

Dragons in Flight: The Common CBRN Lineage of the Army and Air Force

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U.S. Army chemical, biological, radiological, and nuclear (CBRN) specialists and U.S. Air Force (USAF) 3E9 emergency management specialists share a common history. From the beginning of the Chemical Warfare Service (CWS) during World War I, the organization fully supported the fledgling U.S. Army Air Service through its evolution to the U.S. Army Air Corps (USAAC), then to the U.S. Army Air Forces (USAAF), and finally to the USAF, which was created in 1947.

Before World War II

During World War I, CWS scientists developed a special type of aircraft propeller glue in support of the Air Service. The CWS also developed smoke grenades for aerial signaling, smoke generators for aerial camouflage, and firing devices for airplane demolition charges. After World War I, CWS support for the Air Service and, later, the USAAC grew. Chemical officer positions were assigned to major USAAC headquarters; and in 1936, USAAC leaders requested a special Air Forces Gas Defense Course.

Because the CWS mission was to deliver toxic gas to the enemy, experiments with new methods of distribution were continually conducted. Developmental work involved the aircraft delivery of smoke and incendiaries in the form of aerial sprays and bombs.

The CWS began researching aerial screening smoke in the 1920s. After experimenting with various concepts, they delivered an aerial spray tank that was capable of releasing smoke or chemical warfare agents. By 1941, the 30-gallon M10 spray tank had become the standard expendable tank. The M10 was

filled with a standard smoke solution of sulphur trioxide and chlorosulfonic acid (a mixture commonly referred to as “FS”) or titanium tetrachloride (FM). When released into moist air (which is common in the South Pacific), these compounds reacted to form a dense, white cloud.

An incendiary bomb requirement was signed in 1936. Serious work on the bomb began in 1937, and the 100-pound M47 chemical bomb was adopted in 1940. The M47 was designed to carry any chemical filling, incendiary, or chemical warfare agent. However, good fillings were not available until after 1941, when the CWS assumed responsibility for incendiary bomb development. Also in 1941, the CWS attempted to create “dragon’s breath” by developing an aircraft-mounted flamethrower; unfortunately, propeller blasts extinguished the flame.

Unit requirements developed at the General Headquarters (HQ) Air Force (AF), Langley Field, Virginia, in 1939 called for a platoon to be stationed at each air base that performed chemical supply and maintenance functions or conducted chemical warfare defense training. As a result, 134 platoons were activated stateside and more were activated overseas. Aviation chemical companies were created for each air district in 1940; and by the end of 1941, the 7th Chemical Company (Aviation) (CCA)—which was formed to support the Far East Air Force¹ from platoons located at Clark, Nichols, and Iba airfields—was stationed in the Philippine Islands (then a possession of the United States). In addition, the 5th CCA, which supported the Hawaiian Air Force, was located at Hickam Field, Oahu, Hawaii. Consequently, when World War II began, the CWS was already actively supporting the USAAF.



Beginning of World War II

World War II began with Japanese attacks on Hickam, Bellows, and Wheeler Army airfields in Hawaii on 7 December 1941. As the Soldiers of the 5th CCA struggled to defend their airfield against the attacks, they suffered one casualty; however, they also claimed responsibility for shooting down a Japanese aircraft.

The first attacks in the Philippines eliminated the Far East Air Force as a fighting force; so the 7th CCA, which began the war with 3 officers and 185 Soldiers, was left without a mission. Members of the company then trained and fought as infantryman in the 31st Infantry Regiment. Eight of the Soldiers were killed in action before 9 April 1942; the survivors took part in the infamous Bataan Death March. They suffered inhumane conditions at Camp O'Donnell and Cabanatuan prison camps, endured trips to Japan in "hell ships,"²² and were possible victims of sinister Unit 731³ chemical and biological warfare tests in Manchuria. Sixty-two 7th CCA Soldiers returned home at the end of the war—a survival rate of about 30 percent.

