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COUNTERPROLIFERATION: LESSONS FROM HISTORY**

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**NAVAL
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MONTEREY, CALIFORNIA

THESIS

**SPECIAL OPERATIONS FORCES AND
COUNTERPROLIFERATION: LESSONS FROM
HISTORY**

by

Kyle J. Thompson

December 2018

Thesis Advisor:
Second Reader:

Tristan Volpe
Ian C. Rice

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**SPECIAL OPERATIONS FORCES AND COUNTERPROLIFERATION:
LESSONS FROM HISTORY**

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Major, United States Army
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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

Considering the significant consequences of nuclear proliferation, this thesis asserts that historical case studies yield lessons learned that inform the suitability of Special Operations Forces' (SOF) role within counterproliferation efforts that can help guide development of SOF counterproliferation-related missions. The important aspects of each case form the basis of the evaluation: the agility of SOF in relation to the success of the mission being examined. In other words, if the conditions enabling an organization's agility are present, an organization is more likely to be successful in its counterproliferation role. To determine cogent lessons from SOF's history informing the suitability of its role in counterproliferation, the thesis begins with a survey of SOF characteristics. Next, a historical analysis of two representative case studies was evaluated to judge the success of the operations and adherence to SOF principles and concepts. Both cases highlight that understanding the threat and attacking proliferation networks can be enhanced with coordination across SOF organizations internally and through partnerships fostered by engagement of United States SOF abroad. Qualities of increased familiarity with counterproliferation, consistent communication with weapons specialists, and coordination through security cooperation are present in the studies and can be applied to contemporary pathway defeat efforts.

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LIST OF ACRONYMS AND ABBREVIATIONS

CWMD	Countering Weapons of Mass Destruction
DoD	Department of Defense
DSG	Defense Strategic Guidance
JP	Joint Publication
NDS	National Defense Strategy
NMS	National Military Strategy
NSS	National Security Strategy
QDR	Quadrennial Defense Review
SOE	Special Operations Executive
SOF	Special Operations Forces
UCP	Unified Command Plan
USSOCOM	United States Special Operations Command
USSTRATCOM	United States Strategic Command
WMD	Weapons of Mass Destruction

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I. INTRODUCTION

A. RESEARCH QUESTION

Given the United States Special Operations Command's (USSOCOM) new authority to coordinate Department of Defense (DoD) countering weapons of mass destruction (CWMD) efforts, Special Operations Forces (SOF) are potentially positioned to assume a more impactful role within that mission.¹ Special Operations Forces can use the transition of this authority from United States Strategic Command to USSOCOM as an opportunity to evaluate its role. To fully capitalize on this opportunity—and to avoid mistaking reorganization for progress—it is important to answer the following questions: What lessons can be learned from SOF's history to inform the suitability of this role, and how can SOF leverage these lessons to enhance performance? Understanding the capabilities and opportunities involved in SOF's role in CWMD is imperative to avoid the mistake of confusing reorganization for progress.

B. LITERATURE REVIEW

Few scenarios in the contemporary imagination conjure the catastrophic images of a nuclear detonation. Control of nuclear weapons and the technology to develop them remains an important security issue. Since 1945, over 125,000 nuclear warheads have been produced.² In total, the current number of weapons is decreasing because Russia and the United States are reducing their stockpiles.³ However, nuclear weapons remain “integral to [the] conception of national security” in the minds of those that possess—or hope to possess—these weapons.⁴ Current scholarship includes examination (to varying degrees) of the problem of counterproliferation and SOF's potential role in countering weapons of

¹ Daniel M. Gerstein, “SOCOM Will Soon Lead the Pentagon's Anti-WMD Efforts. Here's What It Still Needs,” *Defense One*, February 10, 2017, <https://www.defenseone.com/ideas/2017/02/socom-will-soon-lead-pentagons-anti-wmd-efforts-heres-what-it-still-needs/135331/>.

² Hans M. Kristensen and Robert S. Norris, “Global Nuclear Weapons Inventories, 1945–2013,” *Bulletin of the Atomic Scientists* 69, no. 5 (September 2013): 77, <https://doi.org/10.1177/0096340213501363>.

³ Kristensen and Norris, 77.

⁴ Kristensen and Norris, 77.

mass destruction. First, literature examines the perceptions of counterproliferation across different agencies, its importance, and endorsement of interdiction and application of counterproliferation. Second, some literature suggests that USSOCOM is uniquely suited to synchronize counterproliferation efforts. Third, current scholarship intertwines with military doctrine to broadly associate SOF's role in implementation of CWMD initiatives.

1. Counterproliferation and Countering Weapons of Mass Destruction

Existing arguments address counterproliferation of WMD and perceive “counterproliferation” differently. Indeed, diverging definitions and understandings of “counterproliferation” within government can complicate intergovernmental cooperation and international relations. As Harald Muller and Mitchell Reiss explain, “Almost as soon as the concept entered the strategic lexicon... questions arose as to what it really meant.”⁵

a. Interpretations

There is a degree of variation in how many scholars have interpreted counterproliferation. Some view “counterproliferation” as interchangeable with “nonproliferation,” others suggest counterproliferation connotes a more aggressive stance.⁶ The definitions, influenced by perception, outlook, and policy, continue to be a topic for debate and examination. Muller and Reiss capture the evolving characterization of counterproliferation across two presidential administrations, beginning with the Bush administration in 1989:

[Counterproliferation is] [t]o fight proliferation in all its aspects, by means ranging from the control of dual-use technology to the preventive destruction of WMD facilities [...] Counterproliferation as offensive military actions to eliminate the WMD capabilities, including the production facilities, of proliferators [...] Counterproliferation is nonproliferation as performed by the Department of Defense [...]

⁵ Harald Muller and Mitchell Reiss, “Counterproliferation: Putting New Wine in Old Bottles,” *The Washington Quarterly* 18, no. 2 (1995): 143-54.

⁶ Harald Muller and Mitchell Reiss; Carlson, Lonnie. “Countering WMD Journal.” *Countering WMD Journal*, no. 15 (Summer/Fall 2017): 41–52; Margaret Kosal. “CWMD Strategy Gap: Capacities, Capabilities, and Collaboration.” *Prism* 7, no. 3 (July 1, 2018): 51–67.

Counterproliferation involves preparing U.S. forces to fight and survive in a WMD environment.⁷

As of October 2014, the Department of Defense defines counterproliferation as, “Those actions taken to reduce the risks posed by extant weapons of mass destruction to the United States, allies, and partners.”⁸ This definition suggests a less reactive DoD stance than Muller and Reiss’s most recent definition (conveyed in 1995), spurred by concern surrounding existing weapons, “transnational threat organizations,” and technological advances by “rogue regimes.”⁹

The Department of Defense’s position reflects more recent arguments that discuss countering weapons of mass destruction, which “includes activities that span the range of ‘prevent,’ ‘shape,’ ‘contain,’ and ‘respond’ concepts.”¹⁰ Likewise, much of the literature focusing on CWMD supports the application of counterproliferation efforts across a range of activities and adversaries’ statuses. Margaret Kosal argues that foremost, “Denying the acquisition and use of WMD by hostile states, sub-state actors, or non-state actors as part of nonproliferation and counterproliferation... are desired strategic ends.”¹¹ It is naturally more advantageous to interrupt the development of a weapon than to attempt to compel a WMD-armed state or manage the consequences of WMD use by an adversary. The prospect of eliminating such a capability would “inevitably span all phases of conflict from prewar engagement through combat operations to postwar reconstruction,” representing significant investment and risk.¹² Current scholarship appears to agree that CWMD

⁷ Muller and Reiss, 144-145.

⁸ Joint Chiefs of Staff, *Joint Publication 1-02, Dictionary of Military and Associated Terms* (Washington, DC: Joint Chiefs of Staff, 2016), 54.

⁹ United States. Office of the President, *National Security Strategy of the United States of America*, (Washington, DC: The White House, 2017), <https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf>, 25.

¹⁰ Margaret Kosal, “CWMD Strategy Gap: Capacities, Capabilities, and Collaboration,” *Prism* 7, no. 3 (July 1, 2018): 51–67, 52; Department of Defense, *Department of Defense Strategy for Countering Weapons of Mass Destruction*, (Washington, DC: Department of Defense, June 1, 2014), <https://doi.org/10.21236/ADA603433>.

¹¹ Kosal, 52.

¹² Rebecca K. Hersman, *Eliminating Adversary Weapons of Mass Destruction: What’s at Stake?* (Washington, DC: National Defense University, Center for the Study of Weapons of Mass Destruction, December 1, 2004), <https://doi.org/10.21236/ADA446028>.

encompasses “activities centered on securing and destroying material and delivery systems; but, more broadly, it also entails activities intended to address the associated programs, infrastructure, and expertise” represented in counterproliferation.¹³

b. The Importance of CWMD and Counterproliferation

As United States national security strategies shift focus over time, CWMD has remained a high-stakes priority. The Department of Defense Strategy for Countering Weapons of Mass Destruction “seeks to ensure that the United States and its allies and partners are neither attacked nor coerced by actors with WMD.”¹⁴ The strategy “outlines three end states: no new WMD possession, no WMD use, and minimization of WMD effects.”¹⁵ Additionally, it outlines four objectives:

These objectives are to reduce incentives to pursue, possess, and employ WMD; to increase the barriers to WMD acquisition, proliferation, and use; to manage WMD risks emanating from hostile, fragile, or failed states and safe havens; and to deny the effects of current and emerging WMD threats through layered, integrated defenses.¹⁶

These goals are reflected in numerous “national and department-level strategy documents, to include the National Security Strategy (NSS); the National Military Strategy (NMS); the National Defense Strategy (NDS); the Defense Strategic Guidance (DSG); and Quadrennial Defense Review (QDR).¹⁷ CWMD literature and briefings by government officials consistently underline the “complex, fluid, shifting national security environment.”¹⁸

While the intergovernmental and international interpretations of counterproliferation are varied, the standardized definitions of CWMD-related terms are closely

¹³ Kosal, 52.

¹⁴ Department of Defense, “Department of Defense Strategy for Countering Weapons of Mass Destruction,” v.

¹⁵ Department Of Defense, v.

¹⁶ Department Of Defense, v.

¹⁷ Kosal, 51.

¹⁸ “Press Briefing with DARPA Director Arati Prabhakar from the Pentagon,” U.S. Department of Defense, April 24, 2018, <https://content.govdelivery.com/accounts/USDOD/bulletins/782dcf>.

related. CWMD, counterproliferation, and pathway defeat definitions are noticeably similar. Recalling counterproliferation’s definition as “those actions taken to reduce the risks posed by extant weapons of mass destruction to the United States, allies, and partners,” one can see how it closely reflects the definition of CWMD.¹⁹ That definition described CWMD as:

Efforts against actors of concern to curtail the conceptualization, development, possession, proliferation, use, and effects of WMD, related expertise, materials, technologies, and means of delivery.²⁰

Comparing the two side-by-side helps to show that CWMD is a broader description of “efforts” whereas counterproliferation focuses on “actions.” Pathway defeat’s definition also uses the word actions. The DoD defines pathway defeat as:

Deliberate actions against actors of concern and their networks to delay, disrupt, destroy, or otherwise complicate the conceptualization, development, possession, and proliferation of WMD, related expertise, materials, technologies, and means of delivery.²¹

With pathway defeat, the difference lies in the emphasis on networks and implies a preventative stance in the term itself. Pathway defeat represents a proactive approach oriented on networks, while counterproliferation is less specific. The modest increase in specificity of these terms within DoD is perhaps an indication of increased attention to the hazards of proliferation.

c. Supporting Interdiction and Application

While the complexity of CWMD and counterproliferation is widely acknowledged, discussions surrounding the mechanics of achieving the policy are comparatively scarce. Understandably, there are security constraints and compartmentalization issues to consider. However, there is space for discourse surrounding policy implementation (e.g., weighing capabilities and limitations) that remains largely untouched – even with these

¹⁹ Joint Chiefs of Staff, *Joint Publication 1-02, Dictionary of Military and Associated Terms*, 54.

