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more quickly. The fractions of mobilization times assumed here are in keeping with this previous analysis and historical data from Army and Defense Department records.

[120] Deployment lengths of more than nine months would affect availability as well. For example, if the BOG:Dwell ratio were 1:2 and the MOB:Dwell ratio were 1:4, deployment and mobilization periods were to last 12 months, and ARNG units were to need two, rather than three, months to conduct post-mobilization readiness preparation, we would have *a* = 3/5 * 10/12 = 1/2.

Appendix C. Review of EOD Legislation and Related Material from 2018 to 2022

FY 2018 NDAA and Related Materials

NDAA

The fiscal year 2018 National Defense Authorization Act established the conditional designation of a U.S. Army Explosive Ordnance Disposal Corps as a basic branch of the Army in addition to existing branches as delineated in 10 U.S.C. § 7063 (e.g., Infantry, Armor, Artillery, Finance Corps, or Chemical Corps).[121] The effective date for establishing EOD as a basic branch was to be October 1, 2020 (subsequently amended to October 1, 2025).[122] The Act provided for a delayed establishment beyond October 1, 2020 if the Secretary of the Army submitted a report to Congress no later than September 30, 2020 certifying the following (subsequently amended to September 30, 2025):

- Separating out EOD funding from the defense budget as a program of record
- The establishment (within five years of the enactment of the FY 2018 NDAA) of at least one EOD qualified Army general officer (to ensure EOD professional development and upward mobility)
- The continued manning of the Ordnance Personnel Proponency Office with an EOD officer to oversee officer and enlisted EOD proponency
- The inclusion of EOD officer education in the basic officer's leadership course; a captain's career course; and a policy and planning course specific to EOD as part of intermediate level education and pre-command courses
- The continued manning of the Army Deputy Chief of Staff, G8 and G3, with EOD officers responsible for decision management packages, ammunition organization integration and force modernization
- The establishment and maintenance of EOD cells at Army FORSCOM, Army Service Component Commands, Army TRADOC, and the Army Capability and Integration Center.[123]

House Report for the FY 2018 NDAA

The House of Representative conference report that accompanied the FY 2018 NDAA reiterated the statutory requirement for the conditional designation of the Army Explosive

[121] Pub. L. 115-91, 2017, para. (a).

[122] This date was subsequently amended to October 1, 2025. See Public Law 116-283, Sec. 593, 2021, para. (1).

[123] Pub. L. 115-91 Sec. 582(b), 2017.

Ordnance Disposal Corps basic branch no later than October 1, 2020.[124] The report also reiterated the requirement of the Secretary of the Army to submit a report to Congress certifying that the requirements (bulleted above) noted in the 2018 NDAA have been accomplished no later than September 30, 2020.[125] Additionally, the report noted that the following provisions (to be briefed to Congress by the Secretary of the Army as having been programmed, funded, established and implemented) were not adopted:

- The explosive ordnance disposal (EOD) assistant commandant position in the Army Ordnance School
- EOD personnel talent management
- How the EOD career path ensures and maintains technical proficiency for EOD personnel
- Efforts to improve EOD proponency and advocacy across the Army
- Efforts to enhance synchronization of EOD with other Army missions and functions and retain critical interdependencies
- Annual funding programmed through the future-years defense program and executed during the preceding fiscal year for EOD requirements including personnel, training, and equipment.[126]

Congressman Crawford Testimony before the House Armed Services Committee, April 27, 2017

In his testimony before the House Armed Services Committee (HASC), Congressman Rick Crawford supported the following organizational and governance changes for Army EOD:

- The establishment of a permanent Joint EOD Research, Development, and Acquisition program under the supervision of the Under Secretary of Defense, AT&L (as opposed to the Undersecretary of Defense for Policy). Funding for this program would be managed by DTRA
- Limiting any further reduction in the Army's EOD forces
- The establishment of an Army EOD branch headed by a Chief with the rank of Brigadier General (and permission from Congress to exceed the current Army general officer cap)[127]

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[124] House of Representatives, National Defense Authorization Act for Fiscal Year 2018, Conference Report to Accompany H.R. 2810, U.S. Government Publishing Office, Report 115-404, November 9, 2017, sec. 582.

