

Exhibit 6


Expert Report of Jay L. Brigham, Ph.D.

**In the United States District Court
for the Eastern District of North Carolina
Southern Division**

Case No.: 7:23-CV-897

Camp Lejeune Water Litigation

Prepared by



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December 9, 2024**

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I. Introduction, Qualifications, and Opinions

I have prepared this expert witness report at the request of the Environmental Torts Litigation Section of the Civil Division of the United States Department of Justice. A representative of the Environmental Torts Section first contacted me in March 2024 regarding the Camp Lejeune Justice Act (CLJA) claims. Subsequently, Morgan, Angel, Brigham and Associates, LLC (“Morgan Angel Brigham”) and I, as the expert witness, signed a contract with the Department of Justice to review historical documents and write an expert witness report examining historical issues pertinent to the distribution of water to the areas of Camp Lejeune, relevant to the current litigation, during the CLJA “statutory period,” from August 1953 to December 1987.

This report is based on the information that I have reviewed to date. I reserve the right to supplement the opinions expressed herein as I review additional documents held in the National Archives and Records Administration facilities, other research repositories, including Marine Corps Base Camp Lejeune (MCBCL) and Marine Corps Base Quantico, additional documents produced by the parties in this case, and the reports and testimony of other experts in this matter. I, and staff under my direct supervision, conducted research at the National Archives and Records Administration facility in College Park, MD and at the Library of Congress in Washington, D.C. I contacted the National Archives regional facility in Ellenwood, GA and inquired about potentially relevant documents. I also visited the Harriette B. Smith Library at Marine Corps Base Camp Lejeune. My staff and I also reviewed digitized copies of the *Camp Lejeune Globe*, available online, and conducted online research primarily on Newspapers.com and various U.S. Marine Corps websites. A member of my staff also contacted Marine Corps Base Quantico and the Washington, D.C. Navy Yard to inquire about potentially relevant documents. In total, we reviewed approximately 23,100 documents in the preparation of this report, some of which are duplicates.

I hold a doctoral degree in United States history from the University of California Riverside with an emphasis on late nineteenth and twentieth-century American history. My company, Morgan Angel Brigham, is compensated at the rate of \$175.00 per hour for my services. I have given expert testimony in the United States Court of Federal Claims and the following United States District Courts: District of Kansas, District of New Jersey, Central District of California, District of South Carolina, Western District of Washington, Southern District of California, District of Arizona, the Southern District of Texas, and the District of New Mexico. I have attached my resume as Attachment 1 and a list of cases in which I have testified as an expert during the last four years as Attachment 2.

Based on my research and review of documents I offer the following opinions.

1. Camp Lejeune was serviced by nine water treatment plants (WTPs) during the “statutory period,” from 1953-1987. The Agency for Toxic Substances and Disease Registry (ATSDR) researched and determined that the Tarawa Terrace and Hadnot Point WTPs at Camp Lejeune were affected by contaminated water sources containing the chemicals at issue in this case. A third water treatment plant, the Holcomb Boulevard WTP, from the time it became operational in 1972 until February 1985, sporadically received contaminated water from the Hadnot Point WTP. ATSDR concluded that only base water supply systems at Tarawa Terrace, Hadnot Point, and Holcomb Boulevard were contaminated, and Plaintiffs’ experts did not allege otherwise. The United States’ expert, Dr. Remy Hennet, agrees.

2. The Camp Geiger (formerly Tent City), Camp Johnson (also known as Montford Point), Marine Corps Air Station New River, Rifle Range, Onslow Beach, and Courthouse Bay areas of the base were some distance from the Mainside, and each had infrastructure, including barracks and/or family housing, mess halls, and service clubs. Camp Geiger, Montford Point / Camp Johnson, MCAS New River, and Courthouse Bay all had lengthy travel distances to Mainside and/or were isolated from Mainside and had the types of services and amenities that made frequent trips to the Mainside unnecessary, such as post offices, dental clinics, laundromats or dry cleaners, theatres, libraries, and recreational facilities. Unlike these four areas, few Marines lived at the Rifle Range and Onslow Beach. Instead, portions of Onslow Beach were used by Marines and their families for recreation, while other portions were used for amphibious training. The Rifle Range was used by Marines on a revolving basis for training/qualification but was sufficiently far from Mainside that those assigned to it lived at the Rifle Range for the duration of the training/qualification. Each of these six areas were serviced by water treatment plants/systems that were independent of the contaminated water systems identified by ATSDR and Plaintiffs’ experts.

3. Documentary evidence shows that the ABC One-Hour Cleaners located at 2127 Lejeune Boulevard (Highway 24), identified as the source of contamination of the Tarawa Terrace WTP, likely opened in June 1954 or later, and not in 1953 as reported by the ATSDR.

4. Extant documentation reveals that the Marine Corps used water trailers to supply water for field training (otherwise known as “water buffaloes” or “water bulls”) at Camp Lejeune during the statutory period. All of the WTPs at Camp Lejeune had the infrastructure to support the installation of standpipes used to fill water trailers in their respective areas. The travel times between Hadnot Point and other areas, including those west of the New River, suggest further reason to construct standpipes in those areas.

II. Executive Summary

A. What is Camp Lejeune?

Camp Lejeune was originally called the Marine Barracks New River. It was renamed Marine Barracks Camp Lejeune in late 1942, following the death of Major General John Lejeune, and was later renamed Marine Corps Base Camp Lejeune in 1944.¹ For the entire statutory period, the Camp Lejeune Military Complex covered “an area of approximately 110,000 acres,” that included 2,772 acres that encompasses Marine Corps Air Station (MCAS) New River.² The city of Jacksonville, N.C. borders Camp Lejeune to the north. The Marine Corps acquired the area labeled in Image 1 as the Greater Sandy Run Area (“GSRA”) consisting of 41,100 acres in 1992. The area to the right of the GSRA is the footprint of MCBCL during the statutory period of the current litigation.³

¹ “History,” <https://www.Lejeune.marines.mil/visitors/history.aspx>. Also see G. Carraway, *Camp Lejeune Leathernecks, Camp Lejeune, N.C., Marine Corps’ Largest All-Purpose Base* (Carraway, *Camp Lejeune Leathernecks*) (New Bern, N.C.: Owen G. Dunn, 1946), 5, Exhibit 1. Throughout this report, I will refer to the base as Camp Lejeune. Most of Camp Lejeune is used for Marine Corps training and maneuvers, see Harland Bartholomew and Associates, Inc., “Camp Lejeune-Master Plan Update,” prepared for Atlantic Division Naval Facilities Engineering Command, Camp Lejeune, North Carolina, Atlantic Division, May 1986, (1986 Master Plan Update), CLJA_USMCGEN_0000326502, at *0000326643.

² 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326604. See also No author, “Welcome Aboard: A Guidebook to the 2nd Marine Division and Camp Lejeune, N.C.,” (Wilmington Printing Company) (1952 Base Guide), Base_Guides_0000000058, at *0000000063 and No author, “Camp Lejeune and New River,” (San Diego, CA: MARCOA Publishing Incorporated, 1988) (1988 Base Guide), Base_Guides_0000000923, at *0000000928.

³ USMC, *Semper Fidelis, A Brief History of Onslow County, North Carolina, and Marine Corps Base Camp Lejeune* (*Semper Fidelis, A Brief History of Onslow County*), (2004), 81, Exhibit 2. Portions of this work are excerpted to create the document, Naval Facilities Engineering Command, Mid-Atlantic, *The Past, the Present, and a Promising Future, At Marine Corps Base Camp Lejeune, North Carolina, An Abbreviated Overview of the Native American History and Historical Cultural Resources at Marine Corps Base Camp Lejeune*, undated (The Past, The Present, and a Promising Future, undated), CLJA_UST02-0003676100. In this expert witness report, I will cite the book length document except as noted.

Image 1

Map of Camp Lejeune and the Surrounding Area⁴

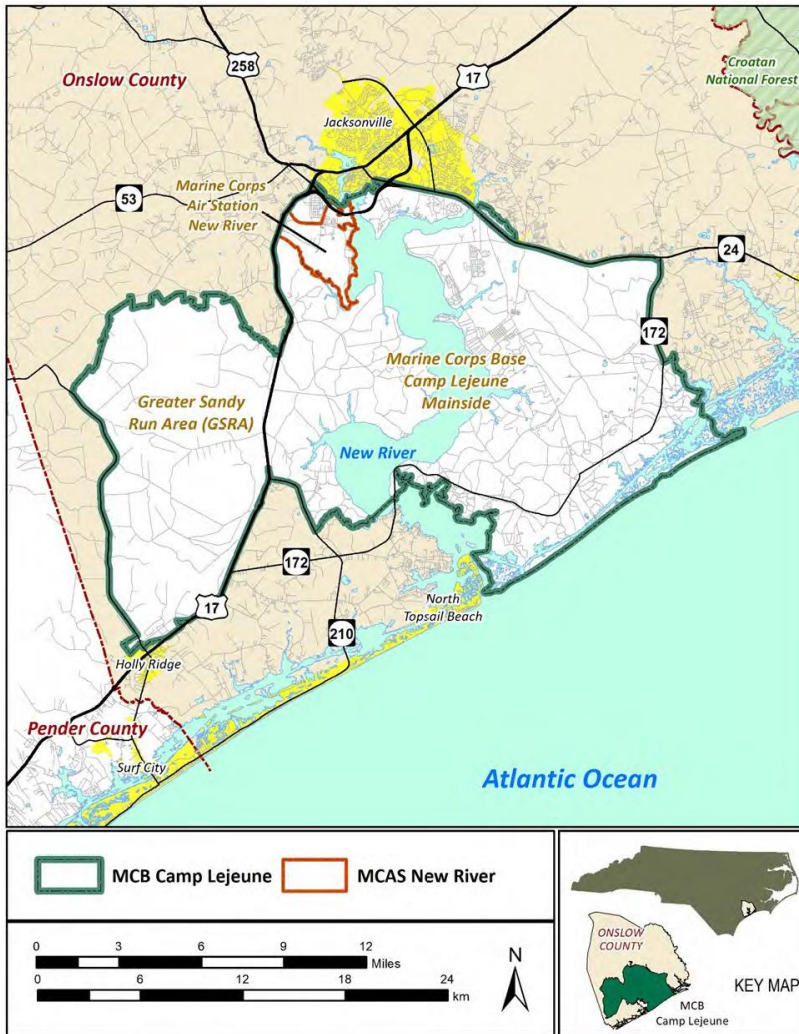
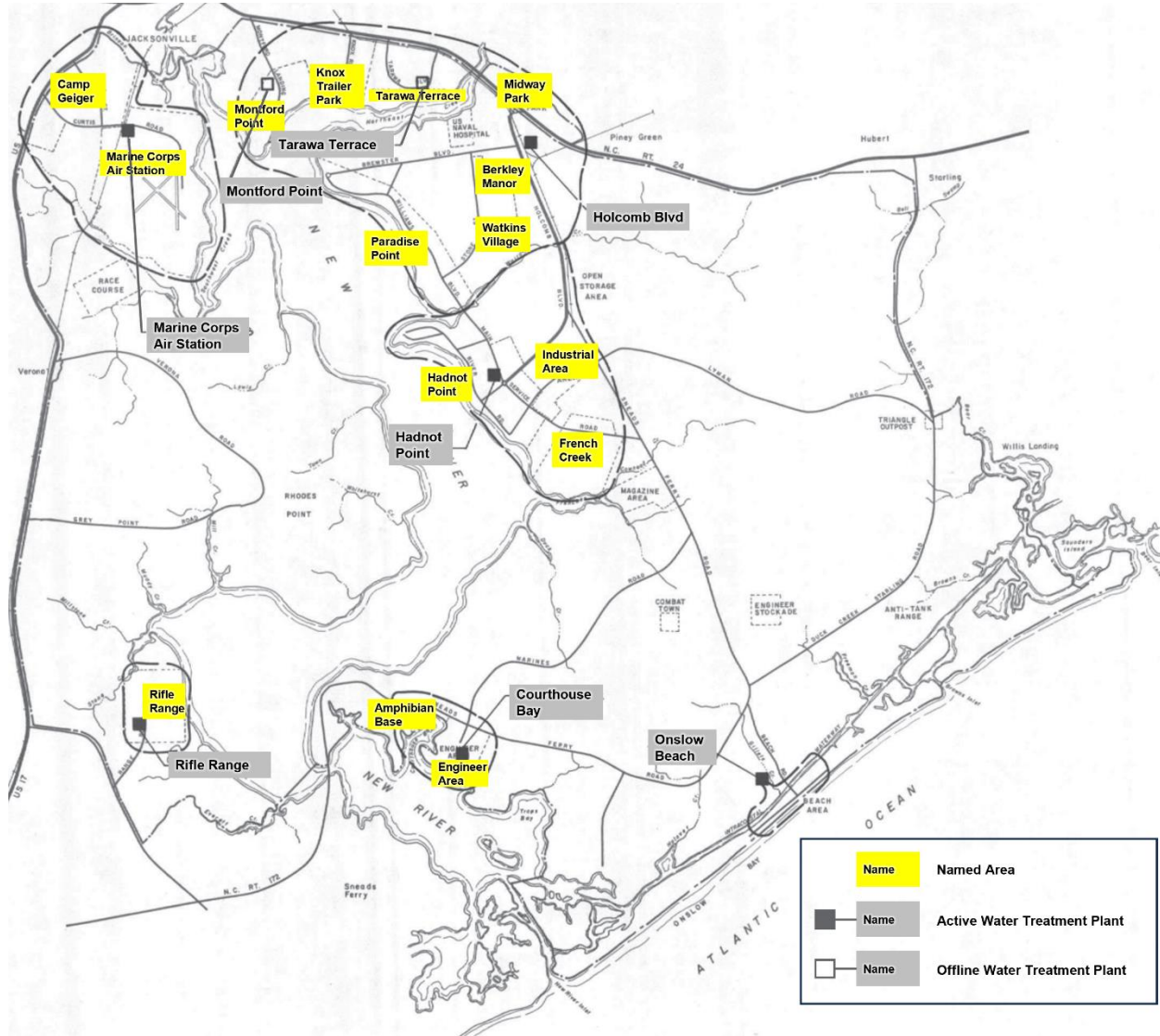


Image 2 is a map of Camp Lejeune dated May 1986. This map shows the areas of the base that I will discuss in this report.

⁴ The Past, The Present, and a Promising Future, undated, CLJA_UST02-0003676100, at *0003676101.

Image 2
Water System, Master Plan
Camp Lejeune, North Carolina, May 1986⁵



⁵ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326660. Highlighting and legend added. The Camp Geiger WTP closed prior to May 1986 and, therefore, is not shown on Image 2.