²⁰ Department of Defense, *Department of Defense Strategy for Countering Weapons of Mass Destruction*, 17.

²¹ Department of Defense, 17.

considerations. As the literature generally favors counterproliferation over later stage WMD-elimination, examination of the opportunities and threats inherent in implementation for such an important issue is prudent. However, current scholarship admits that relatively indefinite recommendations for implementation point to a need for further research to explore potential solutions and develop innovative applications for existing capabilities.²² To the extent possible, academic examination should inform compartmented and classified decisions supporting policy. An unclassified study gleaning lessons learned from historic SOF missions may well contribute to academic discourse that supports these decisions.

2. Special Operations

Current literature on special operations suggests that USSOCOM is uniquely suited to synchronize counterproliferation efforts for the Department of Defense.²³

a. Responsibility for Counterproliferation Coordination

While the United States Strategic Command (USSTRATCOM) previously held the responsibility for counterproliferation coordination, Dan Lamothe, a reporter for *The Washington Post*, reported that counterproliferation competed for prioritization within that command:

One senior defense official who has worked on the mission to counter weapons of mass destruction said that Strategic Command “has rarely invested the necessary political and intellectual capital” to push for issues pertaining to countering weapons of mass destruction. The official attributed that to the Pentagon not having U.S. forces designated

²² Margaret Kosal, “CWMD Strategy Gap: Capacities, Capabilities, and Collaboration”; Gerstein, “SOCOM Will Soon Lead the Pentagon’s Anti-WMD Efforts. Here’s What It Still Needs.”; See also Erik J. Stanfield, “Lost in Translation: Lessons from Counterterrorism for a More Proactive Weapons of Mass Destruction Strategy” (master’s thesis, Naval Postgraduate School, 2017), 59, <https://calhoun.nps.edu/handle/10945/55539>.

²³ Dan Lamothe, “Special Operations Command Takes a Lead Role in Countering Weapons of Mass Destruction,” *Washington Post*, accessed August 25, 2018, <https://www.washingtonpost.com/news/checkpoint/wp/2016/12/23/special-operations-command-takes-a-new-lead-role-countering-weapons-of-mass-destruction/>.

specifically to countering weapons of mass destruction and an “overall low sense of priority as compared to its other missions.”²⁴

As another functional combatant command much like USSTRATCOM, USSOCOM has a transregional portfolio, with accompanying partnerships, but, unlike USSTRATCOM, has assigned forces capable of being trained and tasked to support counterproliferation initiatives in coordination with geographic combatant commands.²⁵ Admiral William McRaven highlighted USSOCOM’s connection to “strategy to capability development to resourcing” in *SOCOM 2020*.²⁶ This connection was translated into responsibility for coordination of CWMD, as noted by Director Vayl Oxford, of the Defense Threat Reduction Agency, a partner of USSOCOM in CWMD efforts:

As the Coordinating Authority for CWMD, SOCOM integrates DoD plans and intelligence priorities to support operations against state and non-state networks that possess or seek WMD, and executes global operations against the same—in coordination with other Combatant Commands.²⁷

While USSOCOM has many strengths to draw from, it must avoid the “pitfalls that hindered [US]STRATCOM in executing the counter-WMD mission” by balancing competing priorities.²⁸ Additional authorities come with additional expectations, including investment and attention to counterproliferation – both represent criticisms levied against USSTRATCOM prior to coordination authority’s transfer to USSOCOM.²⁹

²⁴ Lamothe.

²⁵ Joint Publication 1, *Doctrine of the Armed Forces of the United States*, explains the Unified Command Plan (UCP), as approved by the President, delineates functional combatant commands (II-2). Functional combatant commands are responsible for a – typically – global security issue necessitating single responsibility (II-7). The functional combatant command is charged with coordinating operations related to their specified responsibilities (JP-1, II-7).

²⁶ U.S. Special Operations Command, *U.S. Special Operations Command: Forging the Tip of the Spear* (MacDill Air Force Base, FL: United States Special Operations Command, 2017), i.

²⁷ Vayl Oxford, “Reviewing Department of Defense Strategy Policy and Programs for Countering Weapons of Mass Destruction (CWMD) for Fiscal Year 2019” (statement of Mr. Vayl Oxford, Director, Defense Threat Reduction Agency), House Armed Services Committee, Subcommittee on Emerging Threats and Capabilities (2018), <https://docs.house.gov/meetings/AS/AS26/20180322/108018/HHRG-115-AS26-Wstate-OxfordV-20180322.pdf>.

²⁸ Gerstein, “SOCOM Will Soon Lead the Pentagon’s Anti-WMD Efforts. Here’s What It Still Needs.”

²⁹ Gerstein.

b. Transition to SOCOM

The nature of special operations and SOF made USSOCOM's selection as the coordinating authority for counterproliferation appealing. Charters and Tugwell outline special operations as

Small-scale, clandestine, of an unorthodox and frequently high-risk nature, undertaken to achieve significant political or military objectives in support of foreign policy.³⁰

Colin Gray praised the above "superior definition" while underlining the strategic utility and reliability of SOF:

That utility reposes most essentially in two qualities, economy of force and expansion of strategic choice. In the most general of terms, special operations forces (SOF) offer the prospect of a favorably disproportionate return on military investment. Moreover, SOF provide the possibility of a range of precisely conducted military activities more extensive than that reliably feasible for regular warriors conducting regular operations.³¹

In 2006, James Kiras provided a more recent definition in *Special Operations and Strategy*:

Unconventional actions against enemy vulnerabilities in a sustained campaign, undertaken by specially designated units, to enable conventional operations and/or resolve economically politico-military problems at the operational or strategic level that are difficult or impossible to accomplish with conventional forces alone.³²

The Department of Defense's definition also captures applicable traits that overlap with what DoD would need to leverage for CWMD:

Operations requiring unique modes of employment, tactical techniques, equipment and training often conducted in hostile, denied, or politically sensitive environments and characterized by one or more of the following: time sensitive, clandestine, low visibility, conducted with and/or through

³⁰ Charters, D. and Tugwell, M. "Special Operations and the Threats to United States Interests in the 1980s," in Barnett, F.R., Hugh Tovar, B., and Shultz, R.H. (eds) *Special Operations in US Strategy*, Washington, DC: National Defense University Press, 9.

³¹ Gray, 2, 23.

³² James D. Kiras, *Special Operations and Strategy: From World War II to the War on Terrorism*, (London: Routledge, 2006), 5.

indigenous forces, requiring regional expertise, and/or a high degree of risk.³³

The expectation that USSOCOM's unique capabilities, organizations, and people are equal to the task of confronting this difficult undertaking is behind the decision to transition coordinating authority to USSOCOM. Historically, SOF organizations have repeatedly tackled intricate problems. The above arguments regarding the nature of special operations support the contention that special operations forces are suitable to confront counterproliferation issues. Additionally, lessons from historic special operations challenges may be cogent today as well as informing the heretofore limited conversation regarding how SOF can best integrate and coordinate CWMD efforts.

Matching the consequences of WMD proliferation with the capabilities of USSOCOM was complemented by the reasoning that a single, unified command should confront the possible transregional nature of adversaries' proliferation efforts.³⁴ Underscoring its importance, President Obama stated, "No threat poses as grave a danger to our security and well-being as the potential use of nuclear weapons."³⁵ In August 2016, he followed Secretary Ash Carter's recommendation and modified the Unified Command Plan to transfer responsibility to USSOCOM.³⁶

3. Special Operations Forces Capabilities

While there is no shortage of literature covering a range of special operations missions and capabilities, literature focusing on how special operations fits within counterproliferation initiatives is scarce. Thomas K. Adams writes that SOF's role in counterproliferation as described in unclassified documents is "too vague to really allow

³³ Joint Chiefs of Staff, *Joint Publication 3-05, Special Operations*, 2014, GL-11.

³⁴ Hersman, *Eliminating Adversary Weapons of Mass Destruction*.

³⁵ Barack Obama, "National Security Strategy" (Washington, DC: White House, 2015), https://obamawhitehouse.archives.gov/sites/default/files/docs/2015_national_security_strategy_2.pdf.

³⁶ "Presidential Memorandum—Delegation of Authority of Unified Command Plan Responsibilities," White House, August 5, 2016, <https://obamawhitehouse.archives.gov/the-press-office/2016/08/05/presidential-memorandum-delegation-authority-unified-command-plan>; Lamothe, "Special Operations Command Takes a Lead Role in Countering Weapons of Mass Destruction."

anyone to focus resources on it.”³⁷ He continues by relaying that “there is an idea that, by accepting many missions, SOF demonstrates its fitness and remains competitive... for a share of the diminishing military budget.”³⁸ This unfavorable view accompanies the inclusion of counterproliferation in SOF’s core activities as “intended to make a political-policy point that the US government opposes proliferation of weapons of mass destruction and will use ‘military power’ to do so, when and if appropriate.”³⁹ These points are well taken, but the utility of examining SOF’s role remains a consideration if the credibility of the above policy point is to be established. It is also reasonable to evaluate SOF’s role and how existing capabilities can be used for this mission, even if there are critiques to address.

DoD aligns SOF with counterproliferation initiatives in recognition of the exceptional nature of the counterproliferation problem (i.e. the strategic impact of proliferation/counterproliferation). DoD codifies this in *Joint Publication 3-05 Special Operations* within the list of 12 special operations core activities:

- Direct action
- Special reconnaissance
- Countering weapons of mass destruction
- Counterterrorism
- Unconventional warfare
- Foreign internal defense
- Security force assistance
- Hostage rescue and recovery

³⁷ Thomas K. Adams, *US Special Operations Forces in Action: The Challenge of Unconventional Warfare* (London: Routledge, 1998), 303, <http://ebookcentral.proquest.com/lib/ebook-nps/detail.action?docID=1024696>.

³⁸ Adams, 303.

³⁹ Adams, 303.

