CHAPTER 2
MEETING WARTIME CHALLENGES

The Making of an Atomic Engineer: Kenneth D. Nichols

Manhattan District insiders gave major credit for development of the atomic bomb to the little publicized Engineer colonel who headed the District from 1943 to 1945. To many of them, Kenneth D. Nichols was the real hero of the piece. Dr. Vannevar Bush, who headed the Office of Scientific Research and Development, expressed "great admiration" for the leadership Nichols displayed. Lieutenant General Leslie R. Groves, overall director of the atomic project, rated Nichols "an excellent choice" with "an extraordinary grasp of technical and scientific details." Nobel laureate Arthur Compton, one of the scientific greats behind the bomb, described Nichols as "a man who really understood" the scientists' problems, "who had a clear view of justice. . . , and who was completely straightforward and courageous." In his book *Atomic Quest*, Dr. Compton noted:

> It was Nichols on whom Groves depended to see that the gaseous diffusion plant [at Oak Ridge, Tennessee] was carried through to successful completion and production. . . . Without the product of this plant the bomb that destroyed Hiroshima and shocked Japan into resigning from the war would not have been made in time.

Nichols joined Manhattan Project in the summer of 1942, when Colonel James C. Marshall, its first Manhattan District Engineer, chose him as his deputy. At the time, the 34-year old West Pointer was Area Engineer at the Pennsylvania Ordnance Works, a $50 million TNT plant under construction near Allenwood. His earlier background included several tours at the Waterways Experiment Station, the Corps' hydraulics laboratory at Vicksburg, Mississippi; canal survey work in Nicaragua; and four years as an instructor at the U.S. Military Academy. Brilliant and scholarly, Nichols had studied at the Technical University in Berlin and had earned two advanced degrees, an M.C.E. from Cornell and a Ph.D. from the State University of Iowa. His record as deputy was impressive; and, in mid-1943,

when Colonel Marshall received a promotion and left for duty overseas, Nichols moved up to be District Engineer.

In 1953, shortly before he retired from the Army, Nichols, then a major general, was asked about the secret of his wartime success. His answer was illuminating: research experience at Vicksburg coupled with academic contacts there; the opportunity afforded him by the Corps to pursue his education; and "the patience, persistence, drive, and guts" developed in handling river and harbor projects. In summary, Nichols said: "No strictly military experience during the period 1929 to 1941 could have been of such magnitude as to be in any way comparable with the Manhattan Project.... Without river and harbor assignments, I probably would have lacked most of the [necessary] experience factors."

Lenore Fine

Source: (1) Ltr, Bush to Historical Division, 27 Jan 64. (2) Leslie R. Groves, *Now It Can Be Told* (New York: Harper & Brothers, 1962), 29. (3) Arthur H. Compton, *Atomic Quest* (New York: Oxford University Press, 1956), 106 - 107. (4) Ltr, Nichols to CofEngrs, 9 Apr 53.

From Homefront to Battlefront in the Korean War

In the predawn darkness of 25 June 1950, a barrage of artillery and mortar fire signalled the invasion of South Korea by Communist North Korea. The following day President Harry S Truman ordered American armed forces to go to the aid of the non-Communist South. The Korean War had begun. In the struggle, U.S. Army Engineers played many roles. Perhaps the most versatile Engineer performance was that of the civil-military force-in-being in the United States.

In districts and divisions throughout the country, the emphasis switched from civil to military tasks. In San Francisco a typical pattern emerged. At the outbreak of war, 71 percent of district personnel were in civil works and 29 percent were in military construction; by the end of 1951, 84 percent were assigned to military work. In the Sacramento District, the cost of military construction rose from zero to $37 million in 3 years; at Tulsa, a $1 million military program increased to $50 million; the Buffalo District administered a military procurement program that peaked at $21 million annually.

