I. Introduction

The military services often view the first Gulf War as an aberration. Interrupting post-Cold War military reduction, it was the combined arms fight they had planned to wage against the Soviets but instead unleashed to great effect against Saddam Hussein's Iraq. For the Defense Logistics Agency, however, Operation DESERT SHIELD, the defense of Saudi Arabia, and Operation DESERT STORM, the freeing of Kuwait, were less departures from the expected than the acceleration of a trend. The last years of the Cold War had witnessed a logistics revolution that the Gulf War confirmed and amplified. Although lost today due to consolidations later in the decade, this revolution defined contingency support for a generation.

The DLA of 1990 was different from DLA today. When Saddam Hussein ordered his brigades into Kuwait, the agency had been operating under a combat support moniker for less than four years. While accepting this designation, DLA leaders had yet to work out what it meant. Also unclear was the agency's relationship with the newly formed U.S. Transportation Command, whose lines of communication governance appeared to overlap DLA's global distribution mission, also new. Structurally, the agency was even more different, with its 62,000 employees arrayed by business function or commodity group and including those working for the now-separate Defense Technical Information Center and Defense Contract Management Agency.

Beyond the departures of DTIC and DCMA, DLA's headcount shrank 60% in the decades following the Gulf War due to technology. Much of what the agency automates today was manual in 1990. In one telling example, its acquisition workforce completed more than 94,000

contract actions during the six-month war, a total bragged about then but one computers accomplish every two weeks today.[1]

At least one commonly held perception about the Gulf War applies to logistics: it was a conflict in which America got things right. Decisions in doctrine and equipment made since Vietnam proved as propitious for logistics as they did for operations. A key example was deployable medical systems. After a Joint Chiefs of Staff study in the early 1980s "indicated a shortfall in wartime medical care capability . . . would result in over a 20% death rate among wounded," the Defense Personnel Support Center obtained equipment and agency depots assembled it. [2] Thanks to DLA, the joint medical community had four combat-support DEPMEDs, three evacuation DEPMEDs, and six Mobile Army Surgical Hospital DEPMEDs when the war began.

Another example was nerve agent antidote kits. Infrequently ordered, these kits and their components – atropine and 2-pam chloride – were on the verge of having no suppliers in 1988. Army Lieutenant General Vincent M. Russo, DLA's ninth director, could have asked the Office of the Secretary of Defense to invoke the Defense Production Act. Instead, he convinced the Army, as executive agent for the kits, to request enough new ones to keep vendors in business.[3] As reported a month after Operation DESERT SHIELD began, "if DLA had not maintained a "warm production base, … it would have taken two years and $40 million to" restart assembly.[4]

[1] Today, 95% of contract actions involve no human intervention. Email, Kimberly A. Villareal, DLA Acquisition, to Colin J. Williams, DLA Historian, 9 May 2024, Historian Files.
[2] Fact sheet, Deployable Medical Systems, 4 Aug 1987, pp. 1-2, Folder: DDOU, Box 2, UD(09W) 2, RG 361, NARA.
[3] Sss, MG Charles R. Henry, dpty dir (AM), Industrial Base for Nerve Agent Antidote Autoinjectors, 29 Aug 1988, pp. 2-3, Folder: dpty-signed Aug 88, Box 3, UD(20W) 2, RG 361, NARA.
[4] IOM, M.J. Popik, chf, plans and ops, contracting, Data for Admiral Cole, 26 Oct 1990, p. 2, Folder: Operation Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.

DLA addressed more than medical readiness in the 1980s. Instead of relying on military specifications for packaged petroleum, the agency switched to commonly available commercial products.[5] Doing so returned both monetary and labor savings. DLA also worked with TRANSCOM to develop radio-identification tags capable of tracking items in transit. Unfortunately for all involved, war broke out before this technology could be deployed.

Operation DESERT SHIELD began three days after Iraq invaded Kuwait when President H.W. Bush, walking from Marine One to the White House, declared Saddam Hussein's aggression "will not stand." The subsequent deployment was piecemeal. A brigade from the 82d Airborne Division flew to Saudi Arabia, followed by the rest of the division, more XVIII Airborne Corps units, and aircraft. Meanwhile, marines and naval vessels sailed into the Perian Gulf. With support units sequenced late in deployment, land forces ate MREs and bedded down in tents donated by the Saudis, who also supplied water, built latrines, collected refuge, and provided in-country transportation.[6] Relying on the Saudis simplified DLA's mission but left unaltered CENTCOM's concept of support, which had units pulling equipment from prepositioned stocks.

As soon as a supply system was operational, President Bush announced he was deploying 200,000 soldiers from VII Corps. Ending in January 1991, VII Corps's deployment overlapped with Operation DESERT SHIELD. Because DLA built combat power while sustaining deployed

[5] IOM, Capt B.L. Cohen, dir, C&P, Desert Shield and Desert Storm Records, 7 May 1991, p. 1, Folder: Record Submissions 1, Box 55, PAO Archives; AAR, DLA, "Support of Operations Desert Shield/Storm, August 1990 – March 1991, 21 May 1992, p. I-23, Folder: DLA Support in Desert Storm / AAR, Box 22, PAO Archives.
[6] Brad D. Lafferty, et al., "Gulf War Logistics: Theory into Practice," Air Command and Staff College, pp. 15-17; John J. McGrath and Michael D. Krause, *U.S. Army Materiel Command: Theater Logistics in the Gulf War*, n.d. 1994, p. 22.

units, the following sections overlap, with the first covering the agency's initial mobilization and the second provision begun later or lasting throughout the conflict.