- Counterinsurgency
- Foreign humanitarian assistance
- Military information support operations
- Civil affairs operations⁴⁰

JP 3-05 continues by outlining:

USSOCOM supports [Geographic Combatant Commands] through technical expertise, materiel, and special teams to complement other CCMD teams that locate, tag, and track WMD; DA in limited access areas; helping build partnership capacity to conduct CWMD activities; MISO to dissuade adversaries from reliance on WMD; and other specialized capabilities.⁴¹

While this selection briefly describes different SOF activities that support CWMD, it is worth noting that both *JP 3-05* and *Joint Publication 3-40 Countering Weapons of Mass Destruction* were published two years prior to President Obama's update to the Unified Command Plan and USSOCOM's assumption of its current role. The chronology indicates that USSOCOM's supporting role in terms of providing trained forces to geographic combatant commanders has matured into the additional responsibility of coordinating these activities. As of this writing, the doctrine – the common language and understanding within DoD – informing this additional aspect of USSOCOM's role is still evolving. Published CWMD-related doctrine predates SOCOM's assumption of its coordinating authority.⁴² Given the recentness of the change, the academic body of work exploring the subject is also thin. For example, how is the coordinating dynamic strengthening or hindering the SOF capabilities relative to CWMD? SOF's ability to build partner capacity to increase the efficacy of CMWD efforts may be more resonant under this dynamic but has not been examined. United States Special Operations Command prominently displays the SOF Truths on their website:

⁴⁰ Joint Chiefs of Staff, *Joint Publication 3-05, Special Operations*, x.

⁴¹ Department of Defense, II-7.

⁴² Joint Chiefs of Staff, *Joint Publication 3-40, Countering Weapons of Mass Destruction*; Department of Defense, *Department of Defense Strategy for Countering Weapons of Mass Destruction*.

- Humans are more important than Hardware
- Quality is better than Quantity
- Special Operations Forces cannot be mass produced
- Competent Special Operations Forces cannot be created after emergencies occur
- Most Special Operations require non-SOF assistance⁴³

These truths are referenced in doctrine that describes to SOF's potential to shape "potential environments," gain a "deep understanding of local conditions," and to build partner capacity.⁴⁴ While it is justifiable to continue to stress these aspects of SOF, it is also beneficial to address the application of these capabilities to CWMD to support more comprehensive efforts in this area. As Adams notes, counterproliferation as a core task is intended to reflect policy and represents a willingness apply military force. This will manifest in supporting tactical tasks and operations that will ultimately achieve CWMD objectives. In doing so, these actions would in turn be considered counterproliferation. Linked to an overall approach, they would contribute to pathway defeat. As such, SOF's talents of building partner capacity can also be leveraged to build partnerships within the United States government within USSOCOM and across government agencies to produce synergy and emphasis that the problem has been lacking.

The problem of proliferation will continue to be difficult, but it is not one that should be ignored or marginalized. Merely assigning SOF to a challenging mission is not a panacea. Study remains to be done.

⁴³ "U.S. Army Special Operations Command SOF Truths Page," accessed August 25, 2018, <http://www.soc.mil/USASOCHQ/SOFTruths.html>.

⁴⁴ James B. Linder, "From the Commandant," *Special Warfare* 28, no. 4 (December 2015): 4; Lonnie Carlson, "Preventing Weapons of Mass Destruction Proliferation—Leveraging Special Operations Forces to Shape the Environment," *Counter WMD Journal*, no. 15 (Summer/Fall 2017): 41–52.

4. Current Thinking on Implementation

Many scholars support the implementation of the pathway defeat concept, but there are few discussions that go beyond esoteric, general terms concerning SOF's participation as recommended.⁴⁵ Rediscovering—or discovering—that counterproliferation is an encompassing collection of tasks aimed at achieving potential CWMD objectives would remove the opacity and mystique of counterproliferation as something wholly new within academic discourse. In other words, the objective is what makes a given task characteristically counterproliferation. As such, there is a wide array of SOF tactical tasks and capabilities that can be applied to CWMD goals. The inaccurate notion that there is a completely different menu of essential tasks specific to counterproliferation potentially confounds debate. Injecting historical case studies of SOF operations to achieve CWMD objectives into the academic conversation demonstrates this insight and helps reinvigorate stalled discussion caused by painting with a counterproliferation broad brush.

Recalling DoD's definition of pathway defeat as “activities [that] focus on actions to delay, disrupt, destroy, or otherwise complicate conceptualization, development, possession, and proliferation of WMD” lends itself to this more proactive stance.⁴⁶ Many agencies join academia's assessment with emphasis on “efforts to ‘the left of boom,’ i.e., non-proliferation and arms control.”⁴⁷ While this approach is likely to strike a reader as efficient and sensible, there is a risk in presuming these traits will translate to success without rigorous consideration. Kosal summarizes the disconnect between strategy and multiple phases of CWMD:

While a prevention strategy is laudable and important, the disparity between strategy and the required operational capabilities and capacities needed for securing, interdicting, and eliminating WMD reveals potential gaps that

⁴⁵ Margaret Kosal, “CWMD Strategy Gap: Capacities, Capabilities, and Collaboration”; Lonnie Carlson, “Preventing Weapons of Mass Destruction Proliferation—Leveraging Special Operations Forces to Shape the Environment,” *Countering WMD Journal*, no. 15 (Summer/Fall 2017): 41–52; Hersman, “Eliminating Adversary Weapons of Mass Destruction.”

⁴⁶ Joint Chiefs of Staff, *Joint Publication 3-40, Countering Weapons of Mass Destruction*.

⁴⁷ Margaret Kosal, “CWMD Strategy Gap: Capacities, Capabilities, and Collaboration,” 53.

must be recognized and accounted for to ensure a credible deterrent posture.⁴⁸

Despite the advocacy for proactive efforts, scholarship discussing implementation is often vague and uncritical, which allows for the faulty perception that SOF attributes and activities are automatically optimally translated to these approaches.

Aside from classification constraints and prudent compartmentalization of information, openings to discuss possibilities for SOF's increased effectiveness exist. In 2002, LTC Walter Herd recommended a "global reconnaissance" role for special operations units (specifically, U.S. Army Special Forces) exercised through surrogate forces to gather information in the context of a counterproliferation mission.⁴⁹ More recently in 2016, Colonel Lonnie Carlson compares proliferation pathway defeat to counterterrorism and counternarcotics.⁵⁰ He states that the resident capabilities of network analysis, non-lethal targeting, and non-lethal targeting within SOF should be combined with SOF's ability to "leverage security cooperation activities" to create partners to support WMD pathway defeat.⁵¹ SOF familiar with the nuance of each operational environment must navigate the potentially competing considerations of U.S. and host nation goals. Together, these works wedge the door open for the topic of SOF's role in CWMD, which could be strengthened with historical examples of SOF's capabilities and translated to CWMD efforts emphasizing "early action through pathway defeat, shaping the environment to dissuade actors from pursuing WMD, and cooperating with partners to achieve countering WMD goals."⁵²

⁴⁸ Margaret Kosal, 51.

⁴⁹ Walter M. Herd, *Current Unconventional Warfare Capability Versus Future War Requirements*, (Carlisle Barracks, PA: U.S. Army War College, 2002), 13, <http://www.dtic.mil/dtic/tr/fulltext/u2/a402022.pdf>.

⁵⁰ Carlson, Lonnie, "Countering WMD Journal," 44.

⁵¹ Carlson, Lonnie, 46.

⁵² Department of Defense Washington DC, i.

5. Projected Findings

SOF's attributes and capabilities suggest a compatibility with CWMD while revealing that much of the topic is unexplored in depth. Observations of the WMD elimination mission as "still in its infant stages" also indicate that "support among the services and commands is tenuous, and concepts and capabilities are still lacking."⁵³ This observation can arguably apply to the overall CWMD effort, particularly in the case of SOF integration and coordination, based on the relatively recent change. Additionally, technological changes further lend to the dynamic nature of the situation. According to Oxford, "Rapidly evolving technologies... are both exacerbating existing threats and making WMD... more diffuse and accessible, and not just to nation states."⁵⁴ He continues by agreeing with many others that have noted a threat "comprised of complex global networks that require a shift in our approach to prevent proliferation and use."⁵⁵

While attempting to identify case studies of SOF's role in CWMD is challenging, finding – at least – analogous scenarios that are demonstrative of SOF's attributes and their prospective usefulness to SOF's doctrinal approach to CWMD may be more feasible. Applying observations rooted in historical events to CWMD would enable a beneficial, inductive projection onto the intersection of CWMD and SOF.

The concept of pathway defeat and exploration of SOF experiences in analogous scenarios could prove useful to evaluate SOF's future utility concerning CWMD. Identifying lessons learned from SOF's history can inform and enhance the application of capabilities.

Similar principles and capabilities that led to SOCOM's designation as a desirable coordinator for counterproliferation activities can be examined and compared to historical SOF activities to shed light on the capabilities, limitations, and expectations that policy-makers should understand with respect to SOF's ability to affect the counterproliferation

⁵³ *Are We Prepared? Four WMD Crises That Could Transform US Security* (Washington, DC: National Defense University Press, 2009), 58.

⁵⁴ Oxford, Reviewing Department of Defense Strategy, Policy, and Programs for Countering Weapons of Mass Destruction (CWMD) for Fiscal Year 2019.

⁵⁵ Oxford.

mission. Identifying gaps or opportunities for efficiencies is a worthy goal considering the wide-ranging – and potentially catastrophic – consequences in the realm of CWMD. Likewise, understanding and reinforcing opportunities are important to avoid conflating reorganization with progress. Being aware of a problem’s complexity is necessary, but only underscores it as an issue that bears further, and more intense, scrutiny.

C. APPROACH AND METHODOLOGY

Counterproliferation of nuclear weapons and dual-use material presents an interesting and weighty security problem in which special operations forces are being asked to assume an increasingly central role. To determine cogent lessons from SOF’s history informing the suitability of its role in counterproliferation, research began with a survey of SOF principles and concepts. Next, a historical analysis of two representative case studies was evaluated to judge the success of the operations and adherence to the aforementioned principles and concepts. This heuristic serial case study framework allowed each case to contribute to more generalizable conclusions and interrelationships between cases, and reflected the deliberate evaluation pursued.⁵⁶

The first case examines Operation Gunnerside, the successful Allied sabotage of heavy water production in Norway during World War II. The second case discusses the Alsos Missions, which were U.S. activities aimed at securing nuclear material and scientists while preventing their exploitation by advancing Soviet Forces in the waning days of WWII.

These case studies offer opportunities for inductive observations related to SOF capabilities that can help inform SOF’s role in contemporary counterproliferation pursuits. This inductive approach lends itself to generalization.

⁵⁶ Harry Eckstein outlines the heuristic (meaning “serving to find out”) case study as one method to carry out social science studies. Harry Eckstein, *Regarding Politics: Essays on Political Theory, Stability, and Change* (Berkeley, CA: University of California Press, 1992), 143.

D. SPECIAL OPERATIONS AND HISTORY

We trained hard, but it seemed that every time we were beginning to form up into teams we would be reorganized. Presumably the plans for our employment were being changed. I was to learn later in life that, perhaps because we are so good at organizing, we tend as a nation to meet any new situation by reorganizing; and a wonderful method it can be for creating the illusion of progress while producing confusion, inefficiency and demoralization.

—Charlton Ogburn
author and former military officer⁵⁷

Ogburn, a former military officer with the famed Merrill's Marauders, penned the opening quote to this section for a *Harper's Magazine* article in 1957 as part of his account of the World War II Burma Campaign. In a period of rapidly evolving technologies and expanding roles for USSOCOM and SOF in general, looking to representative historical special operations could serve to ground SOF's adaptations to efficiently confront emerging problems and offer well-informed solutions to emerging problems that are, perhaps, not as new as they may appear. In this way, decision-makers can attempt to avoid the pitfall of mistaking unnecessary reorganization for progress.