District responsibilities began at the factory doors and reached to the fighting front. All along the line the Corps displayed military speed plus expert knowledge. Ordered to reactivate Fort Huachuca in Arizona, the Los Angeles District Engineer called in civil employ-

ees and had construction underway within two days. The Fort Worth District undertook military construction at seven air bases, at supply depots and at Fort Hood, Texas. The St. Louis District procured items ranging from barbed wire to prefabricated buildings, awarding 6,000 major contracts and expending $163 million for direct purchases. The same district dispatched the hopper dredge *Davison* to Korea in record time.

A battlefield problem that brought together the districts and the fighting Engineers of the Eighth Army was the tidal basin at Inchon, the harbor of Seoul. Here 30-foot tides made a tidal basin essential for the unloading of ships during low water. When the United Nations forces were in retreat, the 50th Engineer Port Construction Company dismantled the locks of the tidal basin; and, afterward, rebuilt them when free world troops returned. The Chicago District sent its chief of operations to inspect the locks, and the plans he prepared became the basis for rehabilitation of the harbor.

Lessons learned from the emergency were summed up a decade later by Los Angeles District Engineer Lieutenant Colonel Arthur R. Marshall, who stated: "The extremely fast reaction times, technical knowledge, and ability to expand overnight to accomplish vital military and disaster projects are directly due to capabilities developed and sustained by the Civil Works mission." Nowhere were Marshall's words more clearly proved than in the Korean emergency.

Albert E. Cowdrey

Source: (1) Civil Works Study Board records. (2) R. G. Lovett and B. S. Shute, "Army Engineer Procurement," *The Military Engineer*, 43 (March - April 1951), 87 - 91. (3) William McCollam, Jr., "Raising the Tidal Basin Lock Gates at Inchon, Korea," *The Military Engineer*, 44 (March - April 1952), 96 - 101.

Solving Problems for MACV: Dredging in Vietnam

A monumental congestion of shipping at the few Vietnamese ports of entry created a logistic nightmare in the first year of the American build-up. For this reason, in November 1965, Rear Admiral Alexander C. Husband, Officer in Charge of Construction (OICC) Vietnam, asked Lieutenant General William F. Cassidy, Chief of Engineers, for assistance in the dredging of channels into Vietnamese ports. Before the end of the year Husband and Cassidy signed a memorandum of understanding governing Corps of Engineers participation in this activity.

Since 1855 the Corps of Engineers has been building and operating seagoing hopper dredges for the opening and improvement of navigable waterways under its jurisdiction. A hopper dredge is an ocean vessel with propulsion machinery and special apparatus for dredging material into built-in hoppers, and transporting and dumping the spoil at a disposal site. During World War II the Corps of Engineers operated hopper dredges for the U.S. Army in both the European and Pacific theaters.

Because of shallow waters, the Civil Works Directorate, OCE, selected the *Davison*, one of six 700-cubic yard shallowdraft dredges constructed during World War II, for operations off Vietnam. Fitted out for the long ocean voyage and manned by a Corps of Engineers crew, this vessel reached Vietnam around March 1966, accompanied by the *Tudor*, a 65-foot T-boat equipped for survey and sub-bottom exploration. These vessels were attached to the Navy and placed under the operational control of OICC Vietnam.

The *Davison* completed its initial assignment of dredging the entrance channel at Chu Lai in mid-June 1966, removing 600,000 cubic yards and providing an excellent channel for LST's. The dredge next opened an interim deep-draft entrance channel 34 feet deep and 200 feet wide to the inner harbor of Qui Nhon. Subsequently, it deepened the shallow channels of other ports, and, with later dredges, did much to break the shipping jam. At the end of December 1966 this vessel departed for Guam for repairs.

Anticipating the requirement for other dredges of the same class, the Civil Works Directorate of OCE alerted Engineer districts and canvassed crews for volunteers. Hence, when Admiral Husband requested another hopper dredge in November 1966, OCE was ready to send the *Hyde*, which in January 1967 departed from Jacksonville, Florida, for Vietnam.