Troop housing is mostly at “Hadnot Point, French Creek, Camp Geiger,” and at the Marine Corps Air Station while family housing is predominantly at the Holcomb Boulevard housing area, Tarawa Terrace, Midway Park, and there is also family housing at the Marine Corps Air Station, 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326648-49. This document also says troop housing exists “in smaller numbers at scattered locations” at Montford Point, Rifle Range, and Courthouse Bay,” *ibid.*

In 1941, Congress authorized the Navy to purchase the land for Camp Lejeune. Marines that trained at Camp Lejeune during World War II saw combat in the Pacific. There were three populations at Camp Lejeune during the statutory period. First, the Second Marine Division and the Second Marine Logistics Group, and its predecessors that have supported the Second Marine Division, were primarily assigned to Hadnot Point, though Marines and families may have lived in the area of the base I refer to as the Holcomb Boulevard area. Second, several training schools were located at Camp Lejeune: the Infantry Training Regiment (ITR) was located at Camp Geiger, the Engineer School at Courthouse Bay, and several support/supply schools (such as food service, automotive maintenance and driving, administrative supply) and the Field Medical School at Montford Point / Camp Johnson. Third, helicopter units were assigned to the Marine Corps Air Station at New River⁶

B. Summary of Report

This report is divided into seven sections. The first two are: “Introduction, Qualifications, and Opinions” (Section I) and “Executive Summary,” (Section II). In Section III, I review the development of Camp Lejeune from the time the Marine Corps first identified the area depicted in Image 1 as the location for the Marine Corps’ East Coast training center shortly after the start of World War II. In this section, I also review the construction of the base that began in the spring of 1941 and continued into 1943. Many of the structures and facilities built during those years continued to exist and Marines continued to use them into the late 1980s.

Beginning in Section IV, I focus on the “statutory period,” defined in the Camp Lejeune Justice Act of 2022 as August 1, 1953, to December 31, 1987.⁷ In Section IV, I discuss the development of Camp Lejeune’s water systems, consisting of the nine historic WTPs that have provided water to various areas of the base.

Section V examines areas of Camp Lejeune that received water from each WTP during the statutory period and is divided into two parts. Following an Introduction in Section V.A., Section V.B. examines the areas that, at times, received contaminated water: Hadnot Point, Tarawa Terrace, and Holcomb Boulevard (see Image 3). Hadnot Point, referred to as the Mainside, is “the location of the 2nd Marine Division and Marine Corps Base [Headquarters],”

⁶ History, <https://www.Lejeune.marines.mil/visitors/history.aspx>; and *Semper Fidelis, A Brief History of Onslow County*, 48-49, 56, 77, Exhibit 2. An example of the number of troops assigned to each is found in the 1986 Master Plan Update. In 1983, there were 20,082 Marines assigned to the Second Marine Division and 9,840 assigned to the Second Marine Logistic Group (2nd FSSG). There were also 2,553 Marines permanently assigned to Camp Lejeune that were not under the command of the Second Marine Division, see 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326620.

⁷ “Public Law 117-168,” Public and Private Laws of the United States 117 (2021-2022): 136 Stat. 1759. See Sec. 804 Federal cause of action relating to water at Camp Lejeune, North Carolina, “Camp Lejeune Justice Act of 2022.”

and, beginning in the late 1960s, the French Creek area.⁸ The WTPs in this area are indicated by black squares in Image 3. The Hadnot Point service area has included the French Creek area and several areas between Wallace Creek and Northwest Creek, such as Berkeley Manor and Paradise Point. The Holcomb Boulevard WTP began operation in 1972, and served several areas formerly serviced by the Hadnot Point WTP. These areas stretched from Wallace Creek north to the Northwest Creek and included Berkeley Manor, Paradise Point, Watkins Village, and Midway Park (though the Holcomb Boulevard service area was occasionally serviced by the Hadnot Point WTP from 1972 to 1985).⁹ The Tarawa Terrace WTP serviced the Tarawa Terrace housing areas as well as the Knox Trailer Park area (the Knox Trailer Park area also, at times, received water from the Montford Point / Camp Johnson WTP during the statutory period). All three of these WTP service areas—Hadnot Point, Holcomb Boulevard, and Tarawa Terrace—are east of the New River.

Image 3 also shows the sources of contamination for these water treatment service areas. The ABC One-Hour Cleaners, the source of contamination for the Tarawa Terrace WTP and service area, is shown by a red square on Image 3. As identified by the ATSDR¹⁰, the Hadnot Point Landfill Area (HPLF) and the Hadnot Point Industrial Area (HPIA) were the sources of contamination for the Hadnot Point WTP (which, as noted, also served the Holcomb Boulevard Service area until 1972). Image 3 shows these areas in shaded gray rectangles.¹¹

⁸ 1970 Master Plan, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina, Atlantic Division, Naval Facilities Engineering Command, (1970 Master Plan), CLJA_USMCGEN_0000336978, at *0000337047 and *0000337049.

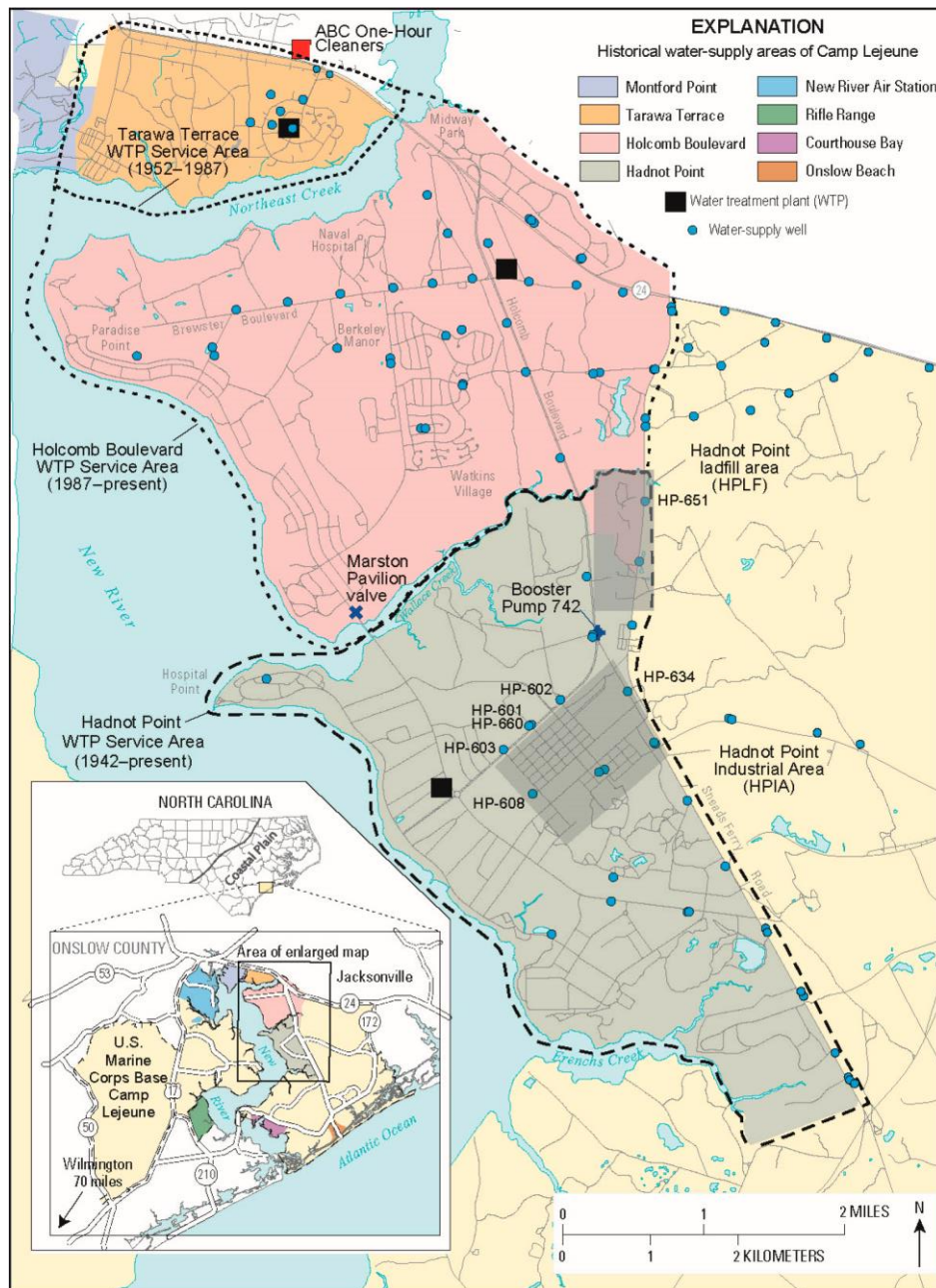
⁹ The Hadnot Point WTP furnished water to Holcomb Boulevard via the Marston Pavilion from January 27 to February 7, 1985, when the Holcomb Boulevard WTP was temporarily shut down. Hadnot Point WTP also supplemented the Holcomb Boulevard WTP “intermittently . . . during dry spring and summer months when demand was high (1972-1985),” Agency for Toxic Substances and Disease Registry, “Summary of the water contamination situation at Camp Lejeune,” 4/18/2017, https://www.atsdr.cdc.gov/sites/Lejeune/watermodeling_summary.html. 1985 was the last time that contaminated water from the Hadnot Point WTP was pumped into the Holcomb Boulevard distribution system, *ibid*.

¹⁰ Image 3 is an ATSDR map. See M. Maslia, et al., *Reconstructing Historical VOC Concentrations In Drinking Water For Epidemiological Studies at a U.S. Military Base: Summary of Results*, Water, 8, 449 (2016): CLJA_ATSDR_BOVE_HC_0000004039, at *0000004040. The inset map of the entire base shows the location of the other Camp Lejeune water supply areas except for the Camp Geiger water supply area since Camp Geiger WTP went offline in 1977. Since that date, the New River Air Station has provided water to Camp Geiger.

¹¹ See pages 24-33 of this report for a discussion of the ABC One-Hour Cleaners and pages 42-43 for a discussion of the Hadnot Point Landfill Area and the Hadnot Point Industrial Area.

Image 3

Historical Water Supply Areas of Camp Lejeune Studied for Contamination¹²



¹² M. Maslia, et al., *Reconstructing Historical VOC Concentrations In Drinking Water For Epidemiological Studies at a U.S. Military Base: Summary of Results*, *Water*, 8, 449 (2016): CLJA_ATSDR_BOVE_HC_0000004039, at *0000004040. The inset map of the entire base shows the location of the other Camp Lejeune water supply areas except for the Camp Geiger water supply area since Camp Geiger WTP went offline in 1977. Since that date, the New River Air Station has provided water to Camp Geiger. The other WTPs are shown in Image 2, except Camp Geiger that closed by May 1986, see footnote 5.

In section V.C., I discuss the Camp Lejeune WTP service areas that the ATSDR did not conclude, and Plaintiffs do not allege, were contaminated (the “Non-Contaminated Areas” of the base). Dr. Remy Hennet, the United States’ expert, agrees with their assessment. The areas are west of the New River, including: Montford Point / Camp Johnson; Camp Geiger, the location of Camp Lejeune’s first WTP and system; Marine Corps Airfield / Marine Corps Air Station New River; and the Rifle Range located at Stone Bay; as well as two areas east of the New River and south of Hadnot Point: Onslow Beach and Courthouse Bay (see Image 2).¹³

Several of the areas discussed in Section V.C. were home to Marine Corps schools wherein Marines participated in occupational specialty training. Infantry training was conducted at Camp Geiger, support occupations were trained at Montford Point / Camp Johnson, and combat engineers were trained at Courthouse Bay. Marines assigned to helicopter units lived and trained at the Marine Corps Air Station.¹⁴ As I will discuss in Section V.C., in these areas during the statutory period, Marines lived in barracks—or lived in family housing with their families—and had access to mess halls, amenities, service clubs, and recreational activities.

In Section VI, I examine life at Camp Lejeune, focusing on swimming pools that were used for training and leisure, schools for base dependents, and recreational and social activities available for Marines and their families on the base. In Section VII, I review the use of water trailers at Camp Lejeune and their role in providing drinking water to Marines training at the various areas of the base.

¹³ Hennet Report at Sec. 5 Op. 1.

¹⁴ MCAS is under the jurisdiction of the Commander, Marine Air Bases, Eastern, Cherry Point, N.C., No author, “The Coast of North Carolina Salutes Camp Lejeune,” (Lubbock, TX: Boone Publications, Inc., 1966), Base_Guides_0000000098, at *0000000103 (1966 Base Guide).

III. The Development of the Marine Corps Base Camp Lejeune Prior to the Statutory Period: Origins, Site Selection, and World War II Construction of the Base

A. Background, Site Selection, and Base Authorization

In September 1939, Germany invaded Poland starting World War II in Europe. At the end of 1939, the Marine Corps numbered 19,432 troops.¹⁵ It became apparent with the expected escalation of the war and the United States' possible involvement, that the Marines' existing East Coast training facilities at Quantico, VA and Parris Island, SC, would be inadequate to train the projected influx of new Marines.¹⁶ To address this situation, the Marine Corps began to study areas for a new training facility.

In 1940, the Marine Corps examined the area along the New River in North Carolina as the site for the Marine Corps' new East Coast training facility. The New River site was considered ideal as there were deepwater ports to the south (Wilmington) and the north (Morehead City).¹⁷ The site was also close to the Cherry Point Naval Air Station located approximately forty miles to the east/northeast.¹⁸ On December 30, 1940, Secretary of the Navy Frank Knox approved the site as the location for the Marines' East Coast training facility.¹⁹ On April 5, 1941, Congress passed a law that included \$14,575,000 for the "Marine Corps training area, east coast."²⁰ Eventually, the Navy purchased 111,155 acres of land totaling 174 square miles that included eleven miles of oceanfront land.²¹ The government moved quickly to

¹⁵ United States Marine Corps History Division, "End Strengths: 1795-2015," <https://www.usmcu.edu/Research/Marine-Corps-History-Division/Research-Tools-Facts-and-Figures/End-Strengths/>.

¹⁶ During World War I, Congress authorized establishment of facilities to "house advanced base/expeditionary units" at Quantico, VA and San Diego, CA, see, A. Millett, *Semper Fidelis, The History of the United States Marine Corps* (Millett, *Semper Fidelis*) (New York: The Free Press, 1980), 284, Exhibit 3. In 1927, Congress authorized the Secretary of the Navy to spend \$2,205,000 for construction of "public works" at Quantico to replace "temporary buildings" dating from World War I, 44 stat., 1101.

¹⁷ *Semper Fidelis, A Brief History of Onslow County*, 17-18, Exhibit 2. In 1915, the Marines moved their recruiting station from the Naval Base at Norfolk, VA to Parris Island, S.C., see, <https://www.mcrdpi.marines.mil/Centennial-Celebration/Historical-information/2TheMarinesArriveatParrisIsland/>.

¹⁸ *Semper Fidelis, A Brief History of Onslow County*, 94, Exhibit 2.

¹⁹ *Semper Fidelis, A Brief History of Onslow County*, 18, Exhibit 2.

²⁰ 55 Stat. 123, at 128-29.

²¹ T. Farnham, "Camp Lejeune," *NCPEDA*, 2006, <https://www.ncpedia.org/camp-Lejeune/>; and *Semper Fidelis, A Brief History of Onslow County*, 18, Exhibit 2.

construct the Marine Corps' new East Coast base. On May 1, 1941, Marine Corps Commandant Lieutenant General Thomas Holcomb ordered Lieutenant Colonel William Hill "to establish and assume command" of the new base at that time named Marine Barracks New River, N.C."²²

The Marine Corps planned a long list of training activities at the new base, including:

'rifle range firing; long-range and anti-aircraft machine gun firing; combat practice firing; anti-aircraft artillery firing; light and medium field artillery firing; seacoast artillery firing; boat and anti-boat gun firing; troop landing operations in surf; maneuvering and training in rubber boats; land and water training with amphibian vehicles; maneuvering and training with artillery and tank lighters; maneuvering and training landing boat crews; ship and boat loading; tank and anti-tank training; parachute troop training; barrage balloon training; infantry and artillery land tactics and maneuvering; beach defense training; and training of hospital units.'²³

B. Construction of Marine Corps Base Camp Lejeune

Construction of Camp Lejeune started in the spring of 1941 and continued through most of 1943. During the construction phase, the base's architect and engineering company issued completion reports that detailed construction activities between April 15, 1941, and December 18, 1943.²⁴ Each completion report contains information about the construction of facilities at Camp Lejeune including barracks, officers' quarters, mess halls, training areas, swimming pools, gunnery ranges, weapons training areas, amphibious training locations, and water supply systems for the various areas of the base.