II. Deployment and Buildup

DESERT SHIELD was America's attempt to protect Saudi Arabia from Kuwait's fate. If Saddam Hussein had seized the Kingdom's oil reserves, he would have controlled more than half the world's supply. The United States intervened to stop this from happening. It built combat power as fast as possible by deploying units without prescribed loads or electronic ordering systems. When combat units obtained this technology, the lack of service units to receive supplies meant containers piled up at Saudi ports, their location unknown to users.[7]

Supplies could pile up because Saudi Arabia had modern ports. The fact it was also a wealthy country willing to defray the cost of keeping it free helped as well. In addition to logistics services, the Kingdom provided food, water, shelter, and fuel. It also reimbursed the U.S. for what it did not provide. Because DLA normally obtained items offered by the host-nation, it tracked what was donated so the Defense Department knew what not to charge the Kingdom.[8]

DLA already bought petroleum from Saudi Arabia. Even so, quick action had to be taken to ensure Navy jet fuel, which DLA had been purchasing from two companies in Kuwait, could be

[7] LTG William Pagonis and Michael Krause, "Observations on Gulf War Logistics," *Army Logistician*, Sept-Oct 1992, p. 8, in Glenn M. Melton, Industrial College of the Armed Forces, "Materiel Management Challenges during the Persian Gulf War," 12 Apr 1993, p. 9, Defense Technical Information Center.
[8] MFR, DLA-LR, Defining DLA Support to Desert Shield, 18 Dec 1990, p. 1, Folder: Rations, Box 1, UD(UP) 34, RG 361, NARA.

produced by Saudi vendors. Similar speed was necessary for air and naval transportation. While this initial provision came from the U.S., Saudi Arabia, along with the United Arab Emirates and Oman, supplied 1,757,075,544 gallons, or 93% of all fuel America consumed during the war.[9] Host nation support saved the Defense Department $1.2 billion on this one commodity alone.[10]

If subsidized fuel was an advantage of operating in Saudi Arabia, the country's austere environment was a disadvantage. Concerns over desert conditions prompted units to submit 194 queries to the Defense Technical Information Center.[11] Deployers wanted to know about "water purification systems, desert warfare sustainability, pouring concrete in the desert, desert war camouflage," and the desert's effect on operations."[12] These research requests were separate from the 619 deployers submitted on chemical and biological warfare.[13] DLA claimed to be an end-to-end logistics provider in 1990 partly because DTIC provided such information.

DLA did not just respond to queries, it also deployed people. Excluding Defense Industrial Plant Equipment Center technicians who entered the conflict when the ships they were repairing sailed into the Persian Gulf, the agency's first representatives in theater were three Defense Fuel Support Center employees who departed 9 August 1990, forty-eight hours after notification and a week after Iraq's invasion.[14]

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[9] AAR, DLA, "Support of Operations Desert Shield/Storm, August 1990 – March 1991, 21 May 1992, p. I-17, Folder: DLA Support in Desert Storm / AAR, Box 22, PAO Archives.
[10] Ibid., p. I-2.
[11] MFR, Betty L. Fox, dir, P&RM, DLA, Operation Desert Shield/Storm Records, 30 May 1991, p. 3, Folder: AAR Comments, Box 55, PAO Archives.
[12] Ibid.
[13] Ibid.
[14] AAR, DLA, Support of Operations Desert Shield, Desert Storm, 21 May 1992, pp. I-3, I-35, II-A-31, Folder: DLA Support in Desert Storm AAR, Box 22, PAO Archives.

Theater logistics at this stage of the war entailed reception, onward movement, and only the bare minimum of sustainment. Army Major General William G. Pagonis oversaw the effort for U.S. Central Command. His staff asked DLA for additional personnel in mid-August. The Defense Personnel Support Center sent a team under Navy Commander John Proctor later that month.[15] Other supply center and communications personnel followed in September.[16] Finally, DLA dispatched a Defense Reutilization and Marketing Service Office to Saudi Arabia in November.[17] The agency was unprepared to deploy these volunteers, releasing them by subordinate command and without "chemical protective clothing, weapons, [or] individual clothing."[18] Some deployers even lacked training on email, a technology previously restricted to "techies" but one that became the primary means of communication with DLA Headquarters.[19]

Despite being unprepared to deploy personnel, DLA was agile in areas it was expert. Importantly, it used its authorization to deviate from Federal Acquisition Regulations to prevent the Defense Personnel Support Center from having to conduct pre-award reviews on contracts exceeding $500,000 and obtain price data for chemical protective suits.[20] More agility came from new acquisition practices. Rob Molino, the agency's senior procurement officer, pushed supply centers to use indefinite-quantity contracts as much as possible, to the extent he sought permission from the Pentagon to convert existing fixed-quantity contracts.[21] He also called for

[15] Trip rpt, cdr, DPSC, 24 Dec 1990, p. 3, Folder: Operation Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.
[16] AAR, DLA, "Support of Operations Desert Shield/Storm, August 1990 – March 1991, 21 May 1992, p. I-4, Folder: DLA Support in Desert Storm / AAR, Box 22, PAO Archives.
[17] Ibid., p. II-A-6.
[18] Ibid.
[19] Ibid. p. II-B-3.
[20] IOM, M.J. Popik, chf, Plans and Ops brnch, contracting dir, DLA, Operation Desert Shield and Storm Records, 8 May 1991, p. 6, Folder: Record Submissions 2, Box 55, PAO Archives; talking ppr, DLA Contracting Accomplishments in ODS, 13 Mar 1991, p. 2, Folder: Operation Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.
[21] IOM, R.L. Molino, exec dir, acquisition, OSD Acquisition Meeting Summary, 2 Nov 1990, pp. 1-2, Folder: Rations, Box 1, UD(UP) 34, RG 361, NARA.

maximum effort in ensuring the agency reported quantities accurately and could provide extreme cold weather uniforms so troops could survive the desert's stark changes in temperature.[22]

Most acquisition in 1990 was one-time buys.[23] Under Molino's direction, the agency increased its long-term percentage from almost nothing to 29.4% by early December.[24] The Defense General Supply Center led the way, writing infinite-quantity contracts for packaged petroleum, insecticides, aerial film, light wands, pallets, dry cell batteries, chlorination kits, and lubricant cleaner.[25]

Long-term contracts were process improvement. Also demonstrating agency agility were responses to industrial base shortages. Thanks to actions previous to the war, DLA had 500,000 nerve-agent antidote kits on its shelves.[26] They were not enough. The agency worked with the Army to pull from war reserves.[27] When this still proved insufficient, the Defense Reutilization and Marketing Service identified excess stock in the Air Force.[28] These sources covered shortages until the companies DLA had kept warm began delivering.