During World War II

An air chemical officer was assigned to HQ, USAAF, when the organization was formed in 1942. And there was a chemical officer or section placed at every level of command (air force, command, wing). As each Army AF was created, the CWS provided a chemical section; thus, when the 8th AF stood up, so did the 8th AF Chemical Section. Seven officers and nine enlisted men, led by Colonel Crawford Kellogg, arrived in England with the 8th AF in June 1942.

General Henry Harley Arnold, USAAF commander, ordered all USAAF units to prepare and train for a chemical attack early in the war. When the USAAF reached England, they saw how seriously the nation took their defensive measures and followed suit. Overall, USAAF preparations were better than those of the ground forces.

Organization

As the USAAF expanded, the organizational support structure changed. Before the war, the USAAF operated with a fixed-base, service support structure; however, during the war, it became apparent that mobile service support was necessary. In 1942, the Air

Service Group and Air Depot Group were fielded to provide this mobile support. The Air Service Group operated with the air combat units, while the Air Depot Group—which provided depot level support—operated farther to the rear. The CWS support to the USAAF was redesigned to accommodate the new groups.

Many new company organizations supported the USAAF Air Service Command. In addition to chemical sections, chemical companies (air operations) (CCAOs), chemical company depots (aviation) (CCDAs), and chemical companies (aviation maintenance) (CCAMs) also fell under ASC control. While three companies make up a battalion, there were no battalion headquarters allocated to support the entire USAAF.

Although CCAs were the primary support units at the beginning of the war, they were replaced by CCAOs when organizational changes were made in mid-1942. In fact, many of the first CCAOs were organized directly from older CCAs. For example, a 3d CCA platoon and several detachments in the Southwest Pacific area served as the nuclei for the formation of the 809th, 892d, 894th, and 895th CCAOs in September 1942.

The CCAO mission was to receive, store, prepare, load, and arm chemical warfare (gas, smoke, and incendiary) munitions for delivery by aircraft. Fifty-four CCAOs were activated during World War II, making them the largest employer of chemical Soldiers outside the chemical mortar battalions. These units were typically assigned to wings, with one platoon per squadron. The unit designation included an "L" (light), "M&H" (medium and heavy), or "D" (dive) signifying the type of wing supported. These CCAO units were in high demand in the Pacific, where incendiaries were used extensively.

Under Table of Organization and Equipment (TOE) 3-457, CCAOs were organized into four platoons and a distribution point, which were modularly designed so that each could operate independently. For example, the 816th CCAO (M&H) (headquartered at Barrackpore, India) supported the China-Burma-India Theater, with platoons providing support for operations at Shamsbernager, India (1st Platoon); Kunming, China (2d Platoon); Dinjan Airfield, India (3d Platoon); and Tezgaon, India (4th Platoon). Each platoon included teams that filled chemical bombs with smoke, incendiaries, and persistent and nonpersistent chemical agents. The distribution point



contained toxic-gas handlers and decontamination apparatus, and the 19 Soldiers stationed there maintained the Class V chemical dump.

Staff Sergeant John Haibach of the 808th CCAO (M&H) (which supported the 9th AF in England and, later, France) wrote of creating incendiary bombs from 55-gallon drums, working with M47A1 chemical bombs, and fuzing high-explosive bombs to support the fight. He also recalled a shortage of rolling stock, which required that all equipment be removed from trucks so that they could be used to transport supplies to forward air bases.

The heavy B-29 incendiary mission load in the Pacific led to the assignment of multiple companies to each XXI Bomber Command wing:

- The 802d CCAO (M&H) and 890th CCAO (M&H) were attached to the 314th Bombardment Wing (BW), North Field, Guam.
- The 812th CCAO (M&H) and 875th CCAO (M&H) were with the 315th BW, Northwest Field, Guam.
- The 805th CCAO (M&H) and 827th CCAO (M&H) were with the 58th BW, West Field, Tinian.
- The 813th CCAO (M&H) and 891st CCAO (M&H) supported the 313th BW, North Field, Tinian.
- The 870th CCAO (M&H) and 887th CCAO (M&H) supported the 73d BW, Isley Field, Saipan.