1. Construction of the Regimental Areas

When construction began, base headquarters was located at "Tent Camp No. 1," also known as Tent City (now Camp Geiger) and this is where the First Marine Division lived when they arrived in September 1941. Initially 1,000 tents were built at Tent Camp No. 1. After the United States entered the war in December 1941, it became necessary to train more troops and

²² United States Marine Corps, *History*, <https://www.Lejeune.Marines.mil/visitors/history.aspx>.

²³ *Semper Fidelis, A Brief History of Onslow County*, 20, Exhibit 2.

²⁴ Carr and J. E. Greiner Company, "Completion Report Covering the Design of Camp Lejeune U.S. Marine Barracks New River, North Carolina for the U.S. Navy Bureau of Yards and Docks, Contract Number 4751, April 15, 1941-September 30, 1942," Vol. I, CLJA_USMCGEN_0000287341 (Completion Report, Vol. I) and Vol. II, CLJA_USMCGEN_0000161226 (Completion Report, Vol. II); and Carr and J. E. Greiner Company, "Completion Report Covering the Design of Camp Lejeune U.S. Marine Barracks New River, North Carolina for the U.S. Navy Bureau of Yards and Docks, Contract Numbers 6006 and 7795, October 1, 1942-December 18, 1943," Vol. III, CLJA_USMCGEN_0000209879 (Completion Report, Vol. III).

expand Tent City. Tent Camp No. 2 was thus built as an extension of Tent Camp No. 1.²⁵ The previous month, the officer-in-charge had approved a site “plan for entire Division Training Area” at Hadnot Point, which was originally four regimental areas, where each Marine Corps regiment would live while training at Hadnot Point. After the bombing of Pearl Harbor in December 1941, the Marine Corps added a fifth regimental area.²⁶ Completion Report Volume I (April 1941-October 1942), states that all five regimental areas had “been developed.”²⁷ Each Regimental Area included the following buildings:

- 12 Barracks
- 3 Mess Halls
- 12 Battalion Warehouses
- 1 Regimental Headquarters
- 3 Battalion Headquarters
- 1 Post Exchange
- 1 Regimental Infirmary
- 1 Regimental Theater
- 1 Regimental Service Club²⁸

In addition to the five regimental areas at Hadnot Point, there were other barracks and housing areas constructed on the eastern side of New River during World War II. In 1941, for instance, construction began on 177 duplexes and 346 single units to house Marines and civilians. This area later became known as Midway Park (named after Battle of Midway in June 1942).²⁹ During the war, there were also 900 trailers at the “Trailer Camp” located near Midway Park.³⁰ In addition, Completion Report Volume I notes that: “The standard Marine Corps mess hall . . . for a minimum of 600 men is considered the most satisfactory.”³¹ Each of the five

²⁵ *Semper Fidelis, A Brief History of Onslow County*, 23, Exhibit 2.

²⁶ Completion Report, Vol. I, CLJA_USMCGEN_0000287341, at *0000287398-99; and *Semper Fidelis, A Brief History of Onslow County*, 23, Exhibit 2.

²⁷ Completion Report, Vol. I, CLJA_USMCGEN_0000287341, at *0000287410.

²⁹ Completion Report, Vol. I, CLJA_USMCGEN_0000287341, at *0000287380 and *0000287566. The Midway housing was located on Route 24 between the Northeast Creek and Piney Green, and in the Completion Report Vol. I it was referred to as “Low Cost Defense homes.” The Completion Report also stated that an area had “been provided for certain public buildings such as a church, school, and community building,” *ibid.*, *0000287412.

³⁰ Carraway, *Camp Lejeune Leathernecks*, 10, Exhibit 1.

³¹ Completion Report, Vol. I, CLJA_USMCGEN_0000287341, at *0000287356.

Hadnot Point Regimental Areas had three mess halls. This suggests that each housed at least 1800 men, and that at least 9,000 men were stationed at this area of Camp Lejeune.

Hadnot Point was also the area selected for the Naval Hospital.³² The hospital was deemed “essential” as the closest hospital was fifty miles away and was thus inadequate to provide services to the many Camp Lejeune Marines, civilians, and their families in the area.³³ In the Naval Hospital area, there were two corpsmen’s barracks, three officers’ quarters, one warrant officers’ quarters, one bachelor officers’ quarters, one servant quarters for women and one for men.³⁴

In August 1942, the Corps relocated base headquarters from Tent City to Hadnot Point, indicating completion or near completion of the regimental areas and other buildings in the area.³⁵ Although base headquarters and many of the base’s facilities were at Hadnot Point, combat training continued at Tent City throughout World War II.³⁶ Base planners had selected Hadnot Point for the division headquarters, the regimental barracks area, other housing units, and the base hospital because of its central location and close proximity to training areas. The area’s good drainage, scenic views, and fewer mosquitoes added to its attraction.³⁷

³² *Semper Fidelis, A Brief History of Onslow County*, 24, Exhibit 2.

³⁴ Completion Report, Vol. I, CLJA_USMCGEN_0000287341, at *0000287474-75. The corpsmen’s barracks were also H shaped with four dormitories, *ibid.*, *0000287496. Corpsmen provide assistance to doctors and other caregivers. See America’s Navy, Hospital Corpsman, Responsibilities, <https://www.navy.com/careers-benefits/careers/medical/hospital-corpsman>. In the Marine Corps, warrant officers “are officer-level technical specialists in their respective fields, providing leadership, training, and extensive knowledge to the Marines in their MOS [military occupational specialty].” See Marine Corps Ranks, <https://www.marines.com/about-the-marine-corps/roles/ranks.html#:~:text=Warrant%20officer%20Marines%20are%20officer,be%20appointed%20a%20warrant%20officer>.

³⁵ United States Marine Corps, *History*, <https://www.Lejeune.Marines.mil/visitors/history.aspx>.

³⁶ In March 1944, Corporal R. Myers wrote in *The Globe* that Marines arrived at Tent City for training before their westward departure for deployment in the Pacific, making Camp Geiger the “Direct Road to Tokyo,” R. Myers, “Replacement Battalions -- Only Direct Road to Tokyo Now Open to Marines,” *The Globe*, 3/22/1944, 00897_PLG_0000057345, at *0000057352-53. *The Globe* is the Camp Lejeune newspaper. Over the years its name has changed. From 2/23/1944 to 9/2/1948, the name was *Camp Lejeune Globe* (<https://www.loc.gov/item/sn91066064/>); from 9/9/1948 to 12/23/1955 the name was *The Globe*) (<https://www.loc.gov/item/sn95072307/>); then from 1/6/1956 to 7/15/1976 the name was again, *Camp Lejeune Globe* (<https://www.loc.gov/item/sn95072308/>); from 7/22/1976 to 3/28/1985 the name was just *Globe* (<https://www.loc.gov/item/sn95072309/>); and from 4/4/1985 into the 1990s it was again called *Camp Lejeune Globe* (<https://www.loc.gov/item/sn95072310/>). Throughout this report, I will reference it as *The Globe*.

³⁷ Completion Report, Vol. I, CLJA_USMCGEN_0000287341, at *0000287355 and *0000287409; and *Semper Fidelis, A Brief History of Onslow County*, 21, Exhibit 2.

Image 4 is a map of the Division Training Area on Hadnot Point as of June 30, 1946, less than a year from the end of World War II. It shows the main areas of Hadnot Point, including the regimental areas, the supply and industrial area, the service company area, the hospital area, married officer quarters, and the many H-style barracks located at Hadnot Point.

Image 4

Map of the Division Training Area at Hadnot Point, June 30, 1946³⁸

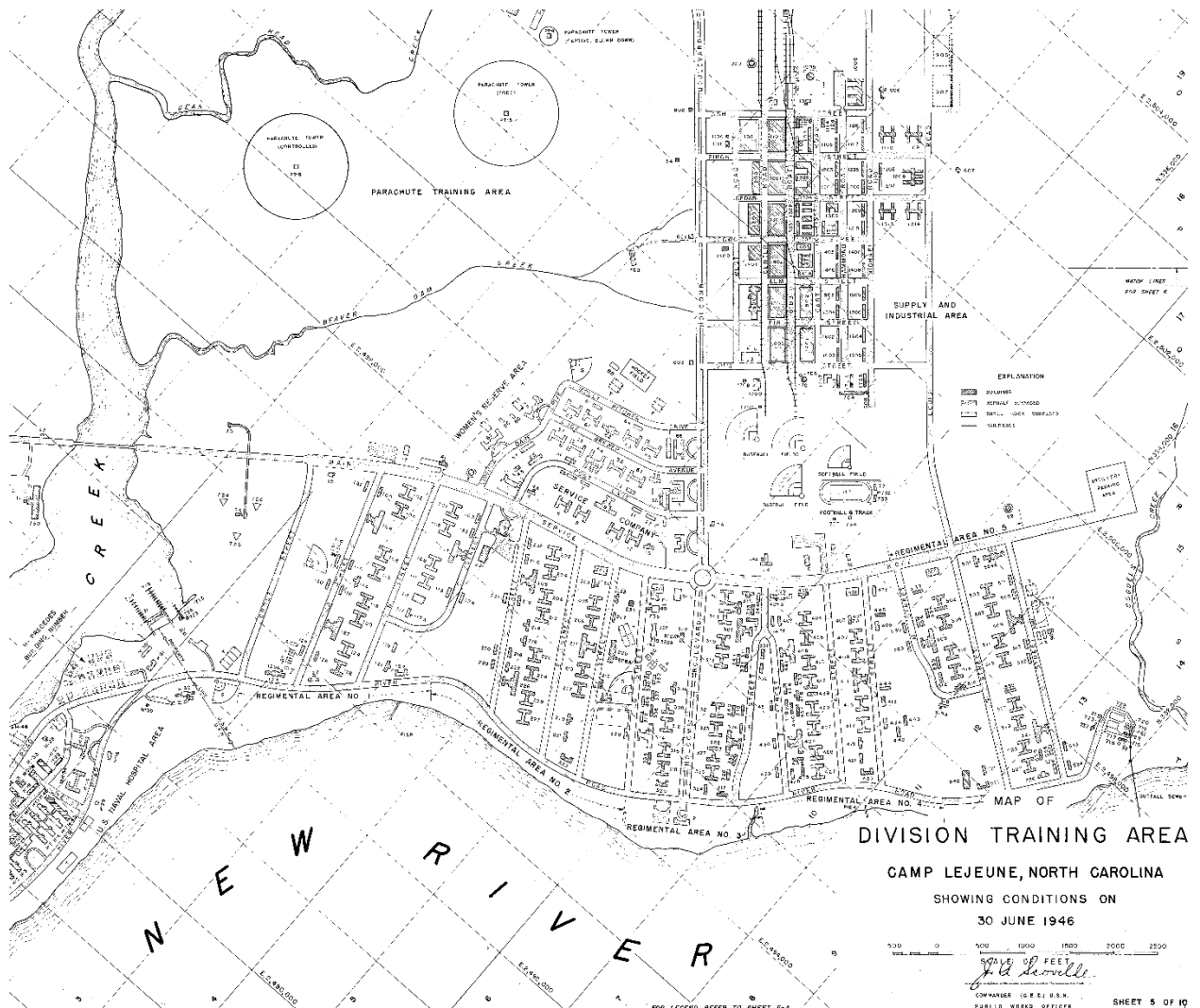


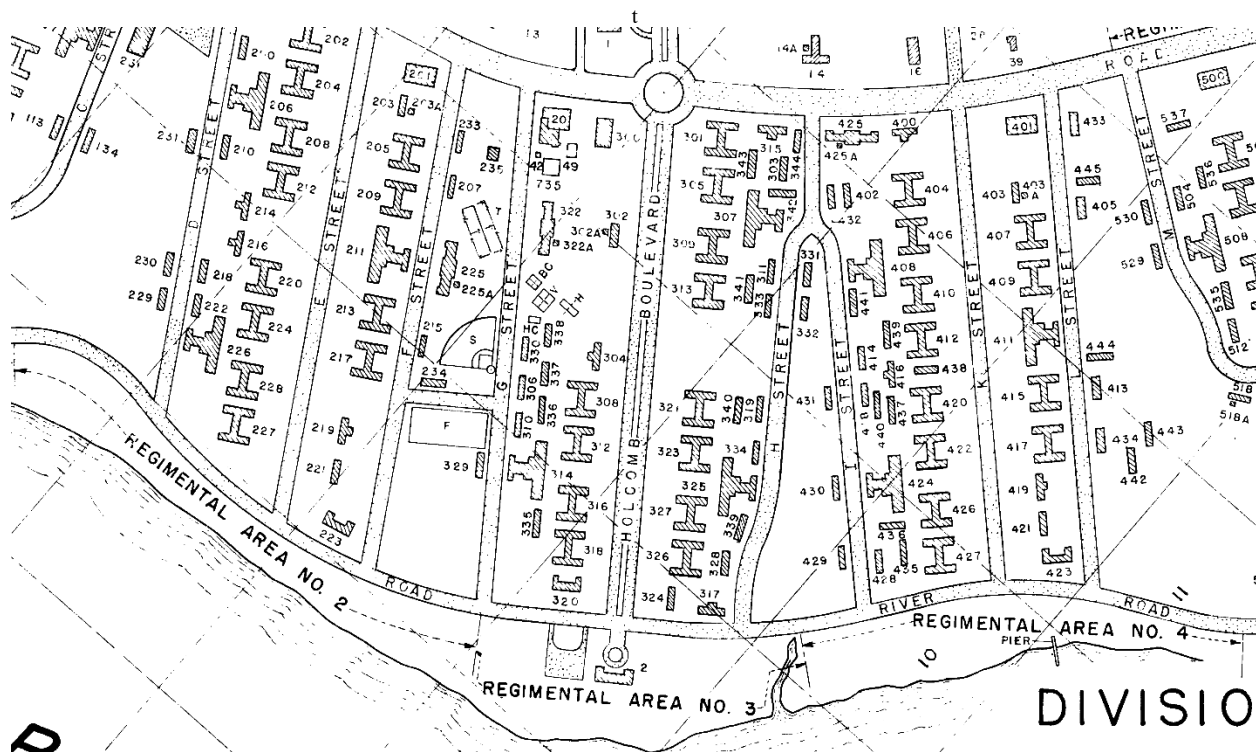
Image 5 is an enlargement of Image 4 that shows most of Regimental Areas No. 2, No. 3, and No. 4 at the Division Training Area. The H-style barracks took their name from the shape of the structures and were the predominant type of housing for enlisted Marines at Camp Lejeune

³⁸ CLJA_USMC_PWD_0000126644.

living on Hadnot Point for most of the statutory period. In the 1960s, the Marines Corps started to build other styles of living quarters as discussed in Section V.³⁹

Image 5

H-Style Barracks in Regimental Areas No. 2, No. 3, and No. 4, June 30, 1946⁴⁰



Housing areas were also constructed at other areas of the base during this time, including at Camp Geiger, Rifle Range, Courthouse Bay and units at the Piney Green housing area for African-American tenants that was located north of Highway 24 (see Image 2).⁴¹ The Rifle

³⁹ During World War II, Marines lived in tents at other locations on MCBCL. Tent Camps were located at Tent Camp Nos. 1 and 2 that housed 16,000 troops, at the location of the Tank Battalion, Engineer Battalion, and at segregated Mumford (later called Montford) Point, Completion Report, Vol. I, CLJA_USMCGEN_0000287341, at *0000287385.