[125] House of Representatives, 2017, sec. 582.

[126] House of Representatives, 2017, p. 795.

[127] Congressman Crawford provides the following justifications for the establishment of an Army EOD Branch: prior EOD capacity cuts and lack of EOD planning impede development of EOD; a lack of general officer and senior officer representation (which exacerbates the capacity cuts and lack of EOD planning); increased deployments; a lack of coordination among the services; and a lack of coordinated, joint EOD research, development, and acquisition.

- The establishment of an Army National Guard EOD Program with authorization for full-time National Guard EOD positions[128]
- The merger of existing U.S. Northern Command (USNORTHCOM) elements into a U.S. Northern Command Joint Task Force for EOD and counter-IED.[129]

FY 2019 NDAA and Related Materials

NDAA

The fiscal year 2019 National Defense Authorization Act established the "Explosive Ordnance Disposal Program."[130] The goal of the EOD Program is to enable the Secretary of Defense to ensure that "close coordination between military departments on matters relating to the explosive ordnance disposal support for commanders of geographic and function combatant commands."[131] With respect to provisions that impact the Army's EOD organization and governance, the legislation required

- the designation of a [DoD] combat support agency to exercise fund management for the DoD-wide program element for EOD research, development, test, and evaluation transactions
- the designation of an Army EOD general officer from the [newly designated] combat support agency to serve as the Chairman of the DoD EOD Program Board
- the Secretary of each military department to assess the needs of their department with respect to EOD and carry out research, development, test, and evaluation activities (including transactions and procurement activities) and, if they deem necessary, to address the department's unique needs (e.g., weapons systems, manned and unmanned vehicles and platforms, cyber and communication equipment, and EOD kits and outfits).

[128] Additionally, in 2017, Congressman Crawford referenced CBRN in relation to the National Guard's Civil Support Teams, stating:

> The National Guard's Civil Support Teams (CST) are the first line of defense for individual states in the instance of a Chemical, Biological, Radiological, or Nuclear threat. However, EOD technicians are a missing and much-needed element. The Caucus recommends a National Guard EOD Program which will authorize full time National Guard EOD positions enabling the National Guard to provide 24/7 EOD support to protect our Nation. This will also allow EOD technicians transitioning out of the active component, who currently have limited options, to transition into the National Guard.

[129] See Congressman Rick Crawford, 2017.

[130] Public Law 115-232, John S. McCain National Defense Authorization Act for Fiscal Year 2019, Section 311, Explosive Ordnance Disposal Defense Program, August 13, 2018.

[131] Pub. L. 115-232, Sec. 311, 2018.

Congressman Crawford Testimony before the House Armed Services Committee, April 11, 2018

In his testimony before the HASC, Congressman Rick Crawford supported the following organizational and governance changes which affect Army EOD:

- The establishment of a joint EOD Research, Development, and Acquisition program under the supervision of the Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs (including a defense-wide program element on EOD RDA under DTRA and performed by a Joint Program Executive Officer for EOD)
- The establishment of an EOD Intelligence Program within DoD (to ensure close, continuous coordination between the Intelligence Communty and military departments)
- Authorization for a pilot program to enhance bomb squad capability support of U.S. border security operations
- Authorization for a pilot program for Active Guard Reserve EOD qualified soldiers for the Army National Guard's planning and response to support civil authorities
- Requiring the Secretary of Defense to provide a plan to Congress to merge USNORTHCOM elements into USNORTHCOM's joint task force for EOD and counter-IED. The task force would have an EOD qualified commander who would ensure, among other aspects, the successful integration of military EOD forces with state and local public safety bomb squads.[132]

FY 2020 NDAA and Related Materials

NDAA

The fiscal year 2020 National Defense Authorization Act amended certain sections of the FY 2019 NDAA, thereby amending 10 U.S.C. § 2284 ("Explosive Ordnance Disposal Program"). Most notably, the amendments removed reference to the [EOD] Joint Program Executive Office and removed the provision to designate a combat support agency to exercise fund management for the DoD-wide program element for EOD research, development, test, and evaluation transactions. Specifically for the Army, the amendment re-designated the Army EOD general officer to serve as the ***co***-Chairman of the DoD EOD Program Board.[133]