Considering the significant consequences of the prospect of proliferation, this thesis asserts that historical case studies yield lessons learned that inform the suitability of SOF's role within counterproliferation efforts that can help guide development of SOF counterproliferation-related missions. The important aspects of each case form the basis of the evaluation: the agility of SOF in relation to the success of the mission being examined. In other words, if the conditions enabling an organization's agility are present, an organization is more likely to be successful in its counterproliferation role. The case studies indicate a positive relationship between SOF's utility relative to counterproliferation stems from the agility these forces are afforded during the conduct of the operation. Trust and effective delegation, organizational coordination, informed initiative, and unique

⁵⁷ Charlton Ogburn, "Merrill's Marauders: The Truth about an Incredible Adventure," *Harper's Magazine*, January 1957, <https://harpers.org/archive/1957/01/merrills-marauders/>.

capabilities form aspects of “agility” that contribute to the degree of success these forces are characteristically capable of achieving, which can be generalized to counterproliferation problems. Conversely, an absence or degradation of agility, represented by these qualities, limits the prospects for success in the same regard.

The historical analysis of each case study will highlight aspects of “agility,” which is defined in Simon Reay Atkinson and James Moffat’s *The Agile Organization* as “an ability of the forces to adapt, to learn, and to change to meet the threats they face.”⁵⁸ Notably, “change” does not always manifest as a tectonic shift in organization structure, but can represent adjustments in authorities, permissions, flattening of communication conventions, coordination protocols, and informed initiative. Agility implies a freedom of action that empowers an organization to adjust their approach to meet mission objectives. In cases where organizations charged with achieving special objectives, agility that included the ability to pursue “the range of actions available” succeeded in the strategically important tasks that were entrusted in them.⁵⁹

Operation Gunnerside and the Alsos Mission will showcase agility’s role in the success of an organization during the conduct of counterproliferation actions and the viability of SOF’s role in pathway defeat through operations exhibiting foundational essential tasks. The salient points of these cases can be applied to contemporary cases as a basis for comparison. There is insight in these historical cases for larger organizations exploring the utility of SOF’s counterproliferation role.

⁵⁸ Simon Reay Atkinson and James Moffat, *The Agile Organization: From Informal Networks to Complex Effects and Agility*, Information Age Transformation Series (Washington, DC: CCRP Publication, 2005), 164.

⁵⁹ Atkinson and Moffat, 126.

II. OPERATION GUNNERSIDE

The German cars went towards Vemork on the road right below us. Nobody must have thought that we would go toward Rjukan. At 0500, we were at Gvepseborg. And we felt great satisfaction when we sat and looked at Vemork and thought of all the commotion we had caused down there.

—Claus Helberg,
Linge Company member⁶⁰

Operation Gunnerside has been hailed as the most successful and important Allied act of sabotage during the Second World War.⁶¹ In 1940, Norwegian commandos trained by the British Special Operations Executive (SOE) raided the Vemork Hydroelectric plant to destroy what was deemed an essential element of Nazi Germany's atomic weapons program. With Norway under German occupation, the Germans took control of the Vemork plant and exploited its status as "the first industrial-scale production site of heavy water in the world."⁶² The plant produced deuterium oxide (more commonly known as "heavy water"), which was critical to the Nazi's strategy for developing an atomic weapon.⁶³ In April 1939, the Nazis began a secret weapons program named "Uranverein," or "Uranium Club," led by prominent German physicists and drawing from "the top scientific minds in Germany."⁶⁴ Among those was Werner Karl Heisenberg, a Nobel laureate in physics.⁶⁵

⁶⁰ "The Vemork Action: A Classic Act of Sabotage," Studies Archive Index, Central Intelligence Agency, Center for the Study of Intelligence, May 8, 2007, https://www.cia.gov/library/center-for-the-study-of-intelligence/kent-csi/vol36no3/html/v36i3a11p_0001.htm.

⁶¹ Ian Dear, *Sabotage and Subversion: The SOE and OSS at War* (Gloucestershire, UK: The History Press, 2016); M. R. D. Foot, *SOE: An Outline History of the Special Operations Executive, 1940-1945*, Illustrated (Penguin Random House, 2014), https://books.google.com/books?id=7x_unAEACAAJ.

⁶² "Operation Gunnerside," Atomic Heritage Foundation, July 28, 2017, <https://www.atomicheritage.org/history/operation-gunnerside>.

⁶³ "The Vemork Action: A Classic Act of Sabotage."

⁶⁴ "Operation Gunnerside," 2.

⁶⁵ "Operation Gunnerside," 2.

The German scientists elected to utilize the rare heavy water molecule as a moderator for their process. A nascent atomic weapon requires numerous components; two materials are particularly difficult to procure—uranium and heavy water.⁶⁶ The Atomic Heritage Foundation summarized deuterium oxide (D₂O, or “heavy water”) in their 2017 article:

Deuterium oxide (D₂O) or “heavy water” is a water molecule made with two deuterium ions rather than two hydrogen ions. Deuterium is an isotope of hydrogen whose nucleus includes a neutron in addition to a proton and electron. This additional neutron causes the deuterium to have a higher molecular weight and thus form “heavy water” when combined with oxygen.⁶⁷

Heavy water’s role as a moderator is to slow the “bombardment of neutrons and control the fission process,” which helps to complete the necessary chain reaction.⁶⁸ While the American program selected comparatively readily available graphite as a moderator, the German scientists chose to work with heavy water – a molecule that exists on at only a “one to 41 million molecule ratio” with regular water.⁶⁹ Uranium production can occur through several means, but at the time, heavy water production was extremely limited, making it a critical vulnerability to the German program.⁷⁰ When German forces captured Norway in 1940, they gained access to existing infrastructure that would satiate their demand for heavy water to support atomic experimentation. Allied leaders regarded the heavy water plant near the town of Rjukan as resting “on the thin line separating victory and defeat.”⁷¹ Allied decision-makers were concerned that Germany could achieve a shift in momentum if the Nazi-sponsored scientists could realize their atomic program’s goals.

⁶⁶ Christian Fossen, “Leif Trondstad: Chemistry Professor in Trondheim and WWII Hero of Telemark,” Norwegian University of Science and Technology, <https://www.ntnu.no/forskning/kjentealumni/tronstad>.

⁶⁷ “Operation Gunnerside,” 2.

⁶⁸ “Operation Gunnerside,” 2.

⁶⁹ “Operation Gunnerside,” 6.

⁷⁰ Fossen, “Leif Trondstad: Professor and WWII Hero.”

⁷¹ Simon Worrall, “Inside the Daring Mission That Thwarted a Nazi Atomic Bomb,” *National Geographic News*, June 5, 2016, <https://news.nationalgeographic.com/2016/06/winter-fortress-neal-bascomb-heroes-of-telemark-nazi-atomic-bomb-heavy-water/>.

The members of the commando team responsible for this successful mission were natives of Norway's resistance against Nazi occupation. These commandos received training from the SOE in Great Britain and constituted "Company Linge," the Norwegian branch of SOE activities.⁷² Their collaboration with the SOE to target the Vemork plant adheres to Colin Gray's definition of special operations through economy of force and "expansion of strategic choice" to the Allies and the important operation leaves little doubt of its counterproliferation objective.⁷³ Thus, Operation Gunnerside is a principal example of a direct action mission that aligned with a pathway defeat approach and accomplishment of CWMD objectives.

A. HISTORICAL SUMMARY

When Major Leif Tronstadt saw that the suicide capsules had been distributed, which offered a last resort to the commandos in the event of capture, he said, "I cannot tell you why this mission is so important, but if you succeed, it will live in Norway's memory for a hundred years."⁷⁴ The commandos of Operation Gunnerside were following an unsuccessful attempt by British commandos, under the auspices of Operation Freshman, to destroy the heavy water production facilities months before, and would be joining the Norwegian advance force that had infiltrated into extremely difficult environmental conditions in October 1942.⁷⁵ The SOE and members of Company Linge optimized their organization's agility and substantially increased the prospects of mission accomplishment despite daunting obstacles. First, Major (and Professor) Tronstadt's involvement in the planning of the mission contributed substantial scientific expertise, local resistance experience, and familiarity with the Norsk-Hydro Plant. Second, team members were informed to the extent that the mission's compartmentalization would allow, providing them with enough background information and familiarity with the mission's importance

⁷² "Operation Gunnerside, 3."

⁷³ Gray, "Handfuls of Heroes on Desperate Ventures: When Do Special Operations Succeed?" 2, 23.

⁷⁴ Timothy J. Jorgensen, "Operation Gunnerside: The Norwegian Attack on Heavy Water That Deprived the Nazis of the Atomic Bomb," *Scientific American*, February 23, 2018, <https://www.scientificamerican.com/article/operation-gunnerside-the-norwegian-attack-on-heavy-water-that-deprived-the-nazis-of-the-atomic-bomb/>.

⁷⁵ Jorgensen, 3.

to facilitate disciplined initiative. Third, empowered subordinate leaders made effective adjustments to the existing plan to take advantage of on-the-ground knowledge and updated assessments of the situation. Last, a specially selected, resilient, and well-trained force was able to overcome significant known and unforeseen obstacles to destroy their target, achieving notable disruptions in the Nazi atomic program.

1. Tronstadt's Involvement

Tronstadt's connection to the Vemork Plant's heavy water production, the Norwegian Resistance, and SOE provided invaluable expertise and intimate knowledge essential to enable effective planning and execution of the raid. In 1933, Professor Tronstadt's research led to a collaboration with Jomar Brun, Norsk Hydro's director of its hydrogen electrolysis plant.⁷⁶ Together, the two designed Vemork's heavy water production facilities, which would yield approximately 100 grams of heavy water by 1935 after adapting existing processes at the plant originally designed to create ammonia for fertilizer.⁷⁷ With Germany's invasion and rapidly expanding grip in Norway beginning in April 1940, Tronstadt urged his students at the Norwegian Institute of Technology to muster at their assigned mobilization locations while he proceeded to Oslo to report for duty per his standing orders in the Norwegian Corps of Weaponry.⁷⁸ While en route he discovered that Oslo had already been taken, so he began organizing resistance fighters in the familiar terrain of the Dovre Mountains.⁷⁹ When the Allied forces withdrew and Norwegian forces capitulated in late 1940, Tronstadt resumed instructing at Trondheim's university while joining the underground resistance forces in their continued struggle against Nazi forces.⁸⁰ His reporting became an important aspect of British insight into

⁷⁶ "Operation Gunnerside," 2.

⁷⁷ Jorgensen, "Operation Gunnerside"; Fossen, "Leif Trondstad."

⁷⁸ Fossen, "Leif Trondstad: Professor and WWII Hero."

⁷⁹ Worrall, "Inside the Daring Mission That Thwarted a Nazi Atomic Bomb"; Fossen, "Leif Trondstad."

⁸⁰ Worrall, "Inside the Daring Mission That Thwarted a Nazi Atomic Bomb"; Fossen, "Leif Trondstad."

German activity in Norway and observations proved useful in informing future planning in which he was later involved.