In addition to the *Davison* and the *Hyde*, the dredge fleet ultimately included 18 smaller pipeline cutterhead dredges, which were used primarily for land-fill work.

Dredging was imperiled by enemy attack and buried marine mines. The long supply line caused delays in getting replacement parts. These factors notwithstanding, the dredges in Vietnam cleared and deepened harbors, rivers, and canals; stockpiled sand for road and base camp construction; and reclaimed land for military sites.

Kenneth J. Deacon

Source: (1) Lieutenant General Carroll H. Dunn, *Base Development in South Vietnam, 1965 - 1970* (Washington, 1972), 52 - 54, 143. (2) F. C. Scheffauer, ed., *The Hopper Dredge: Its History, Development, and Operations* (Washington, 1954), ix, 3, 13 - 18 and Table II. (3) Memo, J. Remington, 16 Dec 1966. (4) OCE Items of Interest: Civ Wks Dir, Wks ending 19 Feb, 29 Apr, 23 Sep, 25 Nov 1966 and 20 Jan 1967.

Tulsa Responds in Peace and War

The history of the Tulsa District from 1941 to 1961 points up the flexibility of the district type of organization, which makes possible a quick transfer from civil works activities to military construction, civil defense, and disaster relief.

In late 1940, the Tulsa District included some 500 officers and civilian employees. With the transfer of Army Air Corps construction from the Quartermaster Corps to the Engineers in December of that year, the District got its first military construction projects—the Tulsa Aircraft Assembly Plant, Tinker Airfield at Oklahoma City, and Enid Army Airbase. The transfer of all remaining Quartermaster construction to the Engineers on 16 December 1941, nine days after Pearl Harbor, greatly increased the military construction load of an organization that only a year before had been concerned solely with civil works. The Tulsa District was now responsible for building cantonments, airbases, aircraft assembly plants, internment camps for prisoners of war and enemy aliens, ordnance plants, and military hospitals. During World War II the District supervised $800 million worth of military construction and procured equipment costing $100 million. The number of employees reached a peak of 3,250 in 1942.

In the years immediately after World War II, as military construction declined, the District again became almost wholly concerned with civil works. Just before the Korean War broke out in 1950, the District had a $17 million civil works program under way, with a military construction effort amounting to a mere $1 million. With the outbreak of war, the military construction effort again expanded, the District making the transition from civil to military construction rapidly and efficiently. From 1950 through 1953, the District supervised a military construction effort costing $150 million.

Military construction activities were also expanded occasionally in peacetime. In 1960, the District took on the crash program of building launching facilities for 12 Atlas ICBMs in the south-central United States. To provide protection against nuclear missile attack, the Tulsa District participated in the civil defense shelter survey program for the state of Oklahoma, entering into about 40 contracts with architect-engineer firms. About 4,500 buildings were surveyed.

The District on a number of occasions helped provide relief and assistance to areas stricken by natural disasters, easily taking in stride such added duties. In August 1947 the District was cited by the city of Tulsa for assistance rendered when the Arkansas River threatened to flood the Tulsa area. The District came to the aid of numerous communities when the Grand, Verdigris, and Red Rivers flooded in 1957 and 1959. It sent personnel to provide assistance during and after natural disasters, such as the California floods of 1955 - 56, the New England hurricane and floods of 1955, and Hurricane Carla in

1961. In Oklahoma, the scene of many tornadoes, District personnel provided crucial assistance to communities wrecked by the storms.

Karl C. Dod

Source: Ltr, Tulsa District Engineer to the Chief of Engineers, 11 May 64, sub: Civil Works Study Board, w/incls.

Dust Control in Vietnam

Dust caused helicopters much trouble in the early days of the war in Vietnam. At that time it was commonly and fallaciously believed that the employment of helicopters would require comparatively little maintenance. It was found, however, that the whirling rotor blades generated huge clouds of dust when the choppers used unimproved areas, unsurfaced hardstands, or hardstands surfaced with pierced steel plank. Dust abrasion wore out rotors in as little as 200 hours and did much harm to carburetors and engines. By obscuring visibility, dust led to crash landings and collisions. In fact, dust put more helicopters out of commission than enemy action.