Progress with antidote kits allayed CENTCOM concerns. When its senior logistician asked Air Force Lieutenant General Charles P. McCausland, DLA's tenth director, to update his commander, the kits were not on his list of key items. Instead, he wanted Army General Norman

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[22] Ibid.
[23] DLA currently uses long-term contracts for 92% of hardware actions and 82% of hardware obligations. Email, Kim Villareal, DLA Acquisition Operations, to Colin J. Williams, DLA historian, 9 May 2024, Historian Files.
[24] IOM, Capt B.L. Cohen, dir, C&P, Desert Shield and Storm Records, 7 May 1991, p. 1, Folder: Record Submissions 1, Box 55, PAO Archives.
[25] Brf, DGSC, Long Term Contracting, 21 Feb 1991, p. 8, Folder: Record Submissions 1, Box 55, PAO Archives.
[26] Talking pts, DLA Public Affairs, 5 Nov 1990, p. 14, Folder: Pouches/DMRDs, Box 56, PAO Archives.
[27] Ibid.
[28] Ibid.

Schwarzkopf Jr. briefed on three ration types and three uniform items.[29] McCausland reported on-hand and due-in quantities, as well as three actions to meet requirements: maximizing industrial base production, underway and showing results; increasing industrial base capacity, underway and expected to take at least nine months; and substitutes, which the services had to approve.[30]

One substitute involved sandbags. DLA was short this critical barrier material in 1990. Hundreds of thousands were on hand or in Germany but millions were needed.[31] Unfortunately, while several companies made the item, only two manufactured their military specification fabric.[32] After Natick Army Labs granted exceptions for polyethylene on 18 December 1990 and polypropylene, cotton, Polyester, burlap, jute, and acrylic on 23 January 1991, DLA issued nine letter contracts, preliminary agreements allowing vendors to start production immediately.[33]

Another bag caused more problems. “Body bags,” or human remains pouches as the agency and practically no one else called them, caught the media’s attention. It was impossible to judge if DLA had sufficient stock because no one knew how deadly the fighting would be. Worst-case scenarios had Americans dying from chemical attack and requiring rubber as opposed to nylon versions. Unfortunately for agency, the material lining rubber pouches was the same material

[29] Mssg, DLA, to GEN Schwarzkopf and CJCS, ODS Rations and Clothing, 5 Nov 1990, p. 1, Folder: Rations, Box 1, UD(UP) 34, RG 361, NARA.
[30] Ibid., pp. 1-4. McCausland ended his update with a “personal commitment to stay on these issues.” Ibid., p. 4.
[31] Ltr, Capt H.O. Ruppmann, dpty exec dir, contracting, to Rep. Gus Yatron, US House, 28 Feb 1991, p. 3, Folder: Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.
[32] Ibid., p. 4.
[33] Ibid.; talking ppr, DLA Contracting Accomplishments in ODS, 13 Mar 1991, p. 1, Folder: Operation Desert Shield, Box 1, UD(UP) 34, RG 361, NARA. Rushed orders and new production lines increased unit cost. Ltr, Capt H.O. Ruppmann, dpty exec dir, contracting, to Rep. Gus Yatron, US House, 28 Feb 1991, p. 5, Folder: Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.

lining chemical protection suits, also in short supply.[34] Efforts to spur manufacture allowed DLA to report late November that, while the agency had rubber pouch backorders of 22,000, 16,099 were due in through a public exigency order and 5,901 through normal processing.[35] For nylon pouches, 54,924 had been issued, 21,728 were on-hand, and 71,454 were due-in.[36]

Initially, neither DLA nor CENTCOM fretted about pouches. The command had substantial in-theater stock and this, combined with DLA's emergency contracting, covered need. The situation changed 4 January 1991 when the organizations learned the rubber on as many as 60,000 Army-stored pouches had cracked.[37] All of a sudden, DLA became the only source. The agency did all it could do to accelerate production but could not guarantee deliveries before DESERT STORM.[38]

While DLA Headquarters answered questions from CENTCOM, supply centers answered questions from the press. The Defense General Supply Center's public affairs officer was inundated with queries about pouches; he fielded far fewer about packaged petroleum, sandbags, folding cots, fratricide prevention kits, or any of the other commodities his center provided.[39] Even specialty items such as cargo sling nets, map paper, tax forms, and chaplain kits received less attention.[40]

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[34] IOM, Nancy Myrick, DLA-PPP, to DLA-B, Human Remains Pouches, 3 Jan 1991, p. 1, Folder: Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.
[35] IOM, RADM J.P. Davidson, exec dir, supply ops, DLA, to DLA-D/DD, "Remains, Pouches Inquiries – COMMAND BRIEF," 26 Nov 1990, p. 1, Folder: Pouches/DMRDs, Box 56, PAO Archives.
[36] Ibid.
[37] Memo, LTG Jimmy D. Ross, USA, to Lt Gen Charles P. McCausland, dir, DLA, Graves Registration, 4 Jan 1991, p. 1, Folder: Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.
[38] Ibid.
[39] AAR, DLA, "Support of Operations Desert Shield/Storm, August 1990 – March 1991, 21 May 1992, p. I-20, Folder: DLA Support in Desert Storm / AAR, Box 22, PAO Archives.
[40] Richard D. Hill, "Depot Operations Supporting Desert Shield," *Military Review* 71, no. 4, n.d. Apr 1991, p. 22; IOM, Capt B.L. Cohen, dir, C&P, Desert Shield and Storm Records, 7 May 1991, pp. 10-22, Folder: Record Submissions 1, Box 55, PAO Archives.