Notably, Leif Tronstadt began anonymously reporting German interest in heavy water to British intelligence via his connections in the resistance and the Vemork Plant.⁸¹ Specifically, Tronstadt was able to discover that the Germans were examining ways to significantly increase production of the scarce heavy water.⁸² As 1941 drew to a close, “output... exceeded previous production rates by 100 kg more per month and totaled four kilograms per day.”⁸³

Tronstadt continued to evade capture by the Gestapo by traveling to Britain via Sweden and joined the Allied Technical Council and assisted the SOE in building the technical and intelligence picture that contributed to Allied assessment of German intentions regarding their atomic program.⁸⁴ Early on, he contributed to intelligence that enabled the successful aerial bombing of a Nazi missile-testing site near the German port of Peenemunde and was able to round out British assessments of Vemork’s ability to advance the German program and its vulnerabilities.⁸⁵ Because of his involvement with the construction of the plant’s heavy water production, Tronstadt understood that a bombing raid was unlikely to produce a favorable initial result. The facilities were in a subterranean level of the plant, sheltered by numerous floors of steel-reinforced concrete.⁸⁶ Secondly, he wanted to limit the risk of civilian casualties in the nearby village of Rjukan and Norwegian workers at the plant that would arise from an inaccurate aerial bombing raid.⁸⁷ Jomar Brun, Tronstadt’s partner in the construction of the heavy water facilities, continued to work at the plant and was also exposed to risk from such a raid. Brun, likewise, was

⁸¹ “Operation Gunnerside,” 3; Worrall, “Inside the Daring Mission That Thwarted a Nazi Atomic Bomb.”

⁸² Jorgensen, “Operation Gunnerside”; Worrall, “Inside the Daring Mission That Thwarted a Nazi Atomic Bomb.”

⁸³ “Operation Gunnerside,” 2.

⁸⁴ “The Vemork Action.”

⁸⁵ Fossen, “Leif Trondstad”; “The Vemork Action.”

⁸⁶ Jorgensen, “Operation Gunnerside,” 4.

⁸⁷ Jorgensen, 4.

providing valuable intelligence and attempting to subvert ongoing heavy water production to the extent that Winston Churchill requested his exfiltration to Britain, underscoring the attention the issue of heavy water production received.⁸⁸ While American generals continued to push for a bombing raid, British SOE authorities were convinced of the efficacy of a commando raid, in no small part by Tronstadt's assessments and recommendations. The SOE's interpretation of his information expanded options, enabling a change to the Allied default of a mass bombing raid and offered the expansion of choice to decision-makers. The SOE raid would represent a more agile option stemming from Tronstadt's credibility and the SOE's assessment. Although both bombing and ground operations were successively undertaken to halt heavy water production, special operations proved more effective than air raids.

2. Information and Agility

The Company Linge commandos that would constitute the combined raiding force of Operations Grouse (later named "Swallow" by the SOE) and Gunnerside would have enough information and familiarity with the mission's importance to facilitate appropriate initiative and inform their decisions on the ground. To be sure, the team members did not have "perfect information." They did not have a total appreciation for the high stakes of the mission in which they were involved. Gunnerside's team leader Joachim Ronneberg said in a 2017 interview, "The first time I heard about atom bombs and heavy water was after the Americans dropped the bomb on Hiroshima and Nagasaki. Then we started to understand our raid."⁸⁹ Despite the delayed appreciation for the enormity of the specter of atomic destruction, Tronstadt was able to convince the commandos of the mission's importance for Norway and the war effort, and inform them of the significance of the plant as an important component of the Germans' weapons research.⁹⁰ Ronneberg himself

⁸⁸ "The Vemork Action."

⁸⁹ Andrew Higgins, "WWII Hero Credits Luck and Chance in Foiling Hitler's Nuclear Ambitions," *New York Times*, December 21, 2017, sec. World, <https://www.nytimes.com/2015/11/21/world/europe/wwii-hero-credits-luck-and-chance-in-foiling-hitlers-nuclear-ambitions.html>; "Operation Gunnerside."

⁹⁰ Higgins, "WWII Hero Credits Luck and Chance in Foiling Hitler's Nuclear Ambitions"; Jorgensen, "Operation Gunnerside."

recruited each member of the team individually and informed them of the inherent risks, skills required, and “great importance attributed to its success.”⁹¹

Operation Grouse, an eventual component of Operation Gunnerside, was able to apply the appreciation for the severity of the mission’s consequences to inform their extended advanced force operation. Intended as the advance force for an earlier 40-man British commando assault force (known as Operation Freshman) targeting the plant, the five member team infiltrated ahead of the main force to conduct reconnaissance and prepare landing sites for the assault force’s gliders.⁹² However, the Operation Freshman commandos encountered “bad weather and communications issues” that led to the crash landing of Freshman’s gliders far from their intended landing zone – challenges that are to be expected in high risk, high payoff missions with narrow windows of opportunity.⁹³ This ultimately led to the destruction of the initial assault force by way of the crash itself or by subsequent execution of crash survivors by Gestapo forces invoking Adolf Hitler’s Commando Order.⁹⁴ The Gestapo determined the target of the costly raid to be Vemork and German forces strengthened the garrison billeted at the plant.⁹⁵ Thus, SOE deliberated between a proposed bombing run and another ground assault. Meanwhile, Grouse resiliently remained clandestine for months in the harsh conditions of the Norwegian winter with no guarantee that another mission would be forthcoming to provide the opportunity for an operation like Gunnerside to succeed.⁹⁶ With the residual possibilities of excessive collateral damage and doubtful effectiveness, a bombing raid was again forestalled in favor of another commando raid – aided by Grouse.

⁹¹ Thomas Gallagher, *Assault in Norway: Sabotaging The Nazi Nuclear Program* (Guilford, CT: Lyons Press, 2010), 41.

⁹² “Operation Gunnerside.”

⁹³ “Operation Gunnerside.”

⁹⁴ Gallagher, *Assault in Norway*, 37. The “Commando Order” read: “Because of the growing number of cases in which planes are used for the landing of saboteurs, and the great damage the saboteurs have done, I hereby order that crews of sabotage planes are to be shot at once by the troops isolating them.” In this case, the Gestapo questioned surviving troops extensively before subjecting them to a firing squad. (pg. 37-38)

⁹⁵ Gallagher, 38.

⁹⁶ Gallagher, 39.

3. Effective Adjustments

The SOE empowered subordinate leaders to make effective adjustments to existing plans to capitalize on developing information and updated assessments of the situation. In the wake of Operation Freshman's costly defeat, Colonel John Wilson, head of the Norwegian section of the SOE, requested to take over planning for the mission to sabotage heavy water production at Vemork.⁹⁷ He favored alterations to the infiltration plan and empowered Tronstadt and Ronneberg to select their own team.⁹⁸ Adjusting to German measures to strengthen security at the plant against a robust assault force after Operation Freshman, the SOE and Company Linge would attempt to use a small force and stealth to find seams to exploit during the operation.

Six Norwegians from Company Linge constituted the small element codenamed Operation Gunnerside, which would combine with the Grouse element (newly designated as "Swallow," in keeping with the avian theme SOE had established for them) already on the ground.⁹⁹ The smaller Gunnerside team would infiltrate by parachute – rather than via glider – and use their collectively strong skiing ability to aid their movements during infiltration and movement to the plant itself.¹⁰⁰ Prior to departing Britain, SOE planners (including Tronstadt) and team members identified three potential access methods to their target:

1. Descend from the mountains that dominated the plant's location, which was an area the Germans had laced with mines
2. Cross a single lane suspension bridge, which was heavily-guarded
3. Maneuver through a gorge adjacent to the plant, fording a nearly frozen river, and ascend a 500 foot cliff¹⁰¹

⁹⁷ Gallagher, 39.

⁹⁸ Gallagher, 40.

⁹⁹ "Operation Gunnerside," 4.

¹⁰⁰ Gallagher, *Assault in Norway*, 39–40.

¹⁰¹ "Operation Gunnerside," 5.

After Ronneberg led his team out of the aircraft carrying them over Norway under parachute and through a “cover of snowfall at around midnight on February 16, 1943,” the team consolidated with members of Operation Grouse and updated their understanding of the situation.¹⁰² Members of Grouse expressed their reservations regarding the first two infiltration options and argued for a line of attack taking them through the gorge.¹⁰³ The day prior to the attack, the combined team sent Claus Helberg as a scout to confirm the difficult route through the gorge was actually accessible.¹⁰⁴ Once confirmed the combined Gunnerside team proceeded according to their updated plan.

The Linge Company members passed through the gorge undetected and exhibited additional examples of adjusting effectively. They penetrated an unguarded segment of the perimeter near a railroad track they identified through Grouse’s intelligence gathering using wire shears Ronneberg obtained on his own at a hardware in Britain while on leave from training.¹⁰⁵ Ronneberg had previously decided that the British military-issued hand saw would, in his words, “have taken too much time, made too much noise, and alerted Nazi guards.”¹⁰⁶

Once at the building housing the heavy water facilities, the explosives teams sought entry. According to Helberg, there was “some difficulties” getting into the factory.¹⁰⁷ With the doors locked, only two men were able to find the previously identified access tunnel.¹⁰⁸ Ronneberg recalled:

Getting inside I was quite certain that the rest of the party would follow me, but only one chap came. The other ones hadn’t found the entrance to the

¹⁰² “Operation Gunnerside,” 4.

¹⁰³ “The Vemork Action.”

¹⁰⁴ “The Vemork Action.”

¹⁰⁵ Higgins, “WWII Hero Credits Luck and Chance in Foiling Hitler’s Nuclear Ambitions”; “The Vemork Action”; “Operation Gunnerside.”

¹⁰⁶ “Operation Gunnerside,” 5.

¹⁰⁷ “The Vemork Action.”

¹⁰⁸ “The Vemork Action.”

tunnel. Therefore we decided we would have to do it ourselves and started laying out the charges.¹⁰⁹

As the first two began emplacing their explosives, a team member who was unable to locate the same tunnel “decided to act on his own” and broke a window to gain access to crawl inside to assist his teammates.¹¹⁰ Together the men cut the fuses to a minimal time of 30 seconds to mitigate the risk of the explosives being removed before they could destroy their target.¹¹¹ The explosives were measured and emplaced well – they successfully destroyed the heavy water machinery without excessively damaging the rest of the building, which afforded the team the opportunity to put considerable distance between them and the plant before the destruction was detected by the garrison.¹¹² Helberg noted that the team was able to observe the factory from a distant ridgeline before their actions had been discovered. He recalled they “felt great satisfaction when we sat and looked at Vemork and thought of all the commotion we had caused down there.”¹¹³ These individual decisions underscore the imperative impressed upon the team early on by Tronstadt and the SOE planners, and highlight the individual initiative under dynamic circumstances during the course of the mission.

4. Specially Selected

The commandos of Operation Gunnerside were specially selected, well-trained, well-prepared, and agile, allowing them to overcome significant obstacles involving the success of their mission. Their raid destroyed the heavy water production facility, associated supplies, 500 kilograms of the valuable deuterium oxide itself, and decommissioned the plant for months.¹¹⁴ This success started with their recruitment and training in Britain following the invasion of Norway. They prepared and “completed grueling training in Scotland that featured night exercises like climbing mountains, fording

¹⁰⁹ “Operation Gunnerside.”

¹¹⁰ “The Vemork Action.”

¹¹¹ “The Vemork Action.”

¹¹² “The Vemork Action.”; “Operation Gunnerside.”

¹¹³ “The Vemork Action.”