Upon returning home from a trip to Vietnam in December 1965, General Harold K. Johnson, Army Chief of Staff, expressed serious concern over the problem to Lieutenant General William F. Cassidy, Chief of Engineers, and Lieutenant General W. W. Dick, Jr., Chief of Research and Development. General Cassidy soon came up with a solution. Since World War II civil works laboratories of the Corps of Engineers had tested hundreds of materials for alleviating dust and stabilizing soil. Among other measures, Cassidy advised applying peneprime, a high penetration, medium-cure, cut-back asphalt product as a dust-proofing agent.

In addition, Cassidy, suggested the formation of a team of experts from OCE, the Waterways Experiment Station, and Army Materiel Command. The team went to Vietnam for two weeks in February-March of 1966.

After interviewing a number of high-ranking engineers, the team made field inspections in the II and III Corps areas, visiting sites where engineers were constructing roads, airfields, and helicopter landing zones. From the information obtained from the engineer commanders, the team made several recommendations for alleviating the dust problem. The report gave first priority to controlling the dust at helicopter landing sites, especially if tactical operations were being planned. It also indicated how much area around a landing site should be dust-proofed and what combinations of asphalt and oils might be used as expedients until sufficient peneprime was

available. These recommendations and the use of peneprime eventually settled the dust problem, thereby significantly improving the safety and effectiveness of U.S. helicopter operations.

Kenneth J. Deacon

Source: OCE Dust Control Team Rpt, n. d.

POL Facilities in Vietnam

Petroleum, the life blood of modern war, is, in actual tonnage, the largest single item to be transported to a theater of operations. This is because armed forces in the field move and fight on oil. Fleets of motor vehicles, construction equipment, tanks, aircraft, and ships will become immobilized for want of gasoline or diesel fuel. In spite of this obvious fact, there were serious gaps in plans to provide adequate petroleum-oil-lubricants (POL) storage and distribution facilities for the American forces in Vietnam in 1965.

In earlier days, tank farms of three commercial oil companies—Esso, Shell, and Caltex—near Saigon adequately served the small military advisory parties. But these companies had neither the storage capacity nor the means of distribution to take care of the great number of troops during the build-up of 1965.

In September of that year, at the request of U.S. Army, Pacific, in Hawaii, the Department of Army formed a Petroleum Assistance Team to go to Vietnam and plan a petroleum distribution system to meet the requirements of the U.S. Army there. The team consisted of six members, three from the Quartermaster Corps and three from the Corps of Engineers. Had the team been summoned at the start of the build-up, much confusion and frustration might have been averted. The team left Washington for Vietnam on 30 September 1965. After their arrival in Vietnam, the members interviewed representatives of major commands and commercial oil companies, reconnoitered the existing POL systems, and surveyed sites where future construction of facilities was envisioned.

In its report to U.S. Army, Pacific, the team recommended the development of POL storage and distribution systems at Saigon, Cam Ranh Bay, Vung Tau, Nha Trang, Qui Nhon, An Khe, and Pleiku.

The team also studied the petroleum distribution system for U.S. forces in Thailand. Using the same investigational techniques as in Vietnam, it made recommendations covering permanent and tactical pipelines, tankage and dispensing facilities, and ship-to-shore and other dispensing systems to support U.S. Air Force operations.

Following briefings at Army Pacific Headquarters in Hawaii on 15 December 1965, the team completed its mission and its members returned home. The recommendations of the team were implemented in both Vietnam and Thailand.

Kenneth J. Deacon

Source: Mil Eng Div, T&MLE, OCE, Hist Sum FY 1966, based on: Rpts of DAPAT to CINCUSARPAC, sub: Petro Dist Sys, USARV, 17 Nov 65, and Petro Dist Sys, US Forces, Thailand, 4 Jan 66.