⁴⁰ CLJA_USMC_PWD_0000126644.

⁴¹ National Research Council of the National Academies, "Contaminated Water Supplies at Camp Lejeune: Assessing Potential Health Effects," (Washington, D.C.: The National Academies Press, 2009), (National Research Council 2009), CLJA_HEALTHEFFECTS-0000000431, at *0000000486; and *Semper Fidelis, A Brief History of Onslow County*, 26, Exhibit 2. For a contemporaneous account of Camp Lejeune during World War II see, Carraway, *Camp Lejeune Leathernecks*, Exhibit 1.

Range, Barrage Balloon Battalion, Amphibian Base, and Post Troops Activities areas had four barracks each.⁴²

The September 25, 1943, facilities contract included construction of four swimming pools. Three indoor swimming pools for training purposes were built at “Regimental Areas No. 2 and No. 5” and at Montford Point Camp No. 3.⁴³ Each of three training pools had a capacity of 434,000 gallons. There was also a smaller, uncovered, recreational swimming pool at Paradise Point in the officers’ area, in what became the Holcomb Boulevard area.⁴⁴

Following the construction of the officers’ housing on Paradise Point and the addition of two base trailer parks, no additional housing construction occurred at Camp Lejeune until the Korean War.⁴⁵

All together at Camp Lejeune, by September 1942, there were seventy-four barracks, twenty-eight mess halls, 174 warehouses, ten post exchanges, eleven theaters, two brigs (one at Montford Point and one where the Post Troops were housed), and four chapels (two at Hadnot Point, one at Tent Camps No. 1 and No. 2, and one Montford Point).⁴⁶ During World War II, 196 Officers’ Quarters were built: 180 in the residential area for married officers, three at the Naval Hospital, five at the Rifle Range, and eight at the Barrage Balloon area. Ten Bachelor Officer’s Quarters were built with eight located in the residential area and one each at the Rifle Range and Naval Hospital.⁴⁷

⁴² Completion Report, Vol. I, CLJA_USMCGEN_0000287341, at *0000287512, *0000287518, and *0000287552. The Post Troops Activities Barracks were on Hadnot Point. The Rifle Range located at Stone Bay was across the New River from Hadnot Point. The Amphibian Base and Balloon Barrage Battalion were at Courthouse Bay, *ibid.*, at *0000287411-12.

⁴³ Completion Report, Vol. III, CLJA_USMCGEN_0000209879, at *0000209901, *0000209951-53, and *0000210107.

⁴⁴ Completion Report, Vol. III, CLJA_USMCGEN_0000209879, at *0000209907, *0000209951-53, *0000209963, and *0000210107. On page *0000210110-11 of Completion Report Vol. III, it is stated that the capacity of the pool at the Paradise Point officers’ quarters was 177,500 gallons.

⁴⁵ *Semper Fidelis, A Brief History of Onslow County*, 26, Exhibit 2.

⁴⁶ Completion Report, Vol. I, CLJA_USMCGEN_0000287341, at *0000287559-62. Post troops were those Marines permanently assigned to Camp Lejeune who served in administrative, training, and operational support. During World War II a battalion of post troops were assigned to Camp Lejeune, see History of Camp Lejeune, <https://www.lejeune.marines.mil/Offices-Staff/Environmental-Mgmt/Cultural-Resources/History-Live/History-of-Camp-Lejeune/>. Since World War II, these troops have been identified as Force Troops.

⁴⁷ Completion Report, Vol. I, CLJA_USMCGEN_0000287341, at *0000287565-66.

2. World War II Water Systems at Camp Lejeune

From the beginning of construction, water was an issue at the base. Volume II of the Completion Report for the period April 15-September 30, 1942, included a forty-two page chapter on the base's "Water Supply and Distribution" that noted:

Introduction. The design of water utilities, at the outset presented major problems as to the source of supply and the treatment of same.

The treatment and pumping plant for the Division Training Area [Hadnot Point] has been designed for easy and economical operation.

Water systems in the outlying areas have been designed along exactly the same lines except that treatment has been eliminated.⁴⁸

The water systems reviewed in Completion Report Volume II were at Tent Camps No. 1 and No. 2, the Division Training Area (Hadnot Point), Midway Park Residential Area, Mumford (later Montford) Point Camp No. 1, Barrage Balloon Battalion, Amphibian Base, Rifle Range Area, Glider Training Base, Peterfield Point Tent Camp, Tank Battalion Tent Camp, and Camp Knox.⁴⁹

On May 10, 1941, the first well at Tent Camp No. 1 was drilled. In the second Completion Report, it is stated that: "The estimated consumption for all ordinary purposes is 120 gallons per capita, per day, or a total of 720,000 gallons."⁵⁰ Wells would be the source of all water and the water would be stored in elevated and on-the-ground storage tanks. When the government authorized Tent Camp No. 2 in December 1941, additional wells were drilled to accommodate the doubling of the area's population. At the date of completion of this report,

⁴⁸ Completion Report, Vol. II, CLJA_USMCGEN_0000161226, at *0000161430.

⁴⁹ Completion Report, Vol. II, CLJA_USMCGEN_0000161226, at *0000161430. The Barrage Balloon Battalion and the Amphibian Base were near Courthouse Bay. The Glider Training Base and the Peterfield Point Tent Camp were in the area that became the MCAS New River. The Tank Battalion Tent Camp was located on U.S. Route 17 south of Jacksonville. On Image 2, Camp Knox is to the right of the Montford Point label. For the location of the Glider Training Base, Peterfield Point Tent Camp, see Completion Report, Vol. II, CLJA_USMCGEN_0000161226, at *0000161411, *0000161598, and *0000161764. For the Barrage Ballon and Amphibian Base locations see Existing Condition Map, 1943, Balloon Barrage and Amphibian Troops Area, 6/30/1946, CLJA_USMC_PWD_0000126655.

A document dated October 1, 1946 stated that water systems then in operation at Camp Lejeune were at Hadnot Point, Midway Park, Montford Point, Tent Camp, Rifle Range, Courthouse Bay, and Onslow Beach. Hadnot Point water was pumped to the treatment plant and Tent City water into underground storage tanks. At the remaining locations water was pumped directly into the distribution systems, see, Marine Barracks Camp Lejeune, North Carolina, Naval District Five, 10/1/1946, CLJA_WATERMODELING_07-0001200597, at *0001200601-03.

⁵⁰ Completion Report, Vol. II, CLJA_USMCGEN_0000161226, at *0000161434. "Ordinary Purpose" is not defined in the document.

September 30, 1942, eleven shallow wells provided 2 million gallons of water per day and another 1.2 million gallons per day was pumped from “highly mineralized water from deep wells.”⁵¹

When the government authorized Tent Camp No. 2, it also authorized a second elevated storage tank. A pumping plant lifted the well water and it was then “pumped over coke tray aerators” that were attached to the roofs of two 272,000 gallon ground-level storage tanks.⁵² This process removed hydrogen sulfide gas that was found in some wells. The water was also chlorinated before usage as a standard disinfection process.⁵³

At the time the Completion Report Volume II was released, discussions were underway regarding further treatment of water at Tent City Camps No. 1 and No. 2. The Navy considered the current water treatment adequate while the Marine Corps thought “the high mineral content is objectionable . . . because of deposits in hot water heaters and other mechanical equipment.”⁵⁴

While the water systems at Tent City Camps No. 1 and No. 2 were being constructed, work was underway on treating the water at the Division Training Area at Hadnot Point. A preliminary report dated June 16, 1941, based water requirements at the Division Training Area on an estimated population of 12,500 that included the planned four regimental areas, the hospital area, and the residential area. Although pumping water from the New River was considered, and cost estimates made, and after studying the White Oak River as a possible water source, it was determined that there were no suitable bodies of surface water to supply Hadnot Point. Groundwater was the only viable source of water.⁵⁵

In mid-September 1941, the first ten wells—deemed “Group A”—were drilled at Hadnot Point to furnish water to the Division Training Area. By mid-April 1942, workers had finished drilling the Group A wells. Work then began on drilling the six Group B wells, a process that took four months. The sixteen “Group A” and “Group B” wells could furnish enough water for a population of 20,000. Then, in August 1942, additional authority for five Group C wells was

⁵¹ Completion Report, Vol. II, CLJA_USMCGEN_0000161226, at *0000161434-38.

⁵² Completion Report, Vol. II, CLJA_USMCGEN_0000161226, at *0000161438.

⁵³ Completion Report, Vol. II, CLJA_USMCGEN_0000161226, at *0000161438-40.

⁵⁴ Completion Report, Vol. II, CLJA_USMCGEN_0000161226, at *0000161442.

⁵⁵ Completion Report, Vol. II, CLJA_USMCGEN_0000161226, at *0000161442-50. In this document, *0000161448 and *0000161450 are incorrectly numbered. The text on *0000161448 should follow the text on *0000161450. In part, the low river levels in September 1941 contributed to the rationale against pumping water from the New River.

given and that brought the total gallons per day at Hadnot Point, serving the regimental area, housing, and the hospital, to 6.77 million gallons per day.⁵⁶

The completion report then discusses “Water Storage, Treatment, and Pumping Plant.” The WTP at Hadnot Point was designed to pump three million gallons of “softened filtered water” each day. The language in this portion of the report indicates that the plant was still under construction in 1942. For example, reference is made to a June 23, 1942, letter that referenced additional construction of a specific type of tank.⁵⁷ However, the Hadnot Point WTP began operations in the fall of 1942.⁵⁸ In the third volume of the completion report covering the dates from October 1942 into December 1943, it is noted that in July 1943 the officer in charge recommended that the Hadnot Point WTP be enlarged since the population of that area had doubled.⁵⁹ This discussion underscores that the WTP that served Tent City Camps No. 1 and No. 2, was the first WTP at Camp Lejeune.

In October 1946, a local company published *Camp Lejeune Leathernecks*, a book that provides many descriptions and contains many photographs of Camp Lejeune during World War II, including numerous ones of areas and structures at Hadnot Point.⁶⁰ The book’s author, Gertrude Carraway, included descriptions of the Hadnot Point WTP and the Hadnot Point Industrial Area. The WTP cost exceeded \$1 million. Twenty-one wells furnished water to that plant that in 1946 had a daily capacity of 3,000,000 gallons, soon to be expanded to 5,000,000 gallons.⁶¹

The industrial area included a large commissary, warehouses, and the area’s central heating plant that serviced Hadnot Point structures, including the hospital. Also located at

⁵⁶ Completion Report, Vol. II, CLJA_USMCGEN_0000161226, at *0000161456-58. This section notes that two more wells were drilled to provide a dedicated well for the hospital and officers’ quarters, *ibid.*, *0000161458.

⁵⁷ Completion Report, Vol. II, CLJA_USMCGEN_0000161226, at *0000161470 and *0000161478. A *Globe* article from December 1948 states that Hadnot Point WTP started operating in the fall of 1942. The same article stated: “There are outlying stations at Tent Camp, Montford Point, Onslow Beach, Rifle Range and Courthouse Bay, “Water Treatment Plant,” *The Globe*, 12/2/1948, 00897_PLG_0000055167, at *0000055174.

⁵⁸ In December 1948, a story in *The Globe* stated that the Hadnot Point WTP began operating in the fall of 1942, “Water Treatment Plant,” *The Globe*, 12/2/1948, 00897_PLG_0000055167, at *0000055174.

⁵⁹ Completion Report, Vol. III, CLJA_USMCGEN_0000209879, at *0000210100.

⁶⁰ Carraway, *Camp Lejeune Leathernecks*, 5-7, Exhibit 1.

⁶¹ Carraway, *Camp Lejeune Leathernecks*, 7, Exhibit 1. \$1,000,000 in January 1943 equates to approximately \$18.5 million in April 2024, Bureau of Labor Statistics, CPI Inflation Calculator, <https://data.bls.gov/cgi-bin/cpicalc.pl>.

Hadnot Point were the camp dispensary, two churches, a “mammoth camp theatre, regimental theatres, mess halls and recreation centers.”⁶² The Hadnot Point WTP furnished water to all of these structures as depicted in Image 4, the area between Northwest and French Creeks.

Completion Reports Volumes II and III each contain discussions and descriptions of water systems that served Camp Lejeune. Completion Report Volume III, includes a “Summary of Facilities Provided.” The water subsection reads:

98 Miles Water Lines.

58 Wells with Pumping Stations.

3 Water Treatment and Pumping Plants.⁶³

Image 6 is a map of the Camp Lejeune water systems in 1941 and 1942. As indicated by the small blue square in the Camp Geiger area of the map, only Tent City Camps No. 1 and No. 2 had a WTP. The other solid-colored areas received “water (chlorinated) [that] was provided directly to storage tanks and distribution systems.”⁶⁴

⁶² Carraway, *Camp Lejeune Leathernecks*, 6-7, 23, Exhibit 1.

⁶³ Completion Report, Vol. III, CLJA_USMCGEN_0000209879, at *0000209890-91. Evidently the authors of this completion report counted the Tent City Camps No. 1 and No. 2 water systems separately. A document written in October 1950 discussed the Hadnot Point Water System. The author noted that it continued to serve the following areas of Camp Lejeune: the Regimental Area, Post Troops Area, Industrial Area, the U.S. Naval Hospital, the Officers’ Quarters at Paradise Point, Camp Lejeune Schools, and the Midway Park Housing Project, see, Technical Report and Recommendations, for Additions and Improvements to the Hadnot Point Fresh Water System at the Marine Barracks, Camp Lejeune, N.C., 10/13/1950, CLJA_HEALTHEFFECTS-0000057609, at *0000057611.

⁶⁴ Each of the Camp Lejeune Water Zone Maps cited in this report has a note that reads: “Solid color in the water zone area indicates that the water (chlorinated) was provided directly to storage tanks and distribution system.”