¹¹⁴ “Operation Gunnerside,” 5.

rivers, and camping outdoors for weeks.”¹¹⁵ Subsequently, the men of Operation Grouse were compelled to subsist on severely limited supplies, hunting wild reindeer and otherwise living off the land in the frigid temperature of the mountain plateau Hardangervidda.¹¹⁶ This endurance and skill contributed to the success of Operation Gunnerside; the intelligence the combined Gunnerside element garnered from Grouse’s time on the ground added to their adaptability.

The selected group’s training also aided the unit’s ability to complete an arduous planned withdrawal while being pursued by entire formations of German soldiers. The Hardangervidda Plateau could, according to Norwegian legend, “grow cold enough, quickly enough, to freeze flames in a fire.”¹¹⁷ According to Neal Bascomb’s work *The Winter Fortress*, these conditions could result in death for an underprepared individual in two hours.¹¹⁸ Yet, the Gunnerside explosives team was able to ski 200 miles to Sweden to exfiltrate occupied Norway while none of the other members were killed or permanently captured.¹¹⁹

B. EFFECTS AND ANALYSIS

The mission effectively disrupted the heavy water production, an effect the subsequent air bombardments complemented. While it is true that the raid did not permanently halt heavy water production, it significantly impeded progress and halted production until May 1943.¹²⁰ During his inspection of the mangled heavy water facility, German General Nikolaus von Falkenhorst assessed that the attackers were “clearly military,” and that the attack was a “most splendid coup.”¹²¹

¹¹⁵ “Operation Gunnerside.”

¹¹⁶ Neal Bascomb, *The Winter Fortress: The Epic Mission to Sabotage Hitler’s Atomic Bomb* (Boston: Houghton Mifflin Harcourt, 2016), 87; “Operation Gunnerside,” 4.

¹¹⁷ Bascomb, *The Winter Fortress*, 87.

¹¹⁸ Bascomb, 87.

¹¹⁹ “Operation Gunnerside”; “The Vemork Action: A Classic Act of Sabotage.” Claus Helberg was briefly captured by German forces, but was able to escape while en route to a detention facility.

¹²⁰ “Operation Gunnerside.”

¹²¹ Bascomb, *The Winter Fortress*, 213.

It is likely the raid had a political and allocation impact within the Nazi Regime. Albert Speer, Reich Minister of Armaments and War Production, wrote in his memoir:

On the suggestion of the nuclear physicists we scuttled the project to develop an atom bomb by the autumn of 1942, after I had again queried them about deadlines and been told that we could not count on anything for three or four years. The war would certainly have been decided long before then. Instead I authorized the development of an energy-producing uranium motor for propelling machinery. The navy was interested in that for its submarines.¹²²

While Speer's asserted that the program was scuttled prior to the raid, heavy water production nevertheless continued. While the Germans were unwilling to "invest in a Manhattan-style nuclear program," a breakthrough with the fission process aided by heavy water may well have reversed the ebbing interest amongst Nazi decision makers.¹²³ Kurt Diebner, director of the Nazi nuclear program, was told by his superiors, "You get a heavy water reactor going, you prove to us you can do it, and we will shower you with money."¹²⁴ Unexpectedly, Operation Freshman may have infused more momentum into the German program. The failed attack signaled that both sides were exploring similar types of atomic research.¹²⁵ Given that the Allies risked a hazardous mission to destroy means to a German atomic weapon, it indicated that the Allies were also pursuing an atomic weapons program.¹²⁶ Operation Freshman's failure made Operation Gunnerside's success more significant in this sense. Gunnerside further complicated German researchers' frustrations with heavy water's "limited effectiveness in comparison to graphite," and contributed to bureaucratic friction and the dearth of "support for the German atomic bomb program amongst scientists, the government, and military."¹²⁷

¹²² Albert Speer, *Inside the Third Reich*, trans. Clara Winston and Richard Winston (New York: The MacMillan Company, 1969), 227, http://archive.org/details/Inside_the_Third_Reich_Albert_Speer.

¹²³ Worrall, "Inside the Daring Mission That Thwarted a Nazi Atomic Bomb."

¹²⁴ Worrall.

¹²⁵ Gallagher, *Assault in Norway*, 38.

¹²⁶ Gallagher, 38.

¹²⁷ "Operation Gunnerside," 2.

Operation Gunnerside is properly viewed as a representative success in the context of an extended sabotage campaign targeting the German atomic program. Allied bombings and ground-based special operations cooperated to halt heavy water production, but special operations were more effective in halting the program. Over the course of a sixteen-month span, the Allies conducted four separate attacks against the German heavy water production capability: Operation Freshman, Operation Gunnerside, the American bombing raid, and the sabotage and sinking of a ferry transporting the last of the heavy water produced in Norway to Germany. The bombing raid following Operation Gunnerside prompted the Nazis to attempt to move the heavy water and necessary equipment to Germany.¹²⁸ This showed the Germans were willing to continue heavy water production despite the air raid. However, Gunnerside and the sabotage of the ferry struck, reduced, and eventually destroyed the German capability directly—including the “last supplies of heavy water from the Vemork plant.”¹²⁹

Operation Gunnerside succeeded in part due to the agility afforded to the Company Linge and the SOE. While the overall sabotage effort was closely tracked by senior government leaders, they did not unnecessarily constrain or interfere with mission planning, or impose of artificial requirements. For example, senior leaders did not insist on a bombing raid in the wake of Operation Freshman, but provided the SOE planners with latitude to recommend the optimum course of action. Yet, the direct action of the raid could not have been accomplished without adequate coordination across the SOE and the combined operations of a multinational force. This highlights the cooperation and range necessary to effect mission accomplishment, especially when one considers Operation Gunnerside as a single mission within an ultimately successful campaign that progressed to stop the German program. Although, for example, Winston Churchill monitored Jom Brun’s reporting from Vemork and wanted him to come to Britain, the SOE’s Norwegian section led the planning for the mission while benefiting from Brun’s intelligence reports and detailed information about the plant’s layout.¹³⁰ The combination of Tronstadt

¹²⁸ “Operation Gunnerside.”

¹²⁹ “Operation Gunnerside.”

¹³⁰ Gallagher, *Assault in Norway*, 39.

technical and local expertise, adequate information sharing and coordination, subordinate unit empowerment, and rigorous selection and training provided the commandos of Operation Gunnerside and the SOE with the agility necessary to execute a successful counterproliferation mission. These efforts ultimately influenced the abandonment of the German program and supports the notion that an agile organization is suited to a counterproliferation role within a larger government effort.

III. THE ALSOS MISSION

The fact that the German atom bomb was not an immediate threat was probably the most significant single piece of intelligence developed throughout the war. Alone, that information was enough to justify Alsos.

—Colonel Boris Pash,
Alsos Mission Commander¹³¹

The Alsos Mission carries considerably less notoriety than Operation Gunnerside, but Alsos played an important part in the Allies understanding of German capabilities and the shaping of the postwar nuclear capability situation. After American scientists successfully achieved a chain reaction using a uranium pile – a requisite stepping stone to the development of an atomic weapon – the atomic bomb was seen as a reachable goal.¹³² As a corollary, there was a powerful assumption that the German government, who had leading physicists, vast resources, and a head start would already be proportionately farther down the path to a weapon than the Americans.¹³³ Uranium research in Germany had begun two years prior to the U.S.¹³⁴

U.S. Lieutenant General Leslie Groves, director of the Manhattan Project, recognized the Allied invasion of Europe via Italy as an opportunity to develop intelligence concerning German capabilities.¹³⁵ This conception developed into the Alsos (Greek for “grove,” resembling the Director’s name) Mission, which was a “cooperative effort by the Army’s G-2 (Intelligence) department, General Groves’ Manhattan District, the U.S. Navy, and Dr. Vannevar Bush’s Office of Scientific Research and Development.”¹³⁶ Alsos’ mission would be to acquire nuclear-related material, research, organizational information,

¹³¹ Richard Rhodes, *The Making of the Atomic Bomb* (New York: Simon and Schuster, 1986), 610.

¹³² Samuel A. Goudsmit, *Alsos* (Woodbury, NY: AIP Press, 1996), 3.

¹³³ Goudsmit, 3.

¹³⁴ Goudsmit, 3.

¹³⁵ David Irving, *The German Atomic Bomb: The History of Nuclear Research in Nazi Germany* (New York: Simon and Schuster, 1967), 220.

¹³⁶ Irving, 220.

and intelligence related to Germany's capabilities and progress.¹³⁷ General Groves reported to General George Marshall that Alsos "would form the nucleus for similar activity in other enemy and enemy-occupied countries when circumstances permit."¹³⁸

The Alsos Mission's role in counterproliferation shows how an agile element with adequate authority and coordinating capability can support strategic goals. Alsos broke the British monopoly on nuclear intelligence from the Allied perspective, and endeavored to stem the flow of vital nuclear intelligence to the Soviet Union as it ascertained where German progress stood. Additionally, the nature of Alsos' composition, unique skills, and responsibility for providing strategic choice, as well as the disproportionate pay off the mission was able to achieve, justifies its consideration as a special operations mission and its inclusion in consideration for applicable lessons for special operations forces. The combined expertise of military personnel and scientists speaks to Alsos' own special capabilities.

A. HISTORICAL SUMMARY

In 1939, German physical chemist Paul Harteck wrote a letter to the Reich Ministry of War to advise it of the potential for a weapon that would be "many orders of magnitude more powerful than conventional ones" and would provide "that country which makes first use of it an unsurpassable advantage."¹³⁹ The German atomic weapons program started soon after the notification. Albert Einstein's letter warning President Franklin Roosevelt of prospective nuclear weapons' capabilities five months after the German program was underway.¹⁴⁰ During the war, German advances in technology seemed to indicate that they were capable of the intense investment and resourcing required to build an atomic bomb.¹⁴¹

¹³⁷ John D. Hart, "The ALSOS Mission, 1943–1945: A Secret U.S. Scientific Intelligence Unit," *International Journal of Intelligence and CounterIntelligence* 18, no. 3 (October 2005): 516, <https://doi.org/10.1080/08850600590911990>.

¹³⁸ Irving, *The German Atomic Bomb: The History of Nuclear Research in Nazi Germany*, 220.

¹³⁹ "Manhattan Project: Atomic Rivals and the Alsos Mission, 1938-1945," U.S. Department of Energy, Office of History and Heritage Resources, n.d., <https://www.osti.gov/opennet/manhattan-project-history/Events/1942-1945/rivals.htm>.

¹⁴⁰ "Manhattan Project: Atomic Rivals and the Alsos Mission, 1938-1945."

¹⁴¹ "Manhattan Project: Atomic Rivals and the Alsos Mission, 1938-1945."

To determine Germany's nuclear capabilities and prevent proliferation of nuclear material and information, the U.S. established the Alsos Mission unit. Toward the end of World War II, the Alsos Mission successfully provided the U.S. forces with valuable intelligence, prevented the proliferation of nuclear material, and technical knowledge through the organization's agility and composite expertise. Several factors favorably influenced Alsos' organizational agility. First, Alsos had abundant resources at its disposal and authority to conduct their mission. Second, the Alsos Mission demonstrated a capacity to adapt based on lessons from previous operations. Third, unit coordinated effectively with other elements, services, and government agencies to achieve their objectives.