Rufus Putnam's Chandeliers: The Fortification of Dorchester Heights, 1776

Today's highly professional, combat-ready Corps of Army Engineers presents a striking contrast with the infant Corps of 200 years ago. At the outbreak of the Revolution, the American Colonies had no trained military engineers who could serve with forces in the field. To be sure, there was Richard Gridley, a gifted mathematician whose exploits at Louisburg in 1745 and 1758 had won him a commission in the British Army and who, as a surveyor and civil engineer, had come to be known as "the only gauger in America." When the first shots were fired at Lexington and Concord, Gridley was sixty-five. Although he was named Chief Engineer of the Army, his age precluded hard compaigning. Most of the early field fortifications were designed by practical men, artisans and mechanics, who were innocent of engineering knowledge. This situation triggered the complaint from blunt-spoken General Charles Lee that none of his so-called Engineers could tell a chevaux-de-frise from a cabbage garden.

Lee's remark was aimed at the likes of Lieutenant Colonel Rufus Putnam, a Massachusetts militia officer pressed into service as an Engineer. A millwright by trade and a self-educated man, Putnam made no pretense of being a trained technician. He had, as he put it, "never read a word on the subject of fortification," and he disclaimed any knowledge of "laying works." Nevertheless, his plans for improvised defenses at Charlestown and Roxbury in the summer of 1775 had shown a certain Yankee shrewdness that many of his fellow Americans found impressive. In March of '76, lacking bona fide Engineers, General Washington turned to Putnam for advice.

Anxious to force the British out of Boston, Washington asked Putnam if he "could think of any way" to fortify Dorchester Heights, overlooking the city. The task seemed impossible. Because the ground was still frozen, earthworks were out of the question. Put-

nam could do no more than promise to think the matter over and try to find an answer. Later that same afternoon, when he called to congratulate newly promoted Major General William Heath, he happened to see a book on Heath's table, Mueller's *Field Engineer.* Putnam borrowed the book, and the next morning, on opening it to the contents, spied the word "chandeliers," something he had never heard of before. He turned to the page and there was his solution: fortify the heights with moveable wooden parapets, which the French called chandeliers. That very night, work details carried out his plan.

Every schoolchild knows the rest of the story. When the sun rose the following morning, the British saw American cannon pointing down at them from the heavily fortified heights. Overnight, their position had become untenable. Within a few days, they evacuated Boston.

Insisting that "Providence" had guided him to the chandeliers, Colonel Putnam moralized: "Let infidels scoff if they will." Today's Army Engineers enjoy educational advantages that Putnam never dreamed of. Although help from on high is still welcome, the Engineers are now usually able to solve military problems on their own.

Lenore Fine

Source: Rowena Buell, comp., *The Memoirs of Rufus Putnam and Certain Official Papers and Correspondence* (Boston: Houghton, Mifflin and Company, 1903), 56 - 58.

Building the Atlantic Bases

Following the fall of France in June 1940, German U-boats were able to operate with great effectiveness from bases in Brittany and the Atlantic ports. They were boldly aggressive, and, despite the convoy system, sank mounting numbers of British ships. By mid-August 2.5 million tons of shipping had been destroyed. The situation was ominous; Britain's survival was at stake.

Britain had an immediate need for more destroyers; the United States required strategically placed air and naval bases to defend the Panama Canal and the Atlantic coast as part of its Hemispheric Defense Plans. Accordingly, on 2 September 1940, the United States agreed to transfer fifty overage destroyers to Britain in exchange for the right to establish, under a 99-year lease, air and naval bases in the Bahamas, Jamaica, Antigua, St. Lucia, Trinidad, and British Guiana. Base rights for Newfoundland and Bermuda were also granted as a free gift to the United States at the same time.

This "destroyer deal," as it was popularly called, bolstered Britain in her desperate hour and enhanced the defensive posture of the United States.