Image 6
Camp Lejeune Water Zones, 1941-1942⁶⁵

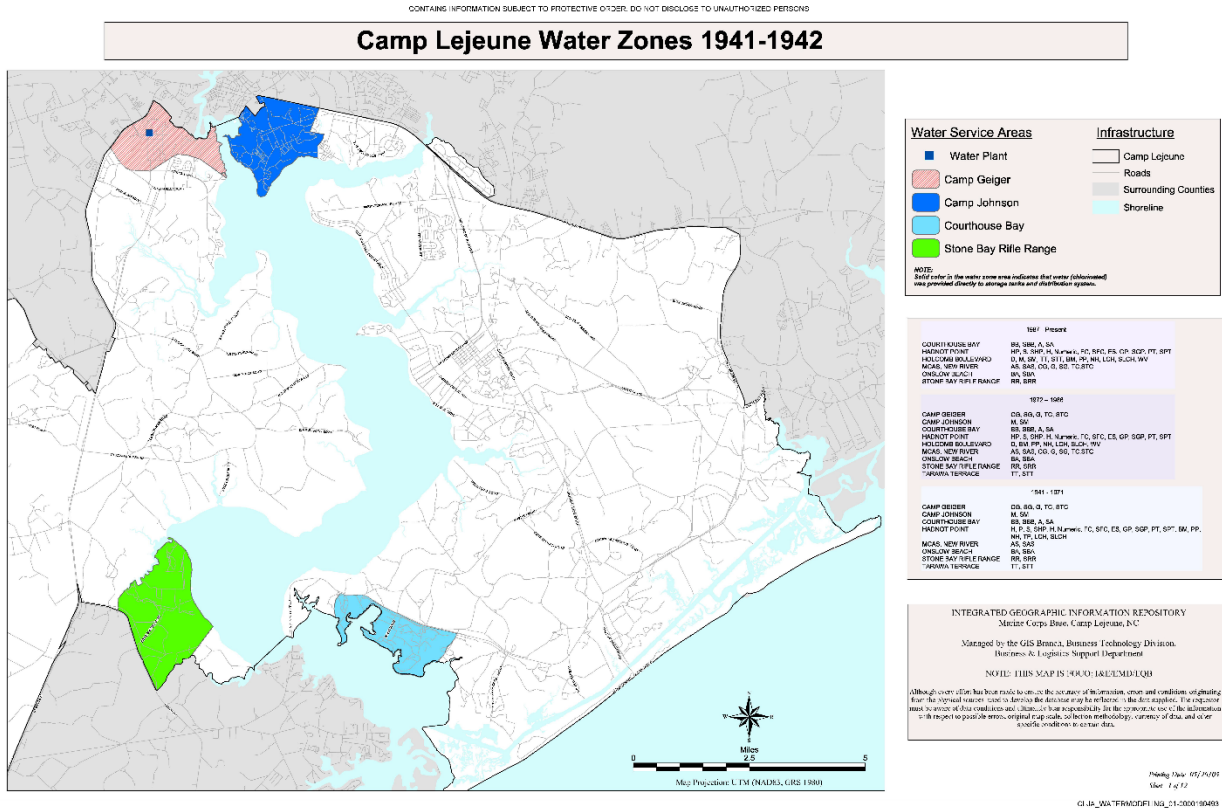
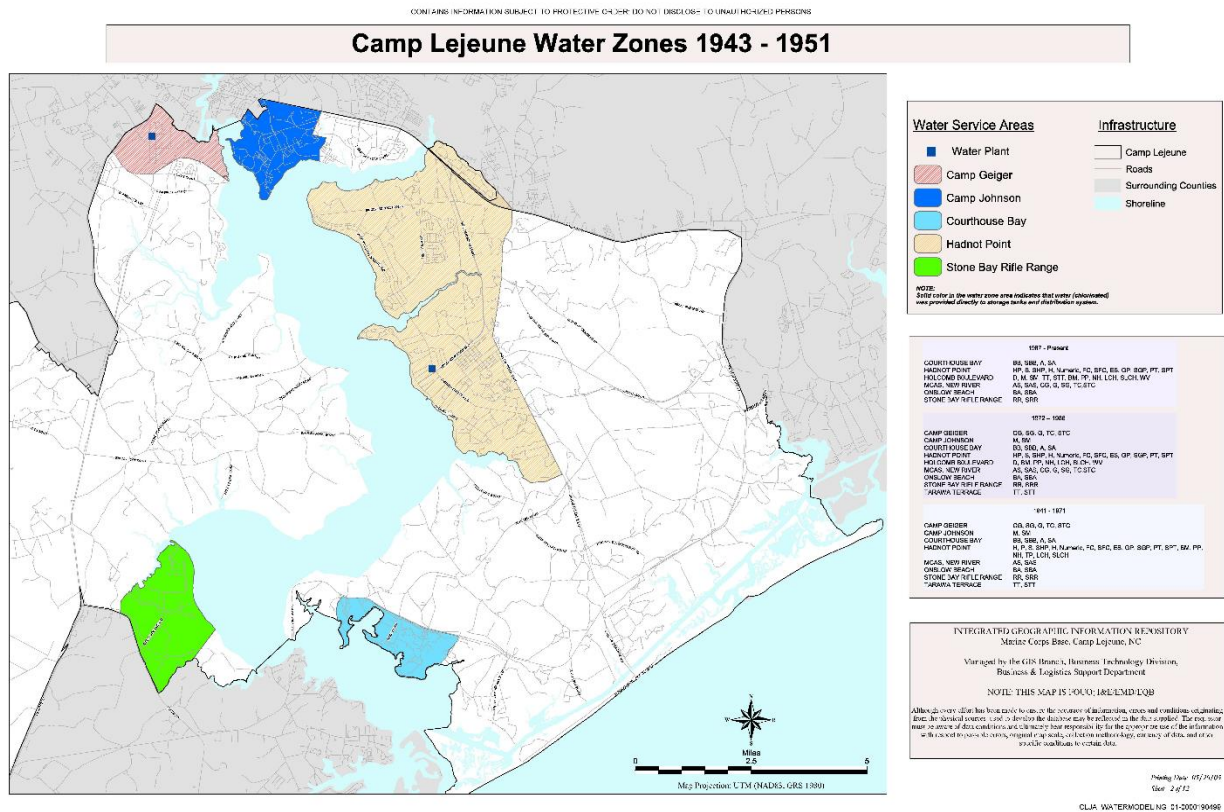


Image 7 is the water zone map for the 1943-1951 period and it shows the Tent City Camp (Camp Geiger) WTP and the Hadnot Point WTP.

⁶⁵ CLJA_WATERMODELING_01-0000190493.

Camp Lejeune Water Zones, 1943-1951⁶⁶



IV. The Development of the Camp Lejeune Water Systems: 1952-1987

A. Introduction

After the construction of the Tent City and Hadnot Point WTPs during World War II, the Marine Corps built seven additional WTPs at Camp Lejeune. All nine WTPs have served particular areas of the base. Table 1 lists the nine WTPs organized by dates of operation.

⁶⁶ CLJA_WATERMODELING_01-0000190499. In 2005, the Integrated Geographic Information Repository at Camp Lejeune created a series of twelve color-coded maps showing the location and dates of the water service areas and water treatment plants at Camp Lejeune dating from 1941 to 2000 that I discuss in this report. The office also created composite map, CLJA_WATERMODELING_01-0000190502.

Although the Hadnot Point WTP continued to pump water beyond 2000, the contaminated wells that it was connected to were deactivated between November 1984 and February 1985, see, the Expert Witness Report of Morris L. Maslia in this litigation (Maslia Expert Witness Report), 10/25/2024, 23; and the Expert Witness Report of Professor Mustafa M. Aral, (Aral Expert Witness Report), 10/23/2024, 6.

Table 1
Operation Dates for Camp Lejeune Water Treatment Plants Based on
Camp Lejeune Water Zone Maps, 1941-1987

WTP Name	Year Operations Started	Year Operations Ended
Camp Geiger	1941	1976
Hadnot Point	1942	Pumping in 2000
Tarawa Terrace	1952	1987
MCAS- New River	1954	Pumping in 2000
Montford Point / Camp Johnson	1957	1987
Onslow Beach	1958	Pumping in 2000
Rifle Range (Stone Bay)	1965	1993
Courthouse Bay	1969	Pumping in 2000
Holcomb Boulevard	1972	Pumping in 2000

As I note above, the Camp Geiger WTP was the first WTP at Camp Lejeune and it began operating no later than September 30, 1942, the end date of the second Completion Report.⁶⁷ As reported in *The Globe* in December 1948, the Hadnot Point WTP commenced operations in the fall of 1942. For the remainder of the War, the Camp Geiger and Hadnot Point WTPs provided water for those two areas. Other areas on the base distributed groundwater that had been chlorinated, as discussed in the completion histories.

At the end of the War, in August 1945, Camp Lejeune was “operating at nearly full capacity.”⁶⁸ The U.S. military quickly demobilized after World War II and the situation was no different at Camp Lejeune. In October of 1946, for example, on average there were fewer than 10,000 Marines on base per month. In 1950, total Marine Corps strength across all commands

⁶⁷ Completion Report, Vol. II, CLJA_USMCGEN_0000161226, at *0000161434-38. In September 1942, what became the Camp Geiger area was still called Tent City Camps No. 1 and No. 2.

⁶⁸ *Semper Fedelis, A Brief History of Onslow County*, 47, Exhibit 2.

numbered fewer than 75,000 regular duty Marines.⁶⁹ Fewer Marines at Camp Lejeune lowered the demand for water.

In June 1950, North Korean troops invaded South Korea, and the United States led the United Nations' response. By the end of 1950, the country was again on a war footing and things began to change at Camp Lejeune as Marines and sometimes their families arrived at the base. During this time, the Marine Corps reactivated old units such as the Field Medical Services and Infantry Training Regiment and established new ones, including Force Troops, Fleet Marine Force Atlantic (FMFLant) at Camp Lejeune. Also, in 1951, the Marines reopened the former Marine Airfield at Peterfield Point, renamed in 1954 to Marine Corps Air Facility (MCAF) New River.⁷⁰

By 1952, the influx of Marines and their families caused a severe housing shortage at Camp Lejeune "that paralleled that of their predecessors at the beginning of World War II."⁷¹ To alleviate the shortage, the Marines started constructing new housing. On January 22, 1953, *The Globe* ran a front-page story on the opening of the Tarawa Terrace II housing development. The article discussed the 1952-1953 housing program and the new construction then underway. According to the article the new Tarawa Terrace II housing complex would have 1,054 housing units, Marine Corps Air Station New River would have 176 housing units, at "Camp Geiger" there would be 900 new trailers, and at "Camp Knox" 250 new trailers.⁷² More Marines and more families meant increased demand for water especially for the 2,108 housing units at Tarawa Terrace I and II.

B. The Tarawa Terrace WTP and the ABC One-Hour Cleaners as a Source of Contamination

The Tarawa Terrace WTP became operational in 1952, after the completion of the Tarawa Terrace I housing area in September 1951.⁷³ Image 8 shows the three WTPs in operation at Camp Lejeune in 1952 and 1953. As noted in the legend of the map, the Montford Point

⁶⁹ *Semper Fidelis, A Brief History of Onslow County*, 48 and 50, Exhibit 2.

⁷⁰ *Semper Fidelis, A Brief History of Onslow County*, 60-61, Exhibit 2. In 1954, six new barracks opened to the west of the airfield located close to the hangar, mess hall, and Service Club and the Staff NCO Club, *ibid.*, 60. On January 8, 1952 Tent City Camp was officially renamed Camp Geiger after USMC General Roy S. Geiger, *ibid.*, 59.

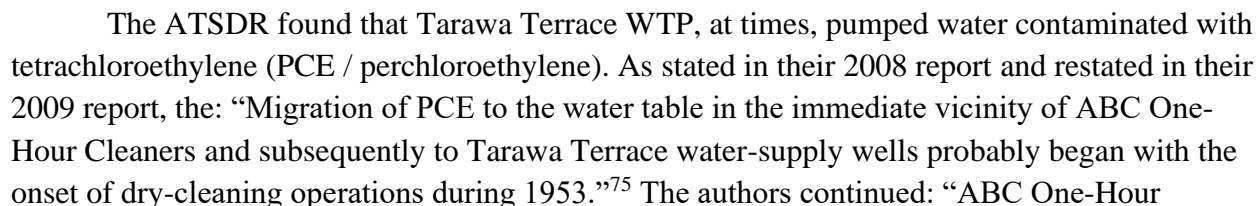
⁷¹ *Semper Fidelis, A Brief History of Onslow County*, 52, Exhibit 2.

⁷² "First Marine Families Occupy Tarawa Terrace Two: Official Greeting Marks Project's Opening Day," *The Globe*, 1/22/1953, 00897_PLG_0000053464.

⁷³ "Tarawa Terrace Doors [Open] to First Families; [Units] Available Weekly," *The Globe*, 9/13/1951, 00897_PLG_0000054027.

Image 8

Map of the Water Systems after the Construction of the Tarawa Terrace Housing Areas and Water Treatment Plant⁷⁴



⁷⁵ ATSDR, Analyses of Groundwater Flow, Contaminant Fate and Transport, and Distribution of Drinking Water at Tarawa Terrace and Vicinity, U.S. Marine Corps Base Camp Lejeune, North Carolina: Historical Reconstruction and Present Day-Conditions, Chapter F: Simulation of the Fate and Transport of Tetrachloroethylene (PCE) (Atlanta, GA: ATSDR, 2/2008), (ATSDR 2008), CLJA_2019ATSDR04-0000000775, at *0000000808. Also see *ibid.*, *0000000798; ATSDR, Analyses of Groundwater Flow, Contaminant Fate and Transport, and Distribution of Drinking Water at Tarawa Terrace and Vicinity, U.S.

Cleaners always used PCE in its dry cleaning operations, beginning during 1953 when the business opened.”⁷⁶ The authors cited the deposition of Mr. Victor Melts, one of the owners of ABC One-Hour Cleaners, in a written communication dated April 12, 2001.⁷⁷ However, as explained in greater detail below, ABC One-Hour Cleaners did not open until June 1954.

During his deposition in April 2001, Mr. Melts testified that they used perchloroethylene at ABC One-Hour Cleaners and that they received it in fifty-five gallon drums with the names of Dow and Dupont on the outside of the drums.⁷⁸ Mr. Melts further testified that he and his brother opened ABC One-Hour Cleaners in 1953 and that at the time of his deposition it was located at 2127 Lejeune Boulevard.⁷⁹

Mr. Melts was later asked, “what years did you actually work at A.B.C. One Hour Cleaners?” He responded: “From 1954 to ’56, ’57. My brother worked it mainly while I moved down to New Bridge Street. Then I had a place out at Camp Geiger on Highway 17 South.”⁸⁰ He continued that he operated the New Bridge Street location and that it was a cleaning business also called “A.B.C. One Hour Cleaners.”⁸¹

However, in contrast to Mr. Melts’ 2001 testimony, a newspaper advertisement, a high school yearbook, telephone directories, and other documents support opinion three that the ABC One-Hour Cleaners on Highway 24 East, later 2127 Lejeune Boulevard, opened in June 1954.

First, an establishment that operated in the same space as ABC One-Hour Cleaners placed an advertisement in the 1954 Camp Lejeune Yearbook. The North Carolina Environmental Management Commission found that a model and hobby shop operated in the

Marine Corps Base Camp Lejeune, North Carolina: Historical Reconstruction and Present Day-Conditions, Response to the Department of the Navy’s Letter on: Assessment of ATSDR Water Modeling for Tarawa Terrace (Atlanta, GA: ATSDR, 3/2009), (ATSDR 2009), CLJA_2019ATSDR04-0000000449, at *0000000470-71.

⁷⁶ ATSDR 2008, CLJA_2019ATSDR04-0000000775, at *0000000798.

⁷⁷ ATSDR 2008, CLJA_2019ATSDR04-0000000775, at *0000000798. Mr. Maslia states in his Expert Witness report that the ABC One-Hour Cleaners started operations in 1953. See, Maslia Expert Witness Report, 57 and 176-77.

⁷⁸ Deposition of Victor John Melts (Melts Deposition), 4/12/2001, 00897_PLG_0000067564, at *00897_PLG_0000067573-75.

⁷⁹ Melts Deposition, 00897_PLG_0000067564, at *0000067569-70.