House Report for the FY 2020 NDAA

Within the House Report accompanying the FY 2020 NDAA, the HASC noted the technical changes to 10 U.S.C. § 2284 ("Explosive Ordnance Disposal Program") and the elimination of the requirement from the FY 2019 NDAA to designate a combat support agency for EOD. The HASC also noted their concern that the expertise of current EOD personnel was not adequately

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[132] See Congressman Rick Crawford, 2018.

[133] Public Law 116-92, National Defense Authorization Act for Fiscal Year 2020, Section 1052, Explosive Ordnance Defense Disposal Program, December 20, 2019.

being accessed or utilized by the Defense Intelligence Enterprise and Intelligence Community to provide combatant commanders with the required intelligence they need to "identify, combat, and deter violent extremism and other asymmetric threats."[134]

FY 2021 NDAA and Related Materials

NDAA

The fiscal year 2021 National Defense Authorization Act further amended certain sections of the FY 2018, 2019 and 2020 NDAAs, thereby amending 10 U.S.C. § 2284 ("Explosive Ordnance Disposal Program").[135] The relevant amendment that may affect or impact the Army's EOD organization and governance are as follows:

- Responsibility for the overall DoD EOD Program was transferred from "an" Assistant Secretary of Defense to the Assistant Secretary of Defense for Special Operations and Low Intensity Conflict (ASD/SOLIC).
- The requirement for the Secretary of Defense, in coordination with the secretaries of the other military departments, to report to Congress regarding
  - the establishment and organization of the DoD EOD Program
  - an assessment of the feasibility and advisability of designating a Joint Program Executive Officer for EOD that would rotate between the Army, Navy, and Air Force
  - an assessment of the feasibility and advisability of designating the Director of DTRA as the manager for a DoD-wide program element for EOD research, development, test, and evaluation transactions.[136]
- The October 1, 2020 date for the establishment of an Army EOD basic branch (as per the FY 2018 NDAA) was amended to October 1, 2025. Additionally, the due date of the report to be submitted by Secretary of the Army to certify requirements of the Army EOD program was changed from September 30, 2020 to September 30, 2025.[137]
- Designating the position title of the EOD Army general officer noted in the FY 2018 NDAA to be the "EOD commandant (chief of explosive ordnance disposal)."[138]
- Adding the following certifying requirement for the Army EOD program (for the report to be submitted no later than September 30, 2025):

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[134] House of Representatives, National Defense Authorization Act for Fiscal Year 2020, Report of the Committee on Armed Services, House of Representatives on H.R. 2500 Together with Additional and Dissenting Views, Report 116-120, June 19, 2019, sec. 1042, p. 218 and Title XVI, p. 289.

[135] Pub. L. 116-283, 2021.

[136] Pub. L. 116-283, Sec. 352, 2021.

[137] These requirements are delineated in the FY 2018 NDAA. See Pub. L. 115-91, Sec. 582(b), 2017; Pub. L. 116-283, Sec. 593, 2021.

[138] Pub. L. 116-283, Sec. 593, 2021. As described previously, the FY 2018 NDAA, at Section 582(b), required the Army to establish an EOD qualified general officer position within five years of the enactment of the 2018 NDAA on December 12, 2017 (i.e., no later than December 12, 2023).