1. Resources and Authority

Alsos was able to maximize its agility and effects because it was afforded adequate resources and authority. With support from Secretary of War Henry Stimson, General Marshall formally established the Alsos Mission and stressed the unique allocation of scientists to delve into the aspects of the German weapon program:

It is proposed to send at the proper time to allied occupied Italy a small group of civilian scientists assisted by the necessary military personnel to conduct these investigations. Scientific personnel will be selected by Brig. Gen. Leslie R. Groves with the approval of Dr. (Vannevar) Bush and military personnel will be assigned by the Asst. Chief of Staff, G-2, from personnel available to him....This group would form the nucleus for similar activity in other enemy and enemy-occupied countries when circumstances permit.¹⁴²

The initial military component for the mission was comprised of "thirteen military personnel, interpreters, and six scientists."¹⁴³ The mission was commanded by Lieutenant Colonel Boris Pash, who was complemented by Dr. Samuel Goudsmit, the chief of the scientific section.¹⁴⁴ All team members were familiarized with Allied research programs and were capable of interrogating and collecting atomic scientific information, but were

¹⁴² "Alsos Mission," Atomic Heritage Foundation, accessed October 3, 2018, <https://www.atomicheritage.org/history/alsos-mission>.

¹⁴³ "Alsos Mission."

¹⁴⁴ "Alsos Mission."

compartmentalized from the Manhattan Project itself.¹⁴⁵ For example, Dr. Goudsmit was a theoretical physicist who worked at the University of Michigan and had previously been employed at the Massachusetts Institute of Technology Radiation Laboratory, but he was not involved with the American atomic weapon program.¹⁴⁶ According to Goudsmit, “I was expendable and if I fell into the hands of the Germans they could not hope to get any major bomb secrets out of me.”¹⁴⁷ Lieutenant Colonel Pash had an intense reputation as an intelligence officer. General Groves selected him specifically because “his thorough competence and great drive had made a lasting impression on me.”¹⁴⁸ The rest of the team also reflected the “high level of support” the unit would receive, including backing from the Counterintelligence Corps and a variety of U.S. Army field units on an ad hoc basis.¹⁴⁹ Alsos exhibited remarkable freedom to maneuver within friendly lines and gathered support from other Allied units to occasionally operate behind enemy positions.¹⁵⁰

2. Adaptation

The Alsos Mission continued to improve their effectiveness and demonstrated agility by applying lessons from previous operations to current missions. There were essentially two phases of the Alsos Mission, with supporting operations taking place in each phase. Phase I occurred in the context of the invasion of the Italian peninsula and push toward Rome.¹⁵¹ The Alsos Mission’s role began in December 1943 and did not yield much intelligence, partially due to tenacious German defensive operations and adequate time for the defenders to destroy exploitable information.¹⁵² The result was a lackluster report with

¹⁴⁵ “Alsos Mission.”

¹⁴⁶ Rhodes, *The Making of the Atomic Bomb*, 607.

¹⁴⁷ Goudsmit, *Alsos*, 15.

¹⁴⁸ Rhodes, *The Making of the Atomic Bomb*, 607.

¹⁴⁹ Hart, “The ALSOS Mission, 1943–1945,” 524.

¹⁵⁰ “Alsos Mission.”

¹⁵¹ “About Alsos: The Original Alsos Mission,” ALSOS: Digital Library for Nuclear Issues, 1996, <http://alsos.wlu.edu/mission.aspx>.

¹⁵² “About Alsos: The Original Alsos Mission.”

little conclusive intelligence.¹⁵³ Tellingly, the circulation of the report was markedly limited and “couched in guarded language.”¹⁵⁴

Apart from the operational difficulties, Alsos members identified a “lack of sufficient qualified scientists” and an “imprecise division of responsibility.”¹⁵⁵ There were also apprehensions about the proficiency of some civilian scientists and their usefulness during interrogations.¹⁵⁶ Generally, detainees were questioned by specially trained Counterintelligence Corps personnel, but incorporating civilian scientists was sometimes necessary.¹⁵⁷ To clarify roles, guidelines were developed for questioning before every mission in order to meet mission-specific requirements.¹⁵⁸ Alsos II, the second phase of the mission, followed the Allied invasion of Normandy and the advance through France into Germany in 1944 and 1945.¹⁵⁹ For this phase, the staffing for the scientists was substantially increased, outnumbering the permanently assigned military officers by slightly more than four-to-one.¹⁶⁰ This was meant to create a degree of redundancy to insure nuanced scientific information did not slip by undetected and also to increase the potential range or coverage of mission requirements.¹⁶¹

3. Coordination

The Alsos Mission’s authority assisted its coordination with other elements to achieve operational goals – even against the backdrop of competing demands characteristic of ongoing combat operations. Their coordination was undoubtedly facilitated by a letter from Secretary of War Stimson held by Lieutenant Colonel Pash. The letter ordered everyone to whom it was presented to accord the Pash “every facility and assistance” to

¹⁵³ Irving, *The German Atomic Bomb*, 221.

¹⁵⁴ Irving, 221.

¹⁵⁵ “About Alsos: The Original Alsos Mission.”

¹⁵⁶ Hart, “The ALSOS Mission, 1943–1945,” 511.

¹⁵⁷ Hart, 511.

¹⁵⁸ Hart, 511.

¹⁵⁹ “About Alsos: The Original Alsos Mission.”

¹⁶⁰ “About Alsos: The Original Alsos Mission.”

¹⁶¹ Irving, *The German Atomic Bomb*, 244.

support his mission.¹⁶² Thus, Alsos was able to draw resources from surrounding forces, and it appears they did so cooperatively and diplomatically. There is no evidence of significant friction between Alsos and adjacent units – at least none that was worth documenting. It seems unlikely that if any friction did occur, it was not detrimental or lasting. Accounts of General Groves’ reservations concerning the codename of Alsos and the first impressions of British intelligence officers regarding an Alsos staff officer are reflected in the historical record, so it is unlikely that friendly unit discord had any impact or was noteworthy. To the contrary, the relatively small unit had essentially “unlimited transport resources” and applied these means audaciously.¹⁶³ Within a few months of the invasion of Normandy and Alsos’ landing in France, their headquarters was flooded with documents from every scientific intelligence target available.¹⁶⁴ Their reports from this period also reflect consideration of “a broad range and large quantity of disparate information.”¹⁶⁵ According to author David Irving, Alsos “reigned supreme” among the “body-snatchers and document-sifters of the Second World War,” and comparatively, “the British had nothing like it.”¹⁶⁶ The results of Alsos are a testimony to its agility in 1944 and 1945.

B. EFFECTS AND ANALYSIS

Despite the lack of notoriety the Alsos Mission receives compared to Operation Gunnerside and other significant Allied operations, Alsos was successful in accurately assessing German atomic capabilities, providing material benefit to the Manhattan Project, and preventing the loss of valuable information and scientists to the Soviets. The collective Alsos operations definitively established that Germany would not be able to employ an atomic bomb against the Allies, they successfully prevented the capture of key German scientists (and in many cases coopted them), seized stores of uranium and nuclear material,

¹⁶² Irving, 243.

¹⁶³ Irving, 243.

¹⁶⁴ Irving, 243.

¹⁶⁵ Hart, “The ALSOS Mission, 1943–1945,” 525.

¹⁶⁶ Irving, *The German Atomic Bomb*, 243.

and acquired a myriad of research documents regarding nuclear technology.¹⁶⁷ The uranium ore confiscated during an operation near Toulouse was immediately sent to the American facility in Oak Ridge, Tennessee, and processed for Little Boy's manufacture.¹⁶⁸ Other stores of the material were located in Germany, Belgium, and France, illustrating Alsos' reach. The unit captured, questioned, and secured the cooperation of leading German scientists like Werner Heisenberg, Max von Laue, and Otto Hahn by tracking them to a remote resort in the Black Forest region.¹⁶⁹ Over 70 target locations were visited (some behind enemy lines and others through securing the surrender of small towns).¹⁷⁰ These locations included:

Including sixteen universities, ten commercial organizations, ten medical research institutes, five veterinary institutions, four concentration camps where medical experiments had taken place, four miscellaneous medical laboratories, and two chemical weapon-related sites. Alsos Mission investigators prepared a total of approximately 400 scientific reports.¹⁷¹

The numbers of reports and sites visited are not successes in their own right. There was no one document or location that served as the smoking gun for the success or failure of the German program. Rather, the numbers indicate the reach and study required by the team to aggregate the intelligence required to answer the central question that was put to them. Goudsmit wrote in his memoir, "It is true that no precise information was given in the documents, but there was far more than enough to get a view of the whole German uranium project. We studied the papers by candlelight... The conclusions were unmistakable."¹⁷² These conclusions and effect of blocking Soviet access to the sites and scientists

¹⁶⁷ Rhodes, *The Making of the Atomic Bomb*, 610.

¹⁶⁸ Rhodes, 610.

¹⁶⁹ "History Center Acquires ALSOS Mission and Post-WWII Europe Photograph Collection and Documents," American Institute of Physics, February 16, 2016, <https://www.aip.org/news/2016/history-center-acquires-alsos-mission-and-post-wwii-europe-photograph-collection-and>; Rhodes, 609.

¹⁷⁰ Hart, "The ALSOS Mission, 1943–1945," 510.

¹⁷¹ John D. Hart, "The Alsos Mission, 1943–1945: A Secret U.S. Scientific Intelligence Unit," *International Journal of Intelligence and CounterIntelligence* 18, no. 3 (October 2005): 510, <https://doi.org/10.1080/08850600590911990>.

¹⁷² Rhodes, *The Making of the Atomic Bomb*, 607.

themselves was consequential toward the evolution of the close of the European Theater of Operations and to American weapons and space programs in the decades to follow.

Despite scant results in its earlier phases, the Alsos Mission should be considered a success with strategic impacts. Over the course of two years, a relatively small unit was able to achieve objectives of strategic importance given adequate authority, resources, adaptations, and coordination – in other words, its agility. The prospect of German weapon development and proliferation of German advancements concerned senior decision-makers. Coordination and command support translated to resourcing for Alsos, which was critical to underwriting its the organization's agility, and by extension, success. Marshall and Stimson's support played a significant role in gaining cooperation from adjacent units against the backdrop of essentially the rest of the war in Europe. With that access, Alsos was able to leverage the other aspects of its agility, including its unique composition of soldiers and scientists, to make efficient and accurate assessments suited to the counterproliferation mission they were assigned. The organizations adaptability was also vital with the stakes involved. In the wake of the scant impact of Alsos I, the unit was not simply torn apart with another built up to replace it with a similar mission. Instead, Alsos retained the instructive experience and many of the same personnel to continue to develop the intelligence picture they were assigned to assess. The mixture of resources, authority, coordination, and adaptability supported the Alsos Mission's agility and enabled the unit to achieve success well beyond the program's initial expectations, which proved to be a technological and strategic advantage to the United States.

IV. CONCLUSION

In 2015, President Barack Obama stated, “No threat poses as grave a danger to our security and well-being as the potential use of nuclear weapons.”¹⁷³ The next year, President Obama modified the Unified Command Plan and transferred coordination authority for the Department of Defense’s counterproliferation of weapons of mass destruction efforts to United States Special Operations Command. Counterproliferation of WMD is a serious, global security issue that USSOCOM has the opportunity to impact positively, aided by consideration of the lessons of historic special operations to and agility of its elements and inform units’ roles. The agility of SOF elements, constituted in authorities, resourcing (i.e., support), coordination, and adaptability, will positively impact SOF effectiveness. Organizational friction across geographic combatant commands and the interagency community complicates synchronization of counterproliferation operations. The array of adversarial networks that support nascent weapons of mass destruction WMD programs are difficult to unravel and suggest intensive resource allocation. Potentially catastrophic effects and strategic implications of nuclear proliferation make elimination of existing capabilities infeasible and laden with risk.