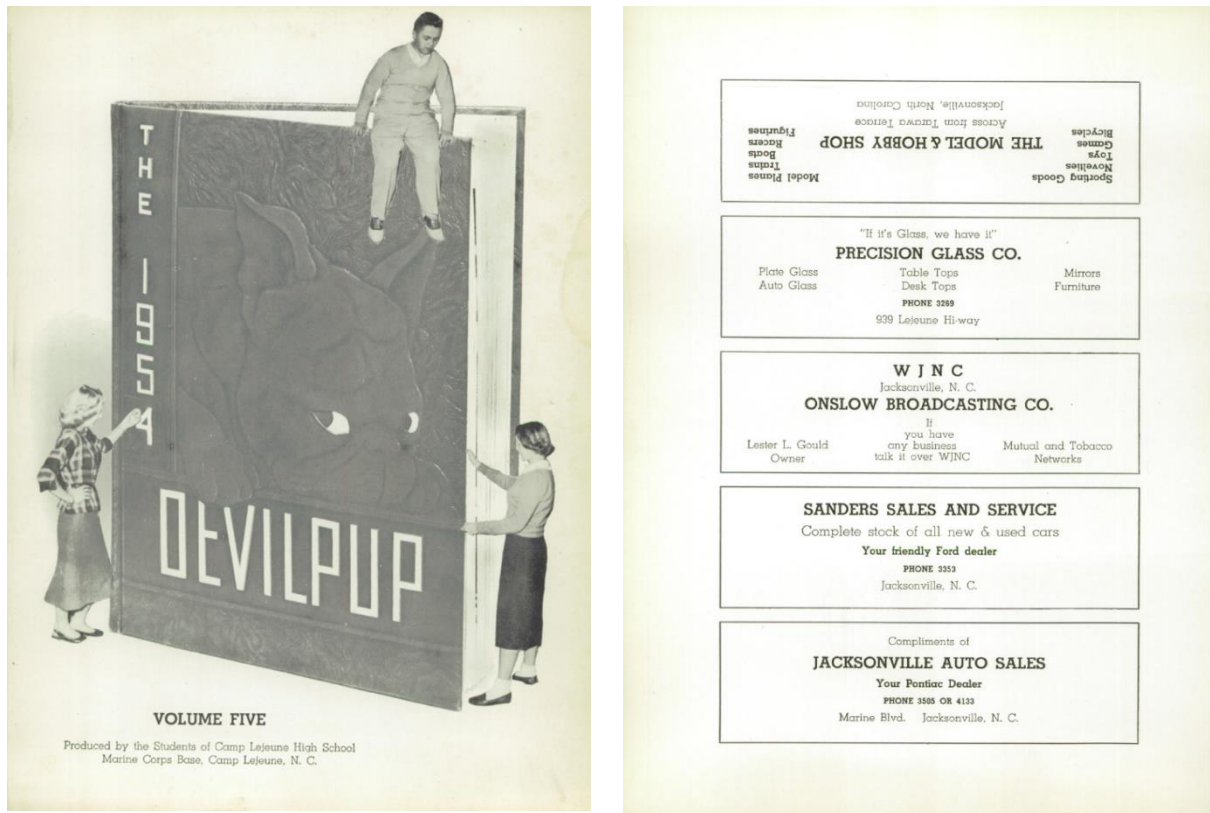
⁸⁰ Melts Deposition, 00897_PLG_0000067564, at *0000067631-32.

⁸¹ Melts Deposition, 00897_PLG_0000067564, at *0000067632. ABC One-Hour Cleaners, New Bridge Street, is the second ABC One-Hour Cleaners location and is situated across Highway 17 to the northwest of Camp Johnson and to the northeast of Camp Geiger.

building leased by Mr. Melts before he opened ABC One-Hour Cleaners.⁸² The 1954 Camp Lejeune High School yearbook, the *Devilpup*, included an advertisement from the “Model & Hobby Shop” as shown in Image 9 below. Information in the *Devilpup* confirms that it was the yearbook for the 1953-1954 school year.

Image 9

Camp Lejeune High School 1954 Yearbook⁸³



Second, a newspaper advertisement in June 1954 indicated that the ABC One-Hour Cleaners opened in that month and year. The June 29, 1954, *Jacksonville Daily News* advertisement reads: “Announcing . . . Grand Opening ABC 1 Hour Cleaners” on Camp Lejeune Highway (Image 10). The advertisement notes that: “We use DuPont Perlene Dry Cleaning

⁸² North Carolina Environmental Management Commission, File No. GW 86-01, CLJA_WATERMODELING_07-0001289853. The signature date of this document is 9/30/1987.

⁸³ These two images were copied from the Camp Lejeune Yearbook available at <https://www.classmates.com/siteui/home>. The yearbook lacks publication information although on the fifth page it is noted: “Volume Five. Produced by the Students of Camp Lejeune High School Marine Corps Base, Camp Lejeune, N. C.,” Exhibit 4.

Solution . . . Safer . . . Faster . . . Cleaner!”⁸⁴ Dupont Perlene Dry Cleaning Solution was a tetrachloroethane / perchloroethylene based solvent.⁸⁵

Image 10

**ABC One-Hour Cleaners Advertisement
in the Jacksonville, NC *Daily News*, June 29, 1954⁸⁶**



⁸⁴ “Announcing . . . Grand Opening ABC 1 Hour Cleaners,” *Daily News*, 6/29/1954, CLJA_OCPL_0000000001, at *0000000012. The advertisement references Midville. To place Midville in the context of Highway 24/2127 Lejeune Blvd, I reference an article in *The Globe* dated March 10, 1960, that discussed a fire that base fire fighters responded to, which indicates that Midville is near Tarawa Terrace. The article reads, in part, “when fire broke out in a huge furniture store in the Midville section of Lejeune Boulevard opposite Tarawa Terrace.” The article further noted that firefighters had “to connect the Lejeune Pumpers and 2,500 feet of hose to the nearest hydrant in Tarawa Terrace.” “Base Firemen Help Fight Highway Fire,” *The Globe*, 3/10/1960, 00897_PLG_0000049366, at *00897_PLG0000049374-75. Notably, Mr. Melts testified that ABC One-Hour Cleaners was next door to a furniture store. Melts Deposition, 00897_PLG_0000067564, at *00897_PLG_0000067626.

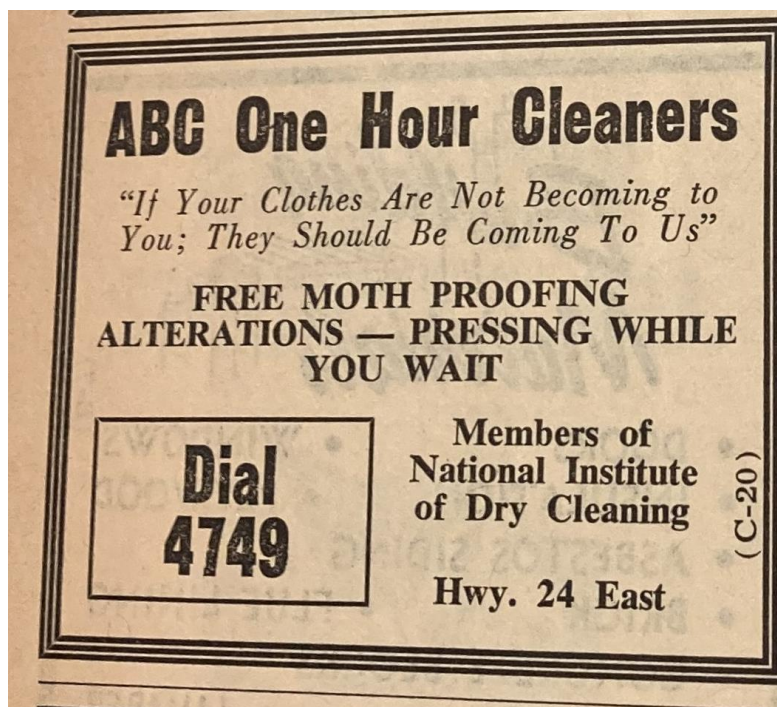
⁸⁵ R. Doherty, “A History of the Production and Use of Carbon Tetrachloride, Tetrachloroethylene, Trichloroethylene, and 1,1,1-Trichloroethan in the United States: Part I – Historical Background; Carbon Tetrachloride and Tetrachloroethylene,” *Journal of Environmental Forensics*, 69 81 no.1 (2000), CLJA_WATERMODELING_07-0001271402.

⁸⁶ “Announcing . . . Grand Opening ABC 1 Hour Cleaners,” *Daily News*, 6/29/1954, CLJA_OCPL_0000000001, at *0000000012.

Third, an examination of telephone books indicates that ABC One-Hour Cleaners did not open in the 2127 Lejeune Boulevard, which was the source of the contamination, until 1954 at the earliest. The 1953 telephone directory for Jacksonville, NC and surrounding communities, which had been updated through April 15 of that year, does not include a listing for the ABC One-Hour Cleaners.⁸⁷ There is not an extant telephone directory for 1954. However, the August 1955 telephone directory has three mentions of an ABC One-Hour Cleaners. Two of these are one-line entries—one appearing in the residential section and the other in the business section—that read: “A B C One Hour Cleaners Hwy 24 East-----4749”; the third is an advertisement for the ABC One-Hour Cleaners located on “Hwy 24” (see Image 11).

Image 11

**ABC One-Hour Cleaners Advertisement, August 1955,
Jacksonville, NC and Surrounding Communities Telephone Directory⁸⁸**



⁸⁷ Telephone Directory, Jacksonville, N.C.; Holly Ridge, N.C.; Richlands, N.C.; Sneads Ferry, N.C.; Swansboro, N.C.; Topsail Island, (Jacksonville Telephone Directory), June 1953, Carolina Telephone and Telegraph Company, Exhibit 5.

⁸⁸ Telephone Directory, Jacksonville, N.C.; Holly Ridge, N.C.; Richlands, N.C.; Sneads Ferry, N.C.; Swansboro, N.C.; Topsail Island, August 1955, Carolina Telephone and Telegraph Company, Exhibit 6.

In July 1956, the date of the next Jacksonville, NC telephone directory, there are again three entries for the ABC One-Hour Cleaners. As in 1955, one in the residential listing and one in the business listing. There is also a half-page advertisement that lists the locations of “2 Ultra-Modern Plants” (Image 12). The first is for the one located on “Hwy. 24 East” and the second is for “509 New Bridge St.”⁸⁹

Image 12

**ABC One-Hour Cleaners Advertisement, July 1956, Jacksonville, NC and
Surrounding Communities Telephone Directory⁹⁰**

ABC **ONE HOUR CLEANERS** (C-26)

FREE MOTH PROOFING
ALTERATIONS - PRESSING
WHILE YOU WAIT

*"If Your Clothes Are Not Becoming To You;
They Should Be Coming To Us."*

2 ULTRA-MODERN PLANTS
TO SERVE YOU...

No. 1—HWY. 24 EAST
No. 2—509 NEW BRIDGE ST.

Dial 4749
Dial 4944

CLOSEST CLEANERS TO CAMP LEJEUNE
ALL WORK DONE ON PREMISES

SPICK **SPAN**

NID
YOUR CLEANER IS YOUR CLOTHES' BEST FRIEND
NATIONAL INSTITUTE OF DRYCLEANING 1931

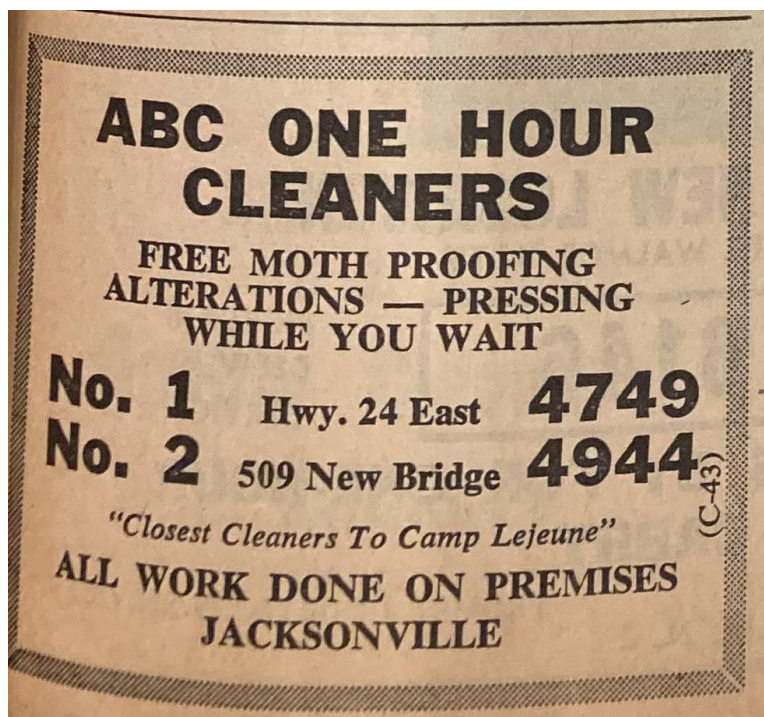
⁸⁹ Jacksonville Telephone Directory, July 1956, Exhibit 7.

⁹⁰ Jacksonville Telephone Directory, July 1956, Exhibit 7.

In 1959, the telephone directory again lists both locations for the ABC One-Hour Cleaners. In addition to the listings, ABC ran an advertisement (see Image 13).

Image 13

**ABC One-Hour Cleaners Advertisement, March 1959, Jacksonville, NC
and Surrounding Communities Telephone Directory⁹¹**



As shown in Image 14, the 1960 directory lists both locations although "Hwy. 24 East" had become "2127 Lejeune Blvd," the address that Mr. Melts testified was the address of his first location.

⁹¹ Telephone Directory, Jacksonville, N.C.; Holly Ridge, N.C.; Richlands, N.C.; Sneads Ferry, N.C.; Swansboro, NC; Topsail Island, March 1959, Carolina Telephone and Telegraph Company, Exhibit 8.

Image 14

ABC One-Hour Cleaners Advertisement, March 1960, Jacksonville, NC
and Surrounding Communities Telephone Directory⁹²



As the above advertisements and discussion illustrate, the ABC One-Hour Cleaners Midville, Highway 24 East, and 2127 Lejeune Boulevard locations are the same. As I have discussed, the ABC One-Hour Cleaners at 2127 Lejeune Boulevard was the source of contamination of the Tarawa Terrace WTP.

Fourth, a North Carolina report issued in 1987 noted that ABC One-Hour Cleaners at 2127 Lejeune Boulevard has been operating as a dry cleaners at the site since 1954,” and was using tetrachloroethylene.⁹³ In this report, the author references a “telephone conversation with Victor Melts, Manager, ABC One Hour Cleaners for the source of the year it opened.”⁹⁴

⁹² Telephone Directory, Jacksonville, N.C.; Holly Ridge, N.C.; Richlands, N.C.; Sneads Ferry, N.C.; Swansboro, N.C.; Topsail Island, March 1960, Carolina Telephone and Telegraph Company, Exhibit 9.

⁹³ C. McMorris, Site Inspection Report, ABC One-Hour Cleaners NC D024644494, 2127 Lejeune Boulevard, Jacksonville, N.C. 28540, 5/27/1987, CLJA_USMCGEN_0000312406, at *0000312408.

⁹⁴ C. McMorris, Site Inspection Report, CLJA_USMCGEN_0000312406, at *0000312428.