> The explosive ordnance disposal commandant (chief of explosive ordnance disposal) had determined whether explosive ordnance disposal soldiers have the appropriate skills necessary to support missions of special operations forces (as identified in section 167(j) of title 10, United States Code). Such skills may include airborne, air assault, combat diver, fast roping insertion and extraction, helocasting, military free-fall, and off-road driving.[139]

House Report for the FY 2021 NDAA

The House of Representative conference report that accompanied the FY 2021 NDAA reiterated the statutory amendments (to the FY 2018, 2019, and 2020 NDAAs) listed above.[140] However, the report also noted that the following provision, which had been included in the House version of the FY 2021 NDAA bill was not adopted: "amend section 167(k) of title 10, United States Code, by adding explosive ordnance disposal to the list of special operations activities."[141]

FY 2022 NDAA and Related Materials

NDAA

The fiscal year 2022 National Defense Authorization Act made enacted no substantive sections related to the Army's EOD organization or governance.[142]

House Resolution 4350

The House of Representatives version of the FY 2022 NDAA, House Resolution 4350, included several EOD related amendments to 10 U.S.C. § 2284 ("Explosive Ordnance Disposal Program") that did not end up being enacted in the final version of the NDAA signed into law. The proposed amendments not enacted that would have affected Army EOD organization and/or governance included

- the designation of an EOD joint program executive officer for the EOD program
- the assignment of the Director of DTRA to manage the Defense-wide program element funding for the EOD program
- the designation by the Secretary of the Navy of an explosive ordnance disposal qualified admiral officer to serve as a co-chair of the EOD program

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[139] Pub. L. 116-283, Sec. 593, 2021.

[140] House of Representatives, William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, Conference Report to Accompany H.R. 6395, Report 116-617, December 3, 2020, Secs. 352 and 593.

[141] House of Representatives, 2020, p. 1757. We note that 10 U.S.C. § 167(k) lists ten special operations activities—"Direct action" through "Such other activities as may be specified by the President of Secretary of Defense." The House amendment would have added, "(10) Explosive ordnance disposal" and renumbered the section accordingly.

[142] Pub. L. 117-81, National Defense Authorization Act for Fiscal Year 2022, December 27, 2021.

- the designation by ASD/SOLIC of a Deputy Assistant Secretary of Defense for Special Operations and Combating Terrorism as the co-chair of the EOD program[143]
- the designation by the Secretary of the Army of an Assistant Secretary of the Army as "the key individual responsible for developing and overseeing policy, plans, programs, and budgets, and issuing guidance and providing direction on the explosive ordnance disposal activities of the Army"[144]
- the inclusion of "explosive ordnance disposal" as a special operations activity contained in 10 U.S.C. § 167(k) ("Special Operations Activities")[145]
- transfer of the 20th CBRNE Command to Army Special Operations Command within USSOCOM (to be called "EOD Command").
  - The Secretary of the Army shall select a commander of the EOD command that shall be a major general or higher (and have EOD qualifications).
  - The EOD command shall be located at Fort Bragg, NC.
  - Not later than 30 days after the date of enactment of the NDAA, the Secretary of the Army shall transfer to the EOD command
    - five explosive ordnance disposal groups
    - one sustainment brigade.
  - The Secretary of the Army shall ensure that the EOD Command achieves early operational capability no later than 90 days after the enactment of the NDAA and achieves full operational capability no later than one year after enactment of the NDAA.
  - Consistent with this transfer, the Secretary of the Army shall treat explosive ordnance disposal as a special operations activity.
  - "Explosive ordnance disposal activities" shall mean "activities relating to the detection, defeat, disposal, and analysis of explosive ordnance, including: (1) gaining access to anti-access and arial denial munitions; (2) preventing detonation signals via electromagnetic spectrum; (3) identifying manufactured and improvised explosive ordnance, including nuclear, biological, and chemical ordnance; (4) rendering-safe, recovering, exploiting, transporting, and safely disposing of explosive ordnance; and(5) gathering and analyzing technical intelligence with respect to explosive ordnance."[146]

[143] House Resolution 4350, National Defense Authorization Act for Fiscal Year 2022, March 1, 2022, Sec. 377. See also the individual amendment, as offered by Congressman Rick Crawford, *Amendment to Rules Committee Print 117-13: Offered by Mr. Crawford of Arkansas*, September 10, 2021.

[144] House Resolution 4350, 2022, Sec. 598.

[145] House Resolution 4350, 2022, Sec. 598.

[146] House Resolution 4350, 2022, Sec. 918, See also the individual amendment, as offered by Congressman Rick Crawford, September 10, 2021.