Military organizations demonstrated their ability to work fast in an emergency. On 3 September a board of Army and Navy officers under Rear Admiral John W. Greenslade, USN, flew to Bermuda to investigate sites for bases. Colonel Joseph D. Arthur, Jr., served as Engineer adviser. By the end of October the board had surveyed sites in each of the territories.

Meanwhile, the Chief of Engineers, Major General Julian L. Schley, organized the Eastern (later Caribbean) Division, under Colonel Arthur, and four new districts—Newfoundland, Bermuda, Jamaica, and Trinidad—to direct base development. The Chief also established area offices in the Bahamas under the Jamaica District, and at Antigua, St. Lucia, and British Guiana under the Trinidad District.

In mid-February 1941, some two months before the State Department had completed negotiations with British and colonial authorities, the District Engineers negotiated contracts with American firms which would do the actual work. The contractors hired skilled American workers and paid them the same wages they would receive in the United States plus a differential for overseas service. Most of the common labor was locally hired and paid at prevailing rates. Seventy-five percent of the construction materials came from the United States. The Corps of Engineers exercised jurisdiction over all construction workers.

To avoid excessive expansion of their staffs, the District engineers engaged architect-engineer firms to aid in the design of airfields, housing, hospitals, and storage facilities. These firms designed buildings to conform with local architectural styles and to suit the particular climatic conditions at each base. Temporary housing was erected for the contractors' work force; more durable buildings were put up for the American garrisons. The Surgeon General appointed military personnel to staff the hospitals.

The airfields were ready when the United States went to war in December 1941. They permitted operations by heavy bombardment groups and interceptor aircraft. They controlled the approaches to the Caribbean and hence to the Panama Canal. The base at Newfoundland formed a vital link in the transatlantic ferry route to Britain; those at Trinidad and British Guiana formed stepping stones on the 2,000-mile flight from Puerto Rico to Belem, the most northern base in Brazil capable of handling heavy traffic.

Kenneth J. Deacon

Source: (1) J. D. Arthur, Jr., "Military Construction in the Atlantic Bases," *The Military Engineer*, 36 (September 1944), 390 - 93. (2) S. Conn, R. C.

Engelman, and B. Fairchild, *Guarding the United States and Its Outposts* (*U.S. Army in World War II* series) (Washington 1964), chs. XIV & XV, passim. (3) S. E. Morison, "History of U.S. Naval Operations in World War II," vol. I, *The Battle of the Atlantic, September 1939 - May 1943* (Boston 1959), 22 - 25, 33 - 36. (4) W. F. Craven and J. L. Cate, eds., "The Army Air Forces in World War II," vol. I, *Plans and Early Operations, January 1939 - August 1942* (Chicago 1948), 121, 124, 162, 320.

End Runs Toward Lae

During the Second World War, General Douglas MacArthur commanded both American and Australian forces in the Southwest Pacific Area. That is how a detachment of the United States 532d Engineer Boat and Shore (EB&S) Regiment happened to be attached to September 1943 to the 9th Australian Division for operations against the Japanese stronghold of Lae in northeast New Guinea.

Plans called for two Australian divisions to envelop Lae. On 6 September the 7th Division was flown from Port Moresby to Nadzab, just occupied by Allied forces. From there it marched easterly toward Lae.

Two days before, the 9th Division had made an amphibious assault on the shores of the Huon Peninsula, 16 - 18 miles east of Lae. The division then had to move over a coastal plain cut by five major rivers and covered with jungle interspersed by mangrove swamps and patches of kunai 8 - 10 feet tall.

The monsoon rains that began on the night of the 6th soon immobilized the vehicles. Troops had to carry supplies on bush litters and on their backs. Although 25 percent of the division's fighting strength was soon devoted to porterage, progress was slow.