Fifth, a 1989 state of North Carolina report and property records indicate that ABC One-Hour Cleaners at 2127 Lejeune Boulevard opened in 1954 or later. In the report, the state noted that the cleaners was located at 2127 Lejeune Boulevard, and further stated: “The site was originally owned by Walter Morgan who constructed a total of three buildings on the property.” The report continued: “In 1954 Mr. Morgan leased the buildings to Milton Melts of ABC 1 Hour Cleaners.” The report also said that the cleaners had “been using tetrachloroethylene at the site since operations began.”⁹⁵ Although, there is not an extant 1954 lease for the property, the first lease involving Mr. Melts is dated May 2, 1955 and between the Carolina Eastern Realty Company and Milton Melts, Jimmy L. Melts, Victor J. Melts, and Florence L. Melts.⁹⁶

The *Devilpup*, the June 29, 1954 advertisement in the Jacksonville, NC Daily News, the Jacksonville, N.C. telephone directories, the North Carolina state reports, the testimonies of Mr. Melts and documents cited in footnotes 77-84 and 86-96 confirm that in the 1950s, the ABC One-Hour Cleaners had two Jacksonville, N.C. locations, and the one located at 2127 Lejeune Boulevard, the source of tetrachloroethylene contamination at Tarawa Terrace, opened in 1954 rather than in 1953 as the ATSDR concluded.⁹⁷

The information in this section of my report serves to lay the foundation for my third opinion.

C. Development of the Camp Lejeune Water Systems, 1957-1987

As shown in Image 15, by 1957, Montford Point (Camp Johnson) and the Marine Corps Air Station had their own WTPs that serviced each area. Stone Bay Rifle Range and Courthouse Bay areas continued to receive and use chlorinated well water from their own WTPs.⁹⁸

⁹⁵ North Carolina Division of Health Services, Solid Waste Management Section, Hazardous Waste Branch, “Comprehensive Ground Water Monitoring Evaluation, ABC 1 Hour Cleaners, Jacksonville, North Carolina, EPA ID # NCD981757726,” 4/20/1989, CLJA_USMCGEN_0000312358, at *0000312360.

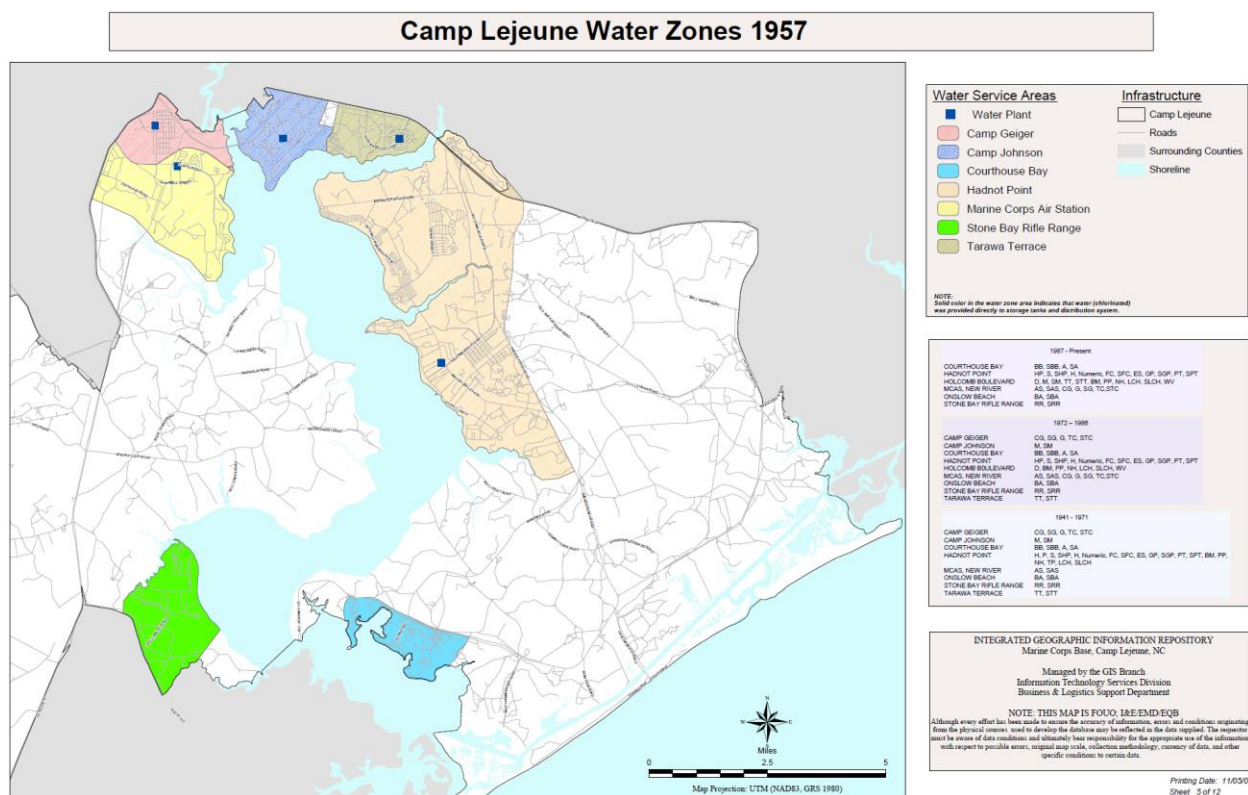
⁹⁶ Lease and Agreement, Carolina-Eastern Realty Company Inc., and Milton Melts, et al., 2/24/1955, Abstract of Title, Lots 1 and 2, Shugart Morgan Subdivision, Plat Book 3, page 55, CLJA_EPA01-0000221397, at *0000221403-05.

⁹⁷ I am unaware of any information that suggests the ABC One-Hour Cleaners located at 509 New Bridge Street (which is the ABC One-Hour Cleaner location in the 1956, 1959 and 1960 telephone directories but not the 1955 directory) was the source of PCE contamination.

⁹⁸ See footnote 64.

Image 15

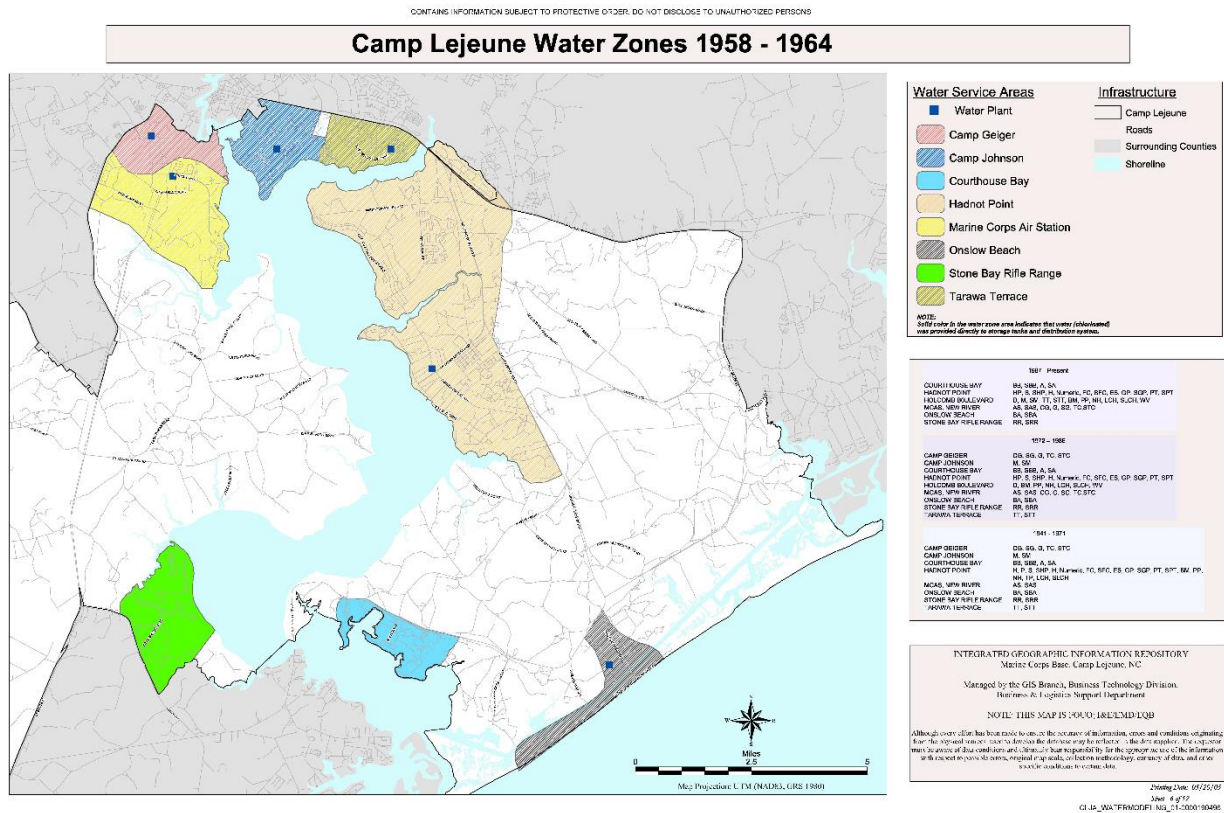
Map of the Water Systems after the Construction of the MCAS and Montford Point / Camp Johnson Water Treatment Plants⁹⁹



In 1958, the WTP at Onslow Beach began operating as shown in Image 16. Then in 1965, when the U.S. involvement in Vietnam escalated, the WTP at the Stone Bay Rifle Range began operations (see Image 17). Four years later in 1969, at the highpoint of U.S. ground forces in Vietnam, the Courthouse Bay WTP went online (see Image 18). With the commencement of service at the Courthouse Bay WTP, all of the major inhabited areas of Camp Lejeune were now connected to WTPs.

⁹⁹ CLJA_WATERMODELING_01-0000190495.

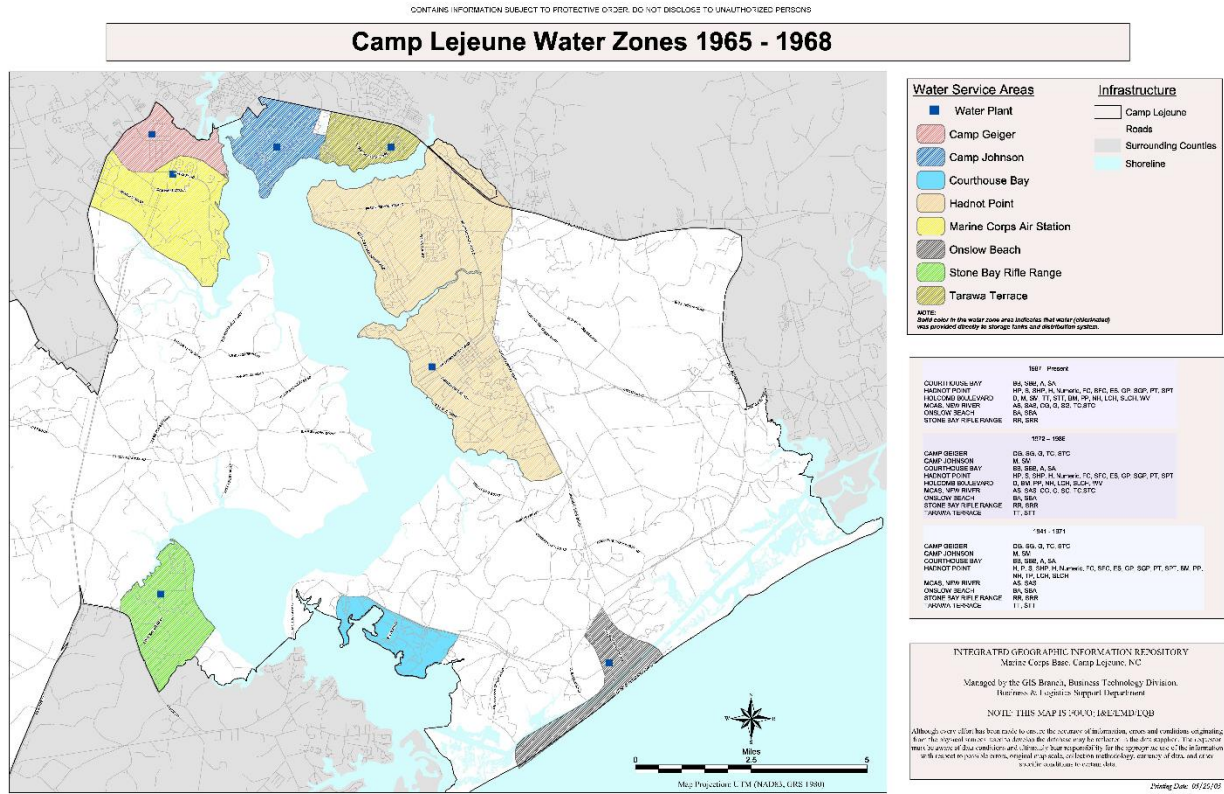
Map of the Water Systems after the Construction of the Onslow Beach Water Treatment Plant¹⁰⁰



100 CLJA_WATERMODELING_01-0000190496.

Image 17

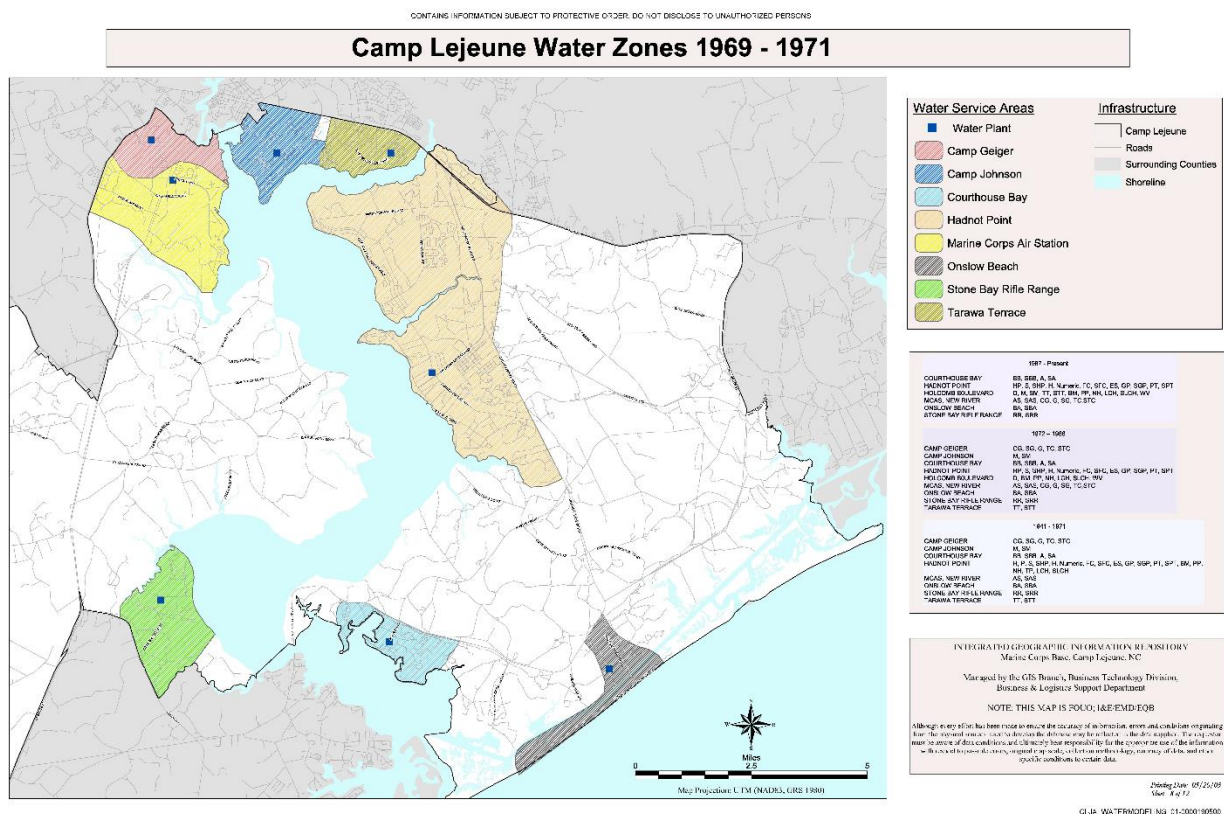
Map of the Water Systems after the Construction of the Stone Bay Rifle Range Water Treatment Plant¹⁰¹



¹⁰¹ CLJA_WATMODELING_01-0000190497.