Joint Explanatory Statement

On December 5, 2021, Congress issued a Joint Explanatory Statement to Accompany the National Defense Authorization Act for Fiscal Year 2022.[147] This statement describes several amendment proposals referenced in the House's proposed version of the NDAA bill (i.e., House Resolution 4350). These proposals were not adopted in the final version of the FY 2022 NDAA. They are as follows:

- The inclusion of "explosive ordnance disposal" as a special operations activity contained in 10 U.S.C. § 167(k) ("Special Operations Activities")[148]
- Directs the Secretary of Defense to submit a report to Congress no later than April 30, 2022, which shall describe the feasibility and advisability of the following:
  - The assignment of the Director of DTRA to manage the Defense-wide program element funding for the EOD program
  - The designation by the Secretary of the Navy of an explosive ordnance disposal qualified admiral officer to serve as a co-chair of the EOD program
  - The designation by ASD/SOLIC of a Deputy Assistant Secretary of Defense for Special Operations and Combating Terrorism as the co-chair of the EOD program
  - Amending section 167(k) of title 10, United States Code, to include "Explosive ordnance disposal" in special operations activities
  - The designation by the Secretary of the Army of an Assistant Secretary of the Army as the key individual "responsible for developing and overseeing policy, plans, programs, and budgets, and issuing guidance and providing direction" on the explosive ordnance disposal activities of the Army
  - Designation EOD as a basic branch of the Army
  - Transfer of the 20th CBRNE Command to Army Special Operations Command within USSOCOM.[149]

[147] United States Congress, Joint Explanatory Statement to Accompany the National Defense Authorization Act for Fiscal Year 2022, December 5, 2021.

[148] United States Congress, 2021, pp. 67–68.

[149] United States Congress, 2021, pp. 67–69.

Abbreviations

ARNG	Army National Guard
ATP	Army Techniques Publication
CBRNE	chemical, biological, radiological, nuclear, explosives
BCT	Brigade Combat Team
BOG:Dwell	deployment-to-dwell
CBRN	chemical, biological, radiological, and nuclear
COE	Center of Excellence
DSCA	defense support of civil authorities
DMDC	Defense Manpower Data Center
DoD	Department of Defense
DoDD	Department of Defense Directive
EOD	explosive ordnance disposal
EODIMS	Explosive Ordnance Disposal Information Management System
ERAA	equivalent Regular Army availability
FAVAR	factor-augmented vector autoregression
FFRDC	federally funded research and development center
FM	Field Manual
FORSCOM	U.S. Army Forces Command
FY	fiscal year
GPF	general purpose forces
IED	improvised explosive device
INDOPACOM	U.S. Indo-Pacific Command
JFKSWCS	John F. Kennedy Special Warfare Center and School
JTF	joint task force
LSCO	large-scale combat operations
MEB	Maneuver Enhancement Brigade
MOB:Dwell	mobilization-to-dwell
MOS	military occupation specialty
MP	Military Police
MSCOE	Maneuver Support Center of Excellence
NCO	noncommissioned officer
NDAA	National Defense Authorization Act
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
PCA	principal component analysis

POTUS	President of the United States
RA	Regular Army
ROA	rule of allocation
SFG	Special Forces Group
SFG(A)	Special Forces Group (Airborne)
SOF	special operations forces
TAA	Total Army Analysis
TAPDB	Total Army Personnel Database
TDA	Table of Distribution and Allowance
TOE	Tables of Organization and Equipment
TRADOC	U.S. Training and Doctrine Command
TTHS	trainees, transients, holdees, and students
U.S.C.	U.S. Code
USACAPOC	U.S. Army Civil Affairs and Psychological Operations Command
USARPAC	U.S. Army Pacific
USASOC	U.S. Army Special Operations Command
USMC	U.S. Marine Corps
USNORTHCOM	U.S. Northern Command
USSOCOM	U.S. Special Operations Command
UXO	unexploded ordnance
VAR	vector autoregression
VIP	Very Important Person
WfF	warfighting function
WMD	weapons of mass destruction

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