The press's selective reporting was unfortunate, as a DGSC-managed item generated one of the war's many heartwarming stories. Light wands were important for warding off friendly fire.[41] They has two manufacturers, one established and large and the other new and small.[42] Despite a nasty lawsuit between the companies, they "drop[ped] their hostilities in recognition of hostilities in the Gulf, to the extent that one contractor (the small business just breaking in to the industry) gave up delivery orders which were his company's … because the big company had stock on the shelf that they [sic] could ship right away."[43]

Even more common than cooperation between competitors was cooperation between companies and DLA. In April 1991, the Defense Contract Administration Services's commander in Atlanta reported problems Texas Instruments and his contract administrators had solved during the conflict. They included modifying eye shields on guided-missile launchers so they could be used with gas masks at night, releasing forward-looking infrared systems before their technical data had been approved, waiving standard requesting and issuing procedures, provisional billings, transferring spare parts between projects, and authorizing nonconforming material.[44]

Problems with vendors were easier to fix than problems with transportation. To ensure as many items reached the Gulf as possible, DLA increased its shipping points. With the Army's massive new warehouse in New Cumberland recently transferred to DLA, the agency had been

[41] Ibid., p. 25.
[42] Ibid.
[43] Ibid.
[44] Memo, Capt C.G. Rumsey, cdr, DSACR, Operation Desert Shield and Storm Records, 26 Apr 1991, pp. 1, 3, 4, 16, Folder: Record Submissions 2, Box 55, PAO Archives.

consolidating shipments in eastern Pennsylvania and dispatching them from there. It suspended this process when the war began, instructing depots such as Defense Distribution Richmond, Virginia, to begin requesting space on vessels.[45] TRANSCOM's goal for these centers was to "move 90 percent of sustainment by sea and 10 percent by air, except Class IX (repair parts), which will be 10 percent by sea and 90 percent by air."[46]

Repair parts were flown to Saudi Arabia on the Desert Express Airlift after 30 October, when TRANSCOM established the route. DLA trucked Class IX and medical items to Charlestown Air Force Base, bypassing backlogs at other ports.[47] The combatant command then flew these commodities using commercial and military aircraft.[48]

Unfortunately for joint logistics, other items flew as well. Flying was faster than shipping and every unit wanted everything it ordered as soon as possible. Aircraft thus played a huge role in the conflict, with the Air Force dedicating 95% of its C-5 Galaxies and 90% of its C-141 Starlifters to the opeartion.[49] This massive investment deviated from TRANSCOM's goal and wore down airframes and engines. It also fell short of need. By December 1990, Dover Air Force Base alone had 7,000 tons of cargo waiting for flights, or six times the military's total airlift capacity of 1,200 tons.[50]

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[45] Richard D. Hill, "Depot Operations Supporting Desert Shield," *Military Review* 71, no. 4, n.d. Apr 1991, p. 22.
[46] James K. Matthews and Cora J. Holt, Joint History Office and U.S. Transportation Command, *So Many, So Much, So Far, So Fast: United States Transportation Command and Strategic Deployment for Operation Desert Shield / Desert Storm*, n.d. 1992, p. 85.
[47] Richard D. Hill, "Depot Operations Supporting Desert Shield," *Military Review* 71, no. 4, n.d. Apr 1991, p. 20.
[48] Talking pts, DLA Public Affairs, 5 Nov 1990, p. 3, Folder: Pouches/DMRDs, Box 56, PAO Archives.
[49] James K. Matthews and Cora J. Holt, Joint History Office and U.S. Transportation Command, *So Many, So Much, So Far, So Fast: United States Transportation Command and Strategic Deployment for Operation Desert Shield / Desert Storm*, n.d. 1992, p. xvii.
[50] ppr, COL Kenneth E. King, USAWC, "Thunderstorms of Logistics," 30 Mar 2007, p. 8, DTIC.

Cargo awaiting flights was mostly DLA-provided. The Civil Reserve Air Fleet flew soldiers and marines. Their equipment came from afloat storage, warehouses on Diego Garcia, or U.S. Navy roll-on, roll-off vessels. With the Desert Express Airlift delivering repair parts and medical items, delayed items included meals and uniforms.

III. Sustainment

DLA tried to fly meals and uniforms because sustainment items contributed as much to combat power in the Gulf as other items. Each service member needed food and water from the day he arrived to the day he departed. Clothing concerns proved similarly constant. Even when the heavy units of VII Corps arrived and the Air Force launched its month-long bombing campaign, CENTCOM cared more about sustainment items than maintenance material.

Clothing was DLA's most significant challenge. The problem started with camouflage. Woodland green, the pattern troops wore upon deployment, trapped heat, a safety hazard in a land where temperatures regularly soared above 120 degrees Fahrenheit. The "chocolate chip" pattern deployers eventually wore enhanced morale as well as health. Given the support America gave its military during the war, desert camouflage became a badge of honor. Support units, last to receive the uniforms, clamored to have them before redeployment so they could march in parades attired in the outfits associated with the war.[51]

[51] Glenn M. Melton, "Materiel Management Challenges during the Persian Gulf War," n.d. 1993, pp. 7-8.