CCDAs provided chemical supply support to the USAAF. This unglamorous task consisted primarily of issuing chemical supplies, but also included salvage operations and munition filling. CCDA units generally established supply points in the forward area and depots in the rear area. Twenty CCDAs provided significant service during World War II.

At the beginning of the war, the authorized strength of the CCDAs under TOE 3-67 was 184 Soldiers. The CCDAs ended the war with 155 Soldiers assigned to a headquarters unit and three service platoons. Each of the modular service platoons included ammunition, toxic gas, general supply, and administrative sections. The platoons could be detached or pooled to operate one large depot.

Two CCDAs were located under the India-Burma ASC in the China-Burma-India Theater—the 769th CCDA

in Calcutta, India, and the 771st CCDA in Ondal, India. The 752d CCDA stored material at North Field, Guam, in support of XXI Bomber Command operations in the Pacific. The 754th CCDA (along with the 756th CCDA, located at Riseley, Bedfordshire, England) operated USAAF Station 517 at Little Heath, Suffolk, England, with a detachment that briefly filled M47A1 incendiary bombs at Warren Wood, Suffolk, in support of the 8th and 9th AFs in England. As the lines moved forward across France, the 761st CCDA operated at Barisley le Cote, France; the 762d CCDA operated at Pierrefonds, France; and the 766th CCDA operated a depot at Reims, France.

CCAMs were designed to perform third-echelon (general support) and fourth-echelon (depot level) maintenance on all USAAF CWS equipment. These units were originally created under TOE 3-47, with a strength of 123 Soldiers (4 officers and 119 enlisted men) and divided into headquarters, repair, and salvage platoons. Five CCAMs operated during World War II. By the end of the war, there were 93 personnel in the HQ gas mask repair and equipment repair platoons.

A 701st CCAM detachment, led by First Lieutenant Howard Beckstrom, was maintaining forward-deployed M47A1 mustard bombs aboard the Steamship (SS) John Harvey when it was destroyed in an air raid in Bari, Italy. Everyone onboard the ship was killed instantly, and there was no one else who was aware of the mustard gas hazard. As a result, hundreds died from exposure to the gas.

Materiel

All USAAF Soldiers were issued gas masks and other associated equipment, including impregnated, chemical-protective clothing. Every vehicle was equipped with a 1½-quart decontamination apparatus, and each squadron was issued the standard, 3-gallon decontamination apparatus. Although power-driven decontamination apparatuses were also to be issued to each squadron, that equipment was always in short supply. The squadrons that had the equipment used it, but not always for its intended purpose. For example, the 315th Bomb Group converted their decontamination trucks into shower facilities.

Research and development in support of the air war proceeded at a



rapid pace. Increased demand for larger aerial smoke screens and curtains resulted in the CWS design of the bomb-bay-mountable, 50-gallon M20 and 30-gallon M21 tanks, from which smoke was forced using a pressurized tank of carbon dioxide. Thousands of these smoke tanks were procured; however, they were not easy to use and, consequently, were discarded in 1944. Other smoke tanks that were designed and produced included the bomb-bay-mounted, 70-gallon M33; wing-mounted, 70-gallon M33A1; and heavy bomber-sized, 200-gallon M40, which could be mounted in a B-17 or B-24. But none were as popular as the 30-gallon M10 smoke tank—at least partially due to its expendability.

The 100-pound M47 was the standard, aerial-delivered, chemical bomb in 1940, but it was improved throughout the war. While the M47 was referred to as a “chemical” bomb, the filling was not limited to chemical warfare agents; the bomb could also be filled with incendiaries. The CWS procured more than 3.5 million M47 series bombs. The USAAF dropped these (generally incendiary-filled) bombs in all theaters of war from Germany to Japan. The need for a good incendiary filling for the M47 prompted the development of “napalm,” which is an incendiary named for two of the chemicals used in its composition—**n**aphthenic and **p**almitic acids. Full-scale production of napalm began in 1943; and by 1945, the M47A2, which carried napalm, was considered one of the most valuable bombs of the war. Other chemical bombs, ranging in size from 115 to 2,000 pounds, were procured depending upon the expected use.