While SOF are a versatile capability, counterproliferation requires resource allocation across the range of associated operations that would conceivably support CWMD policy. President Trump outlined his intention to “augment measures to secure, eliminate, and prevent the spread of WMD and related materials, their delivery systems, technologies, and knowledge to reduce the chance that they might fall into the hands of hostile actors.”¹⁷⁴ These initiatives will require wide-ranging cooperation across joint, interagency, and multinational organizations – assigning them to USSOCOM, and by extension SOF, is not a panacea. According to Gray, “SOF provide the possibility of a range of precisely conducted military activities more extensive than that reliably feasible”

¹⁷³ Obama, “National Security Strategy,” 11.

¹⁷⁴ President of the United States, *The National Security Strategy of the United States of America* (Washington, DC: White House Office, December 2017), 8, <https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf>.

for forces trained to confront conventional threats.¹⁷⁵ While Gray’s assertion suggests that SOF offers “economy of force and expansion of strategic choice,” SOF regiments are finite and must prioritize efforts.¹⁷⁶ Two of USSOCOM’s SOF Truths are prescient regarding counterproliferation: 1) “Special Operations Forces cannot be mass produced” (USSOCOM must distribute resources and allocate assets judiciously), and 2) “Most Special Operations require non-SOF assistance” (USSOCOM must effectively coordinate with other agencies to achieve counterproliferation objectives in the name of national security).¹⁷⁷ Secretary Mattis acknowledged this reality by prioritizing integration with the U.S. interagency community and others by stating, “Effectively expanding the competitive space requires combined actions [...] to employ all dimensions of national power.”¹⁷⁸ The disproportionate effects USSOCOM can achieve through thoughtful application of means, cooperation of affected Geographic Combatant Commands, and synchronization with wider DoD and interagency organizations have the potential to mitigate the risk associated with resource allocation in the expansive international “competitive space” of proliferation.

The possibility of nuclear proliferation (in comparison to other forms of WMD) carries potential catastrophic consequences and strategic effects that carry high degrees of risk. Acknowledging the importance of counterproliferation and the challenges that WMD elimination would impose has led policymakers to favor “pathway defeat” actions. The DoD’s *Strategy for Countering Weapons of Mass Destruction* describes pathway defeat:

Deliberate actions taken against actors of concern and their networks to delay, disrupt, destroy, or otherwise complicate the conceptualization, development, possession and proliferation of WMD and related capabilities. These activities focus on the specific nodes and linkages in an adversary’s WMD pathway. Pathway defeat measures are designed to create layers of complex barriers to impose recurring, collectively reinforcing, and enduring

¹⁷⁵ Colin Gray, “Handfuls of Heroes on Desperate Ventures: When Do Special Operations Succeed?,” *Parameters* 29, no. 1 (Spring 1999): 2, 23.

¹⁷⁶ Gray, 23.

¹⁷⁷ “SOF Truths,” accessed October 3, 2018, <https://www.socom.mil/about/sof-truths>.

¹⁷⁸ Jim Mattis, “Summary of the 2018 National Defense Strategy: Sharpening the American Military’s Competitive Edge” (Washington, DC: Department of Defense, 2018), 5, <https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>.

costs and setbacks on those seeking to acquire or proliferate WMD or related capabilities.¹⁷⁹

The DoD's CWMD Strategy document provides clear focus on preventative measures represented in this definition, but the guidance is sufficiently broad as to allow for creativity and disciplined initiative from planners. The coherent implementation of pathway defeat plans necessarily requires continued prioritization from USSOCOM leaders in balance with other USSOCOM requirements, and adherence to "SMART (specific, measurable, achievable, results-oriented, and time-limited)" criteria to enable evaluation of pathway defeat operations.¹⁸⁰ Objectives like the disruption of a transregional procurement network or the interdiction of WMD-related material are possible examples. While the dynamics of counterproliferation are challenging, these dynamics allow opportunities to identify meaningful CWMD objectives through "flexible, innovative, and adaptive" preventive approaches.¹⁸¹ While a decision-maker may be tempted to construct an entirely new organization to meet an emergent threat, adaptation of existing organizations will likely form a stronger basis from which to pivot focus. Leveraging a suitable existing organization's lessons learned enables an organization to close knowledge gaps quicker and avoids the illusion of progress inherent in continuous reorganization. Instead of costly reorganization, drawing salient lessons from the cases discussed here can offer a basis for useful modification. While the above cases took place during World War II, important lessons can still apply to pathway defeat in the context of either ostensibly peaceful or wartime circumstances.

Both case studies offer insights into how missions supporting counterproliferation objectives handled information sharing. While Operation Gunnerside and the Alsos Mission prudently compartmentalized particularly sensitive information concerning capabilities of friendly and enemy weapons programs, members of both units were aware

¹⁷⁹ Department of Defense, , *Department of Defense Strategy for Countering Weapons of Mass Destruction*, 10.

¹⁸⁰ Ron Ratcliff and Mackubin Owens, "Implementation: The Art of Execution" (Newport, RI: Naval War College faculty paper May 2016), 3.

¹⁸¹ Department of Defense, *Department of Defense Strategy for Countering Weapons of Mass Destruction*, 17.

of the importance of their objectives and knew enough to exercise disciplined initiative. In the case of the Alsos Mission, the inclusion of an adequate number of scientists to complement military personnel enabled the unit's effectiveness. The complementary knowledge the scientists and military personnel brought together proved valuable and when accompanied by an operationally appropriate awareness of the Manhattan Project. It would be imprudent and impractical to brief every SOF soldier about every detail of counterproliferation efforts worldwide. However, mission-related understanding concerning counterproliferation goals, strategies, and an appreciation for counterproliferation's importance is not reckless and can involve greater portions of SOF. Widespread unfamiliarity of counterproliferation goals – and over-compartmentalization – neglects an opportunity to involve a force with a worldwide presence that could offer considerable potential for friendly understanding and initiatives reflecting the proactive intent of pathway defeat. Such involvement could provide missing pieces needed to assess various networks (procurement, financial, etc.) involved in proliferation. Clarifying the vagueness surrounding counterproliferation would counteract Adams' description of counterproliferation as ambiguous and would allow for an enhanced sensitivity for proliferation issues and facilitate opportunities for cooperation across organizations.¹⁸²

Both cases highlight that understanding the threat and attacking proliferation networks can be enhanced with coordination across SOF organizations internally and through partnerships fostered by engagement of United States SOF abroad. This conclusion holds potential for translation from the setting of the case studies to pathway defeat by leveraging broadened understanding of counterproliferation and partnerships established by SOF with other nations via security cooperation, as Carlson suggests.¹⁸³ Tracking and disrupting proliferation networks can conceivably be more feasible when there is already a presence in an unnamed country manifested by ongoing SOF-led partnerships. This presence provides a beneficial relationships and working knowledge of the given nation's security apparatus. SOF offer additional perspective to these aspects distinct from U.S.

¹⁸² Adams, *US Special Operations Forces in Action*, 303.

¹⁸³ Carlson, "Preventing Weapons of Mass Destruction Proliferation—Leveraging Special Operations Forces to Shape the Environment," 46.

intelligence services through security cooperation working relationships. These relationships can be used to clarify or assist in a way far less dramatic than a midnight raid on heavy water plant but that reflects on-the-ground familiarity that enabled Operation Gunnerside's success. Operation Gunnerside stands as an example of the expansion of strategic options that SOF offer decision makers. This expansion of options is cogent when considering counterproliferation courses of action, even with the inherent risk of the mission compared to the arguably less risky – though arguably less effective – bombing that was the Allied default. This is not to suggest that every option must involve commandos, but is a reminder that calculated risks may be appropriate in pursuit of the most effective action with respect to counterproliferation. Courses of actions grounded in credible intelligence and viability are more appropriate than half-measures.

A. RECOMMENDATIONS

Increased familiarity with counterproliferation, consistent communication with weapons specialists, and coordination through security cooperation are present in the case studies and can be applied to contemporary pathway defeat. The lessons learned in the crucible of war can be carried over to the competitive environment of today's relative peace and applied to techniques for pathway defeat. Additionally, they are important considerations for the potential for a WMD program elimination mission in the future against an emerging nuclear nation in the process of developing a nuclear arms program. In order to stifle the potential propagation of nuclear material, expertise, and technology associated with such a scenario, a considerably large effort will likely need to be made. The scale of such an operation would possibly exceed the grasp of a tightly compartmentalized, counterproliferation-centric organization devoted to that sole mission. Agility from SOF would be necessary to manage the consequences of an effort to eliminate a national program that will probably involve more than a single research site, weapon location, or series of air strikes. An organization that is familiar with counterproliferation would be suited for that high-stakes role.

USSOCOM's recent assumption of coordinating authority responsibilities for counterproliferation represents an opportunity to innovate the DoD's approach to a

strategically important security issue. In an environment characterized by “reemergence of long-term strategic competition” and rogue regimes endeavoring to wield disproportionate influence, re-assessments are critical to planning and employment of efficient and effective strategy in service of U.S. policies. An emphasis on re-assessment also underlines the need for rapid adaptation as commanders and staffs align outputs and outcomes to inform assessments and adjustments to strategy. This adaptation should include a broader understanding of counterproliferation goals and requirements amongst special operations units that may be able to contribute to the aggregate intelligence picture required to understand the myriad procurement networks involved in proliferation. In the 2018 National Defense Strategy, Secretary Mattis concluded by calling on the DoD to “transition to a culture of performance where results and accountability matter” to aid responsiveness and in seizing upon short-lived opportunities.¹⁸⁴ As USSOCOM continues to build upon its coordination capabilities and counterproliferation efforts, it should take care to align its performance measures with critical counterproliferation objectives.

B. OPPORTUNITIES FOR FUTURE RESEARCH

Examination of historical case studies to inform discourse regarding the application of SOF in functional, transregional problems like CWMD is not limited to these cases. Researchers can potentially glean historical lessons for pathway defeat from cases which involve networks that proliferate illicit substances, profit in stolen artifacts, or engage in human tracking – among others. For example, an examination of the SOE mission Operation Bonzos, led by Austrian resistance fighter Albrecht Gaiswinkler, could show how the Allies leveraged a combination of SOF competencies to track and recover cached valuable art (including the Mona Lisa) amassed by Nazis during World War II.¹⁸⁵ Like Operation Gunnerside and the Alsos Mission, there is potential to study agility’s role in an organization’s success and to inform the viability of SOF’s role in pathway defeat or other potential functional problems through historical examination.

¹⁸⁴ Mattis, “Summary of the 2018 National Defense Strategy: Sharpening the American Military’s Competitive Edge,” 10.

¹⁸⁵ Robert M. Edsel, *Rescuing Da Vinci: Hitler and the Nazis Stole Europe’s Great Art: America and Her Allies Recovered It* (Dallas: Laurel Pub., 2006).

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