The Army was most in need. With each soldier authorized two sets, deploying the XVIII Airborne Corps jumped its uniform requirements from zero to 600,000.[52] Meeting this need was constrained by cloth. Although a small quantity was on hand, mills had to produce the rest, which took forty-five to sixty days and could not be accelerated.[53] Manufactures then took another thirty days to sew, package, and truck the product to embarkation sites.[54] With such delays baked into the cycle, it is unsurprising requesters and DLA wanted every shipment flown.

Improvements occasionally interrupted production. Responding to complaints from the field, DLA tested new options at its uniform factory. In addition to examining if the extra fabric sewn over elbows and knees could be eliminated and if the chocolate-chip pattern could be reduced from six to three colors, the factory helped meet demand.[55] It also sewed outfits for President and Mrs. Bush.[56]

The agency came very close to outfitting all service members with theater-appropriate clothing. Problems beyond the unavailability of cloth included a sole-source buttons contractor going out of business and the need to manufacture a new boot.[57] The black boots service members wore at home station became cauldrons in the heat. DLA had warm-weather boots on its shelves but these were designed for the Vietnam jungle, where the dangers were water and impalement by bamboo spikes. In a desert, their mesh proved sand-permissive and steel plates trapped heat even

[52] Talking pts, DLA Public Affairs, 5 Nov 1990, p. 13, Folder: Pouches/DMRDs, Box 56, PAO Archives.
[53] Ltr, M.J. Popik, chf, plans and ops, contracting, to Dr. Rita L. Wells, Air University, 20 Dec 1991, p. 8, Folder: Operation Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.
[54] Ibid.
[55] Ibid.
[56] AAR, DLA, "Support of Operations Desert Shield/Storm, August 1990 – March 1991, 21 May 1992, p. I-13, Folder: DLA Support in Desert Storm / AAR, Box 22, PAO Archives.
[57] Rpt, GAO, Desert Shield and Storm Logistics – Observations, 13 Nov 1991, p. 41.

better than their black leather. The CENTCOM commander cared so much about this item that he helped design a replacement, the "Schwarzkopf boot."

Major General Pagonis relates that he had to tell Schwarzkopf his boot would not arrive in time for DESERT STORM minutes before he promoted him to three stars.[58] Although true, 40,000 pairs of the Schwarzkopf design were expected in April, an impressively quick turn-around for a new item.[59] As an interim, the Defense Personnel Support Center removed the drain holes and steel sole from its Vietnam boot and substituted tan for black leather.[60] This temporary fix was not as comfortable as the Schwarzkopf design but would arrive sooner – by the end of February – and in greater quantity: 274,000 pairs, with another 227,000 to arrive later.[61] Intensive management had cut the delivery time for these 501,000 pairs in half.[62]

DLA followed this pattern of offering what it had and pursuing improvements with subsistence. Feeding more than half a million service members had challenges Saudi Arabia's largesse could only mitigate. Like clothing, most food had to come from the states.

DLA began the conflict offering land forces four options; working with the Army, it added a fifth after troops started deploying. Initial options included A rations, fresh or frozen food; B rations, dehydrated or canned food; T rations, tray-packed meals; and meals-ready-to-eat,

[58] William G. Pagonis, with Jeffrey L. Cruikshank, *Moving Mountains: Lessons in Leadership and Joint Logistics from the Gulf War* (Boston: Harvard Business School Press, 1992), p. 60.
[59] Trip rpt, cdr, DPSC, 24 Dec 1990, p. 9, Folder: Operation Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.
[60] Ltr, M.J. Popik, chf, plans and ops, contracting, to Dr. Rita L. Wells, Air University, 20 Dec 1991, p. 8, Folder: Operation Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.
[61] Mssg, Lt Gen Charles McCausland, to GEN Schwarzkopf and CJCS, Supply Posture for Rations and Clothing, 16 Nov 1990, pp. 3-4, Folder: Rations, Box 1, UD(UP) 34, RG 361, NARA.
[62] Ibid.

individually packaged shelf-stable meals. The added option was meals-ordered-ready-to-eat. MOREs were similar to MREs but had commercial items and a shorter shelf life.

While DLA and in-theater logisticians never let a unit go hungry, they also never met the Army's standard of two hot meals per soldier per day.[63] Ideally, B rations would have been used for breakfast and dinner because A rations could not be prepared in advanced positions and the easier-to-serve T rations needed to be saved for DESERT STORM.[64] Unfortunately, the Defense Personnel Support Center had not purchased B rations for years and they took just as long to make as T rations.[65]

DLA pursued two measures to address this shortage. The first was using B ration components, present in quantity at Defense Depot Memphis, for T ration production.[66] By borrowing tray-sealing machines from the Defense Industrial Plant Equipment Center, hiring three hundred people, and going to twenty-four hour operations, the depot increased daily production from 450 to 2,500 pallets. [67]

The second measure was MOREs. MOREs had five components which DLA bought from different suppliers and shipped unassembled to Class I yards in Saudi Arabia.[68] Consisting of an

[63] Rpt, GAO, Desert Shield and Storm Logistics – Observations, 13 Nov 1991, p. 37.
[64] AAR, DLA, "Support of Operations Desert Shield/Storm, August 1990 – March 1991, 21 May 1992, p. I-9, Folder: DLA Support in Desert Storm / AAR, Box 22, PAO Archives.
[65] Richard D. Hill, "Depot Operations Supporting Desert Shield," *Military Review* 71, no. 4, n.d. Apr 1991, p. 24.
[66] Ibid.
[67] AAR, DLA, "Support of Operations Desert Shield/Storm, August 1990 – March 1991, 21 May 1992, p. I-35, Folder: DLA Support in Desert Storm / AAR, Box 22, PAO Archives; Richard D. Hill, "Depot Operations Supporting Desert Shield," *Military Review* 71, no. 4, n.d. Apr 1991, p. 24.
[68] Order, DPSC, to multiple, CIM and MORE Ration Strategies, 26 Nov 1990, p. 1, Folder: Rations, Box 1, UD(UP) 34, RG 361, NARA.