On the 8th the 9th Division reached the broad Busu River that was a serious obstacle to reaching Lae. The next day men of the 2/28th Battalion, 24th Brigade, attempted to wade and swim across the mouth of the wild, rain-swollen river. Many of them were swept off their feet and carried to the west bank where they struggled ashore. Others were swept out to sea, drowned, or were marooned on a sand bar exposed to Japanese fire. Much suffering and loss of life might have been averted had the engineering implications of the assault been earlier recognized.

At this juncture, the detachment of the 532d EB&S Regiment, which had been running supplies to subsidiary beaches, extended its operations to the beleagured force. After bringing in emergency supplies, the American boat commander, Lieutenant Henderson E. McPherson, volunteered to ferry the brigade beyond the river. For 48 straight hours his small boat shuttled troops along the coast to the rear of the Japanese outpost line. Braving hostile fire, turbulent seas,

and rocky beaches, this single boat made 40 trips to deliver 1,200 troops of the 24th Brigade safely west of the Busu.

The Busu behind them, the Australians pressed forward for the final assault on Lae. The Japanese now realized that their position was untenable and fled through the jungle toward the north coast of the Huon Peninsula. On the afternoon of the 16th, the Australian divisions occupied Lae. Although few in number, the U.S. Army Engineers at Lae enhanced the movement of friendly troops and helped to assure the success of this important operation.

Kenneth J. Deacon

Source: (1) OCE, GHQ, SWPA, Ann Rpt for 1943. (2) Hq, 9th Aust Div, Acct of Opns for Capture of Lae, 4 - 16 Sep 43. (3) David Dexter, *New Guinea Offensives (Australia in the War of 1939 - 1945* series) (Canberra, 1961), 254 - 56, 270 - 71, 275 - 76, 337 - 40. (4) John Miller, Jr., *Cartwheel: The Reduction of Rabaul* (*United States Army in World War II* series) (Washington, 1959), 202 - 207. (5) *Engineers of the Southwest Pacific*, Vol. IV, *Amphibian Engineer Operations* (Washington, 1959), 97 - 98, 105 - 10.

Showing What the Corps Can Do During a Crisis

From the Civil War to the end of the nineteenth century, the Corps of Engineers concentrated on river and harbor projects. Congress kept appropriations for seacoast fortifications small. But in 1898, on the eve of war with Spain, the Corps of Engineers skillfully mobilized its civil works organization for defense. In Baltimore, one of the nation's major commercial centers, the Corps hurriedly built gun emplacements for partially constructed batteries from the mouth of the Patapsco River to the Inner Harbor. Chief of Engineers Brigadier General John M. Wilson realized that in such a crisis the reputation of the Corps of Engineers was at stake. He urged Baltimore District Engineer Colonel Peter C. Hains to "show what the Corps of Engineers can do when an emergency arises for which the country is unprepared."

During the spring of 1898, crews worked double shifts using every available daylight hour pouring concrete and mounting guns to protect Baltimore's harbor. By June, the battery at North Point at the confluence of the Patapsco and Chesapeake Bay had eight platforms ready for 12-inch mortars. Closer to the Inner Harbor, the Corps mounted 8- and 12-inch high-power rifles at Hawkins Point and old Fort Carroll.

At the same time, Colonel Hains supervised the planting of mines in the harbor itself. The entire operation was shrouded with utmost

secrecy. Between 23 April and 12 May, workers placed explosives in the water. Hains had them arranged 400 feet apart in two lines on each side of the channel. Engineers kept the mines for blocking the middle of the channel ready on shore "to be promptly laid," Hains wrote Chief Wilson, "when danger is imminent - say after an enemy's fleet has arrived in the Chesapeake Bay."

Fortunately, the Spanish fleet never got that close. By July, the Spanish military had been crushed. But in the emergency, the Corps of Engineers' Baltimore District had effectively transformed its civil works structure to protect the populace. In August, Hains exploded the mines in the harbor in a dramatic fireworks display.

Harold Kanarek

Source: Harold Kanarek, *The Mid-Atlantic Engineers: A History of the Baltimore District of the U.S. Army Corps of Engineers, 1794-1974.*