Another incendiary bomb procured by the CWS was the AN-M50 series, which was modified from a British incendiary bomb. This was a small, 4-pound, magnesium-cased bomblet with a thermite core and a fuze. The bomblet burned at extremely high temperatures for up to 7 minutes. The USAAF and U.S. allies dropped more than 30 million AN-M50s (which were normally dropped in 500-pound clusters) on Europe and more than 10 million on Japan. In anticipation of a possible magnesium shortage, the CWS developed the steel-cased M54 bomb. The M54 was actually used first; the Doolittle B-25 crews, which were launched from the U.S. Ship (USS) Hornet, dropped M54s on Japan in April 1942. The constant availability of M50 bombs rendered the M54 redundant, so it was seldom issued and was declared obsolete in 1945. The 500-pound incendiary M76 bomb was also seldom issued.

The CWS also procured the 6-pound M69 oil bomb. Whereas the M54 burned as it landed, the M69 shot a burning glob of oil. The M69, which was used extensively in the Pacific, wreaked havoc on Japanese wood frame structures. More than 100,000 tons of incendiaries were used in the Pacific.

In addition to the design, development, and procurement of bombs, the CWS also devised fuzes for air-droppable fuel tanks that were filled with napalm or other flammable mixtures. These extremely effective “fire bombs” were used to burn away foliage that covered fighting positions. The USAAF used more than 12,000 of these bombs in Europe, but more than 24,000 were used by all Services in the Pacific campaigns.

Training

Most specialists were trained at the Chemical Replacement Training Center, Edgewood Arsenal, Maryland, and (later) Camp Sibert, Alabama. In December 1942, the USAAF established a specialized course; and by early 1944, 1,450 chemical enlisted men had completed the course. In 1944, the USAAF Center for Chemical Warfare Training was established at Barksdale Field, Louisiana, under the 3d AF. After the Air Force Training Command was established, the center was moved to Buckley Field, Colorado, in 1945.

Unit gas officers and noncommissioned officers who were not chemical specialists initially attended a four-week class at Edgewood Arsenal. The initial demand for the officer’s class was so high that fifteen aviation-focused training classes were conducted from January 1941 to February 1943. After that, diminished requirements resulted in the incorporation of aviation students into regular gas officer classes. In addition, a four-week chemical officer training class, which was designed strictly for officers with pending USAAF assignments, was also offered.

Over time, the USAF chemical specialty has evolved into the 3E9 emergency management career field. Superior airmen who choose this career are trained by Detachment 7, 366th Training Squadron, Fort Leonard Wood, Missouri.

General-Purpose Chemical Unit Support

As necessary, general-purpose chemical units provided support to the USAAF. Smoke companies provided generated smoke coverage for airfields in emergencies, particularly in the Philippines in 1944 to hinder the



accurate Japanese bombing of forward airfields. Chemical laboratory companies provided laboratory support to all who needed it. Chemical decontamination units provided decontamination and bath support. Finally, chemical processing companies provided laundry services and clothing impregnation. This could be considered the same “support to other Services” that the Chemical Corps now provides.

After World War II

The USAF was created by the *National Security Act of 1947*. The separation of the USAAF from the Army meant that much of the support that the CWS had provided to the USAAF was forgotten. However, CBRN protection efforts have been taken up by present-day 3E9 emergency management specialists. The colocation of the U.S. Army and USAF training centers at the U.S. Army Maneuver Support Center of Excellence at Fort Leonard Wood enables the Army and USAF to continue the partnership that began so long ago. 

Endnotes

¹The Far East Air Force was the military aviation arm of the U.S. Army in the Philippines leading up to the beginning of World War II.

²A “hell ship” is a ship with very unpleasant living conditions or with a reputation for cruelty among the crew. The term “hell ship” is generally used to refer to Imperial Japanese Navy ships that transported allied prisoners of war from the Philippines, Hong Kong, and Singapore to Japan during World War II.

³Unit 731 was a covert biological and chemical warfare research and development unit of the Imperial Japanese Army. The unit conducted lethal experiments on humans during World War II.

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