entrée, a soup, a dessert, a piece of candy, and a plastic spoon, MOREs were the "same food you could buy at local supermarkets."[69] They had drawbacks, including a six-month shelf life, no milk, and limited fruits and vegetables.[70] Even so, they had easily obtained components. MOREs were critical because it was not clear in late 1990 if the agency would have to feed allies or prisoners and a commercial option helped build quantity.[71]

Before answers on allies and POWs could be obtained, Lt. Gen. McCausland updated senior leaders on subsistence. The news was mostly positive. By working with contractors, DLA had spurred T-ration and MRE production.[72] Additionally, the agency had just signed a contract with Hormel for 25.6 million MORE entrees, 4 million to be delivered by 26 November, 8 million between December 1990 and February 1991, and 13.6 million between March 1991 and May 1991.[73] B-ration production was also increasing, with assembly maximized at Defense Depot Memphis and set to start at Defense Depot Tracy.[74]

Ten days after McCausland sent his update, the agency started supplementing meals with fresh fruit from Turkey.[75] With production ramping up in the states and refinement in theater, the Defense Personnel Support Command commander traveled to the Middle East. There he found

[69] Rpt, DLA, Gee Whiz Desert Shield / Desert Storm Data, 24 Apr 1991, p. 5, Folder: DLA Support in Desert Storm / AAR, Box 22, PAO Archives.
[70] Order, DPSC, to multiple, CIM and MORE Ration Strategies, 26 Nov 1990, p. 2, Folder: Rations, Box 1, UD(UP) 34, RG 361, NARA.
[71] Mssg, DLA, to Army, ODS Subsistence, 10 Dec 1990, pp. 1-2, Folder: Rations, Box 1, UD(UP) 34, RG 361, NARA.
[72] Mssg, Lt Gen Charles McCausland, to GEN Schwarzkopf and CJCS, Supply Posture for Rations and Clothing, 16 Nov 1990, pp. 1-3, Folder: Rations, Box 1, UD(UP) 34, RG 361, NARA.
[73] Ibid., p. 2.
[74] Ibid.
[75] Mssg, DLA, to DPSC, et al., DOD Purchases of Turkish Fruits, Vegetables, and Dairy, 26 Nov 1990, pp. 1-2, Folder: Rations, Box 1, UD(UP) 34, RG 361, NARA.

subsistence "generally good," although units were still short DLA commodities such as "medical [items], barrier material, some packaged POL, and some repair parts."[76]

Most repair parts were ordered by newly arrived units. On 8 November, four days after the XVIII Airborne Corps completed its deployment, President Bush ordered the VII Corps relocated from Europe so he would have a force capable of ejecting Iraq from Kuwait.[77] DLA's provision of food and uniforms did not quite double, as VII Corps was smaller than XVIII Corps, but its supply of repair parts and industrial hardware increased manyfold. VII Corps had thousands of tracked and wheeled vehicles, being comprised of the 1st and 3d Armored Divisions; 2d Armored Calvary Regiment; and 1st Infantry Division, a mechanized unit in the United States.

Demand also increased because of the desert's harsh environment. Blowing sand caused filters to fail eight times faster than in normal operating conditions and extreme heat wore tires out five times faster.[78] Other parts in constant demand included generators, generator parts, aircraft brakes, and modules and cables for Patriot air defense systems.[79]

Patriots became exceedingly important in January when Iraq started firing missiles into Israel. DLA's involvement extended beyond parts replacement. As manager of the weapon's contract,

[76] Trip rpt, cdr, DPSC, 24 Dec 1990, p. 3, Folder: Operation Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.
[77] Brad D. Lafferty, et al., Air Command and Staff College, "Gulf War Logistics: Theory into Practice," pp. 15-17; John J. McGrath and Michael D. Krause, *U.S. Army Materiel Command: Theater Logistics in the Gulf War*, n.d. 1994, pp. 42, 45.
[78] Richard D. Hill, "Depot Operations Supporting Desert Shield," *Military Review* 71, no. 4, n.d. Apr 1991, p. 19.
[79] Rpt, GAO, Desert Shield and Storm Logistics – Observations, 13 Nov 1991, pp. 26-29.

the agency provided "around-the-clock coverage for inspection and acceptance of emergency deliveries" as well as assisting "the 'change out' of tactical software/firmware."[80]

Patriot parts were the high point of DLA's Class IX provision. The low point was center windshields for C-5 Galaxies. As the Air Mobility Command commander complained to Lt. Gen. McCausland, "we are told you have no stock and contract negotiations have been in process for over 1 year … It is in our best interest and support of Operation DESERT STORM that you immediately resolve your negotiation problems and get the C-5 windshields on the shelf."[81] AMC's assertions were only partly true. The agency had received a purchase request in May 1990 but funding constraints had prevented it from soliciting the item until August.[82] Price negotiations then further delayed the contract.[83] Nonetheless, the order had been placed by the time the AMC commander wrote his message, with the first two windshields scheduled to arrive by 11 March.[84]

Other critical items were available in sufficient quantity. The nation's only jewel bearing production site, the William Langer Jewel Bearing Plant in Rolla, North Dakota, was contractor-operated and DLA-owned. Used in satellites; the Abrams main battle tank; and Tomahawk, Hellfire, and Patriot missiles, jewel bearings increased in demand 145% during the war.[85] Other

[80] AAR, Support of Operations Desert Shield, Desert Storm, 21 May 1992, p. I-30, Folder: DLA Support in Desert Storm AAR, Box 22, PAO Archives.
[81] Mssg, MAC, to DGSC, Windshield for C-5 Aircraft, 19 Jan 1991, p. 1, Folder: Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.
[82] Ibid.
[83] Ibid.
[84] Note, DLA, C-5 Windshield, 24 Jan 1991, Folder: Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.
[85] AAR, DLA, "Support of Operations Desert Shield/Storm, August 1990 – March 1991, 21 May 1992, p. I-36, Folder: DLA Support in Desert Storm / AAR, Box 22, PAO Archives.

than kits, specialty uniforms, and presidential flags, jewel bearings were the only item DLA manufactured in the early 1990s.

Managing clothing, food, windshields, and jewel bearings during a popular war made DLA a known commodity to American industry. For suppliers never having done business with the agency, the introduction came from the Joint Chiefs of Staff or Office of the Secretary of Defense, which forwarded unprompted solicitations. Offers sent to DLA included truck-mounted air conditioners and Magellan GPS position finders.[86]

More shocking to a largely invisible agency was becoming known to the general public. Several wartime missions advanced DLA's recognition but none more so than bulk donations. Like citizens who mailed letters "to any service member," corporations wanted to support the troops. At first, the General Services Administration processed their offerings. Short on staff, the administration turned the job over to the Defense Department, which passed it on to DLA. The agency received offers and, if judged beneficial, handled their distribution. Between accepting the task in mid-August and DoD stopping the program on 5 March 1991, the agency received 11,000 inquiries and processed 1,450 shipments totaling $74 million.[87] Shipments averaged seventeen tons and included items such as puzzle books, macrame craft cord, and facial mist.[88]

[86] Ltr, Lt Col Steven M. Demel, to cdr, CENTCOM, Portable Air Conditioners, p. 1, 1 Nov 1990, Folder: Operation Desert Shield, Box 1, UD(UP) 34, RG 361, NARA; Ltr, Capt H.O. Ruppmann, act exec dir, contracting, to David V. Deal, Magellan, 9 Nov 1990, Folder: Operation Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.
[87] AAR, DLA, "Support of Operations Desert Shield/Storm, August 1990 – March 1991, 21 May 1992, p. I-4, Folder: DLA Support in Desert Storm / AAR, Box 22, PAO Archives.
[88] Ibid., pp. I-26, I-44.

Donations ended with service members still in theater. Operation DESERT SHIELD transitioned to Operation DESERT STORM on 17 January – the date by which many commodities had to arrive. At the end of the month, the Army's Deputy Chief of Staff for Logistics requested an update from DLA. McCausland replied that chemical suit providers had increased from four to seven and monthly output from 33,000 to 150,000.[89] Meanwhile, B ration manufacturers had risen from zero to nine, with 27,100,000 meals being assembled monthly, and desert boot manufacturers had jumped from zero to four, with 160,000 pairs being produced monthly.[90]

McCausland submitted this report halfway through the month-long aerial bombardment that launched Operation DESERT STORM. Sustainment remained unchanged after the hundred-hour ground fight that ended it but not the larger logistics mission. Returning troops was more complex than deploying them, involving environmental considerations and excess inventory. DLA's Defense Reutilization and Marketing Office helped the services reduce their excess.

IV. Redeployment and Lessons Learned

The DRMO was important because of the amount of equipment needing to be processed. Land forces had frequently resorted to cannibalism to keep equipment functioning. Not only had poor asset visibility made it easier to ship new vehicles than repair parts but, when the Army replaced M1 Abrams tanks and M2 Bradley infantry fighting vehicles with upgraded versions, maintainers picked the older models for parts. The DRMO handled the carcasses.

[89] Memo, R.F. Chiesa, exec dir, contracting, to LTG Jimmy D. Ross, Contracting Actions, 30 Jan 1991, p. 3, Folder: Operation Desert Shield, Box 1, UD(UP) 34, RG 361, NARA.
[90] Ibid.

Other activity was domestic. Supply centers and contract management offices had to work hard and fast to turn off the spigots they had just worked hard and fast to open. Even so, surpluses had accumulated. Supply centers pursued different approaches to reducing them, with the Defense Personnel Support Center's subsistence managers skipping all purchases for 1992.[91]

While field activities were changing missions, headquarters was fixing problems. One was the lack of asset visibility. Despite the Government Accountability Office reporting problems the services had tracking assets during the war, the agency and TRANSCOM worried about those in transit.[92] Port operators in Saudi Arabia, overworked and few in number, had stacked containers wherever they found space.[93] Frustrated at not knowing where their equipment was, supply clerks, undoubtedly responding to command pressure, kept reordering.

Problems tracking shipments surprised no one. The agency had been working with TRANSCOM on radio-identification technology before the conflict. It was not until after it ended, however, that tags – first passive, then active – were attached to containers. The war also prompted the agency to burn manifests onto optical cards.[94] Cards obviated the need to open containers and helped write discrepancy reports.[95] Like radio-identification tags, they came too late for DESERT SHIELD and DESERT STORM.

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[91] Fact sheet, DPSC, Subsistence Inventory Reduction, 17 Jan 1992, p. 1, Folder: 60 Minutes and Fallout, Box 50, PAO Archives.
[92] Rpt, GAO, Desert Shield and Storm Logistics – Observations, 13 Nov 1991, p. 30.
[93] AAR, DLA, "Support of Operations Desert Shield/Storm, August 1990 – March 1991, 21 May 1992, p. II-B-5, Folder: DLA Support in Desert Storm / AAR, Box 22, PAO Archives.
[94] Beth Offenbacker, DLA Public Affairs, "DLA's Optical Laser Card: the Brain that Can Fit in Your Wallet," *Dimensions* 14, no. 12, Oct/Nov 1993, p. 4.
[95] Ibid., p. 6.

Another wartime development was in-theater contingency support. DLA had understood being a combat support agency meant planning with the joint staff and combatant commands but not deploying employees to active theaters. The after-action review process confirmed the need for trained personnel to be on-call at all times. The result was the contingency support team program still used today.

A third development emerged from the fear the agency would not have enough nerve agent antidote and chemical protective equipment. In February 1991, a DLA major wrote a paper arguing the agency should refrain from terminating contracts for "combat critical" or "militarily unique" items that had "high wartime and low peacetime demands," "long production leadtimes" or a "limited shelf life."[96] He listed chemical protective suits, chemical protective gloves, nerve agent antidotes, desert uniforms, desert boots, MREs, tray packs, concertina wire, fence posts, and human remains pouches as requiring assured supply.[97] He also argued DLA needed to "maintain a viable, responsive production base for critical stock fund items."[98] Recommendations by this officer and others led the agency to develop a contracting device in which it paid to reserve its place in line for items whose demand surged during crises. It called the device the Warstopper program.

[96] Talking ppr, DLA, Acquisition Strategy for Warstopper Items, 21 Feb 1991, p. 1, Folder: Shield and Storm, Box 1, UD(UP) 34, RG 361, NARA.
[97] On the copy in the DLA Public Affairs archives, sandbags, packaged POL, and barbed wire are penned-in additions. Ibid., p. 2.
[98] AAR, DLA, "Support of Operations Desert Shield/Storm, August 1990 – March 1991, 21 May 1992, p. II-C-1, Folder: DLA Support in Desert Storm / AAR, Box 22, PAO Archives.

Analyses after the conflict credited its early termination with hiding the military's inability to sustain itself over prolonged periods.[99] While perhaps reflecting the retail situation, this observation was untrue at the wholesale level. DLA had revived the industrial base in less than six months. Every item in short supply at the beginning of the conflict had been filled, replaced with a substitute, or covered by an accelerated production contract by the time fighting began.

DLA leaders trumpeted this success. Not only was it important for employee motivation but, with the military returning to post-Cold War contraction, the existence of the agency was at stake. Organizationally, decision makers and the public had to know integrated logistics had helped win the war.

Some validation came unprompted. From the Pentagon, Assistant Secretary of Defense for Production and Logistics Bob Stone wrote the director "Dear Chuck – Just a note to let you know how proud I am of the work DLA people have done to support our customers in Operations Desert Shield / Storm."[100] Other validation resulted from outreach. On 2 April 1991, Air Force Major General Charles R. Henry, commander of the Defense Contract Management Command, gave a speech to the Defense Policy Advisory Committee on Trade titled "The U.S. Industrial Response during the Middle East Crisis." On 18 April 1991, McCausland gave a speech titled "The Logistics Miracle of Desert Storm" to the National Defense Transportation Association.

[99] See, for example, rpt, GAO, Desert Shield and Storm Logistics – Observations, 13 Nov 1991, p. 2.
[100] Ltr, ASD(P&L) Robert Stone, to Lt Gen Charles McCausland, 24 Jan 1991, p. 1, Folder: Shield and Storm, Box 1, UD(UP) 34, RG 361, NARA.

The need to promulgate the "logistics miracle" interpretation was apparent a year later when the television show 60 Minutes criticized DLA for excessive storage. The production team ignored the many successes the agency had during the war and instead focused on the few areas in which it could arguably be considered inefficient. Fallout from this imbalanced account was injurious but temporary. While DLA remained sizable and important, it regressed in press coverage, with knowledge of its existence restricted to locations where it operated and the military writ large, although not always there.

Events overtook reform as well as messaging. The agency's after-action review identified many areas for improvement but the need to devote attention to post-Cold War restructuring restricted efforts to those already underway: in-transit visibility, contingency operations teams, and the Warstopper program. Increases in consumable item and distribution responsibilities in the 1990s disrupted DLA just as much as losing the Defense Technical Information Center and Defense Contract Management Command. Additionally, "operations other than war" following Operations DESERT SHIELD and DESERT STORM, to include some over Iraq, left questions about DLA's role in setting theaters and developing lines of communication unanswered.

V. Conclusion

There are two approaches to learning from the past. The first involves deducing what or what not to do. The clarity necessary for this approach is possible only when the event analyzed is similar to the current challenge. The one direct lesson from the Gulf War applicable today is the importance of closing out theaters. What the Defense Reutilization and Marketing Service did in

Saudi Arabia is the same as what DLA Disposition Services did at the end of Operations IRAQI FREEDOM and ENDURING FREEDOM. It is something the agency will have to do again.

The second approach involves fundamental lessons. Operations DESERT SHIELD and DESERT STORM revealed a few enduring truths. The first is the need to embrace technological change. While the Gulf War showed how desperately change was needed, DLA succeeded in the conflict largely because it had embraced logistics modernization before fighting began. The second lesson is that wars are oftentimes unexpected. While the Defense Department had templated an Iraqi attack south, few in the United States expected Saddam Hussein to replace the Soviet Union as the nation's primary nemesis.

A final lesson is the need to understand customers. The military services were undergoing significant rearmament before the Gulf War. The Marine Corps was transitioning away from the M60 tank; the Army was upgrading the Abrams tank; the Air Force was employing guided munitions for the first time; the Navy was proving roll-on, roll-off vessels could be used in combat; and all services were learning to rely on satellite communications. Today, the services are undergoing similar transitions. For an agency whose success depends on predicting materiel needs, staying abreast of these changes is essential.