Image 18

Map of the Water Systems after the Construction of the Courthouse Bay Water Treatment Plant¹⁰²



The Vietnam War caused increased activity at Camp Lejeune. And by the mid-1960s, many of the housing units at the base were approaching twenty years in age and needed repair. In the 1960s, new housing developments such as Berkeley Manor were built, while the remodeling took place at other housing units in areas such as Midway Park.

In 1967, the Marine Corps Commandant requested that a master plan be prepared for Camp Lejeune focusing on the major areas of the base including Hadnot Point and the area immediately south of Hadnot Point, the French Creek area. Once completed, the plan would “be the supporting document for any Military construction program line item. . .”¹⁰³ The master plan

¹⁰² CLJA_WATERMODELING_01-0000190500.

¹⁰³ 1970 Master Plan, CLJA_USMCGEN_0000336978, at *0000337019.

addressed the need for a new WTP at Hadnot Point: “The construction of the new Force Troops Complex, the new Division Shop Area, and the air conditioning of the new majority of existing building will result in a substantial increase in the potable water requirements imposed upon the Hadnot Point water treatment plant.”¹⁰⁴ Because the Hadnot Point WTP was already operating at capacity and it was not “economically possible” to enlarge it was “proposed to construct a new water treatment plant, together with a new well field . . . and to connect this plant to the main housing areas.”¹⁰⁵

The justification for the construction of the new WTP further stated:

Hadnot Point proper is the most highly developed complex on the Base and is the nucleus of the entire camp. It includes the U.S. Naval Hospital, the Division billeting area, the Central Area, the Supply and Industrial Areas, and the Force Troops Area. A reliable and adequate water supply to this area is of absolute and paramount importance to the mission of the Base. The water demand in this area is very susceptible to great fluctuations as influenced by troop loading conditions and the potential for an increase in troop loading always exists here.¹⁰⁶

The proposed new WTP would be located east of the intersection of Brewster and Holcomb Boulevards with wells located in the Piney Green area.¹⁰⁷

The new Holcomb Boulevard WTP plant was approved and was completed in the summer of 1972 at a cost of \$1.8 million. It is located near the old Main Gate to Camp Lejeune on Holcomb Boulevard near Highway 24.¹⁰⁸ As shown on Image 19, it served the area north of Wallace Creek, which had previously been serviced by the Hadnot Point WTP. The addition of the Holcomb Boulevard WTP brought the total number of active WTPs at Camp Lejeune to nine from 1972 to 1976.

¹⁰⁴ Index 09.05-3/24/70-00368, CLJA_LANTDIV_0000000914, at *0000001590. The referenced “new Force Troops Complex” is south of the main part of the Hadnot Point regimental area at French Creek. Construction started in the late 1960s and continued into the 1970s. The Force Troops are those Marines at Camp Lejeune who work in support of the Second Marine Division providing “heavy combat support and specialized technical support not organic to the 2d Marine Division. . . .,” see, 1966 Base Guide, Base_Guides_0000000098, at *0000000112.

¹⁰⁵ Index 09.05-3/24/70-00368, CLJA_LANTDIV_0000000914, at *0000001590.

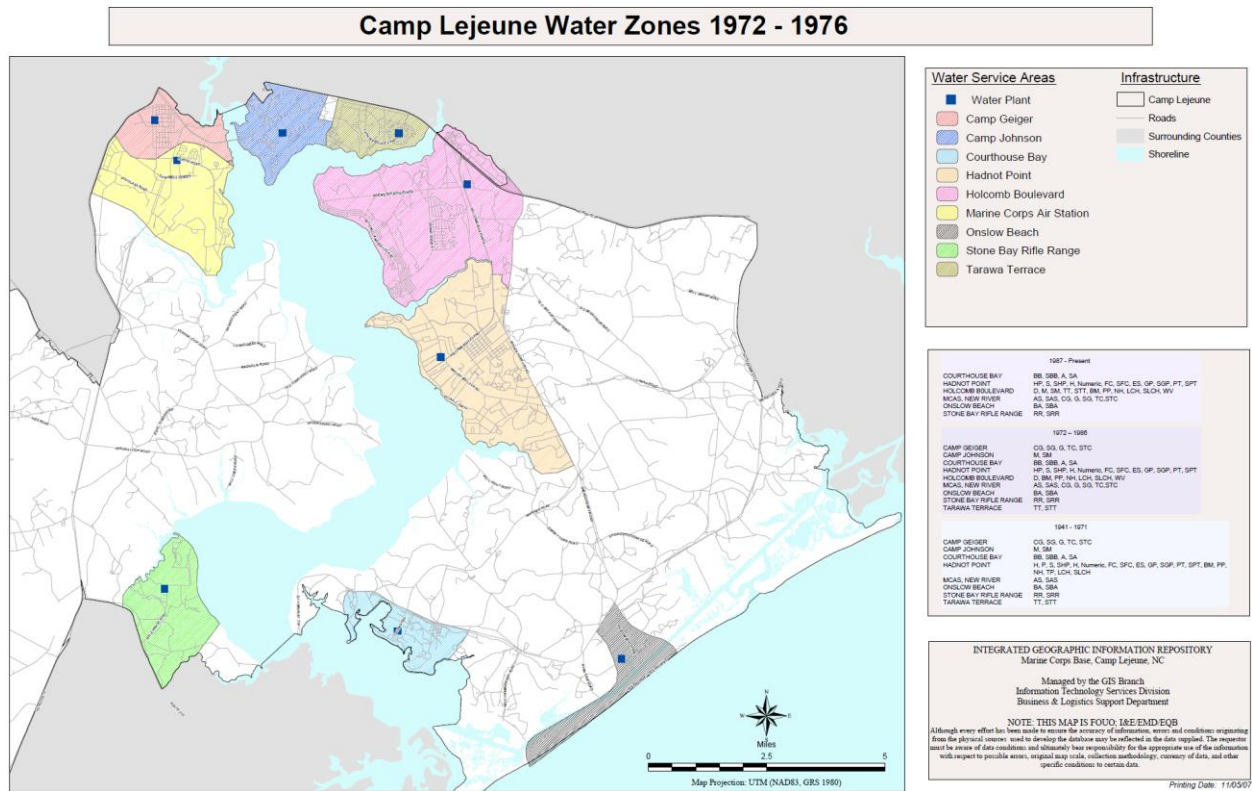
¹⁰⁶ Index 09.05-3/24/70-00368, CLJA_LANTDIV_0000000914, at *0000001593.

¹⁰⁷ Index 09.05-3/24/70-00368, CLJA_LANTDIV_0000000914, at *0000001593-94.

¹⁰⁸ Photo caption “Water Works,” *The Globe*, 8/10/1972, 00897_PLG_0000042448, at *0000042453.

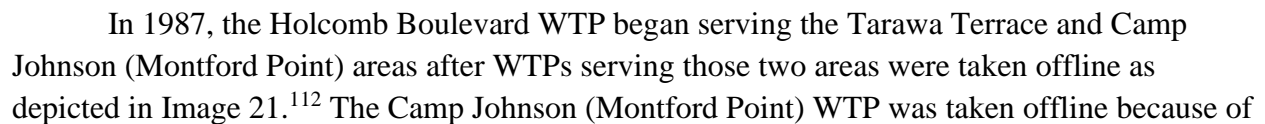
Image 19

Map of the Water Systems after the Construction of the Holcomb Boulevard Water Treatment Plant¹⁰⁹



¹⁰⁹ CLJA_WATERMODELING_01-0000190491.

Image 20
Map of the Water Systems after the Camp Geiger
Water Treatment Plant went Offline¹¹¹

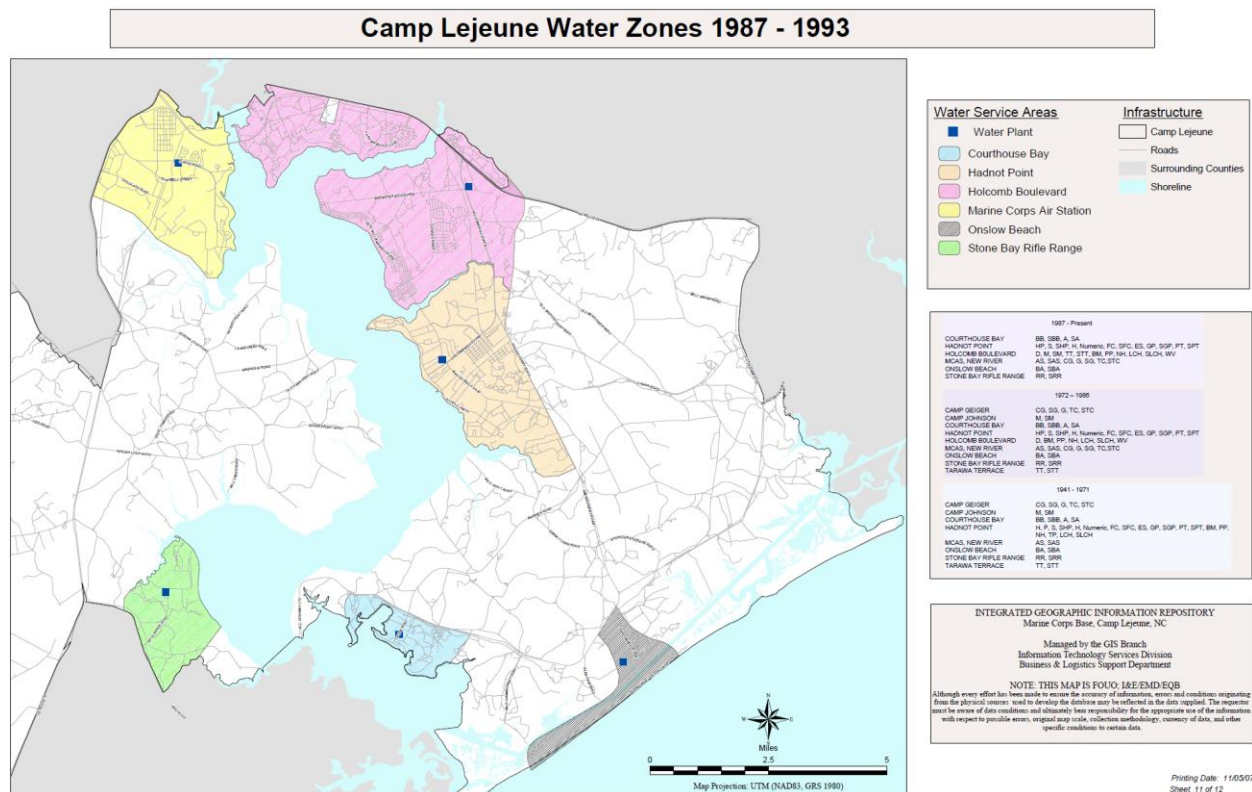


¹¹² National Research Council 2009, CLJA HEALTHEFFECTS-0000000431, at *0000000486.

the hardness of the water and the water's high iron levels, although the water was "safe to drink."¹¹³

Image 21

**Map of the Water Systems after the Camp Johnson and Tarawa Terrace
Water Treatment Plants were Retired¹¹⁴**



Opinions one and three of the current report are partially supported by the discussion above in Section IV.

¹¹³ M. G. Lilley, Commanding General to Commanding Officer, Field Medical Service School, 2/9/1984, CLJA_WATERMODELING_01-0000286041-42.

¹¹⁴ CLJA_WATERMODELING_01-0000190501.

V. Areas of Camp Lejeune

A. Introduction

Various sources provide insight into the physical locations of barracks and family housing, main and auxiliary post exchanges (PX), an officers' club, a NCO and service clubs, theaters, and swimming pools at Camp Lejeune, where Marines might have lived, shopped, exercised, recreated and worked since the construction of the base in the early 1940s. These sources include the World War II era completion reports, *The Globe*, Camp Lejeune telephone directories, and base guides. The 1979 "existing condition" maps presented throughout this section, provide a visual representation of the various areas of Camp Lejeune during those years.¹¹⁵ When compared to the "existing condition" maps from 1946, they show that many areas of the base did not change significantly from the World War II time period. The increase in housing for single and married Marines, additional WTPs, and development of the French Creek area are notable exceptions.

B. Areas Identified by the ATSDR as Contaminated

1. Hadnot Point, including French Creek

The Hadnot Point WTP, located in building 20, close to the main service road and Holcomb Boulevard (as shown in Image 4), began operating in the fall of 1942. Originally designed to filter 3 million gallons per day during World War II, it was later expanded to filter 5 million gallons of water per day.¹¹⁶ As shown in Table 1, the Hadnot Point WTP continued to operate in 2000. By 1953, the beginning of the statutory period, it was one of three WTPs operating at Camp Lejeune (see Image 8).

The Agency for Toxic Substance and Disease Registry (ATSDR) has identified that the Hadnot Point WTP (HPWTP) pumped contaminated water. The Hadnot Point Industrial Area and the Hadnot Point Landfill Area were identified as the sources of contamination of ground water wells connected to the Hadnot Point WTP. The ATSDR stated that "within the HPWTP service area [water] was contaminated with trichloroethylene (TCE), PCE, and refined petroleum products, such as benzene, toluene, ethylbenzene, and xylenes (BTEX). Groundwater within the

¹¹⁵ The existing condition maps were prepared annually for various parts of Camp Lejeune and show changes in a particular area from year to year. Extant existing conditions maps exist for the years 1946-1960, 1963, 1964, 1966, 1979, 1984, and 1985. Most of the existing conditions maps bear the signature of the MCBCL Director of Public Works.

¹¹⁶ "Water Treatment Plant," *The Globe*, 12/2/1948, 00897_PLG_0000055167, at *0000055174.

Holcomb Boulevard WTP (HBWTP) service area remained largely uncontaminated except for intermittent supply by contaminated Hadnot Point water during the years 1972-1985.”¹¹⁷

The legend sheet for Image 22, the 1979 Existing Condition Map for the Division Training Area located at Hadnot Point, lists buildings in the supply and industrial area. Among the buildings listed are an ordnance shop, ordnance warehouses, “a gas and oil filling station,” a “Fuel, Stor. Fac. - 600,000 Gal.,” an “oil storage,” eleven repair shops for vehicles, a motor transport repair shop, an “mc exchange washing and greasing bldg.,” a 420,000 gallon storage tank for fuel oil, and a steam cleaning ramp. There were also barracks, a cafeteria, fourteen mess halls, a bakery, fire station, post office, and post exchange where Marines could buy goods and household items.¹¹⁸

Ever since August 1942, when the Marine Corps moved Camp Lejeune headquarters from Tent City / Camp Geiger to Hadnot Point, Hadnot Point has been the center of activity at the base. As discussed above and shown on Image 4, five regimental areas, officers’ quarters, barracks for women, the U.S. Naval Hospital, the base supply and industrial area, the main base exchange, two training pools, clubs, churches, and theaters were all located on Hadnot Point.¹¹⁹ As noted above the decision to build the Holcomb Boulevard WTP was driven by the construction at Hadnot Point that had strained the capacity of the Hadnot Point WTP.¹²⁰ Although members of the Second Marine Division worked at Hadnot Point, some of them also could have lived at Midway Park, Paradise Point, the Tarawa Terrace housing areas when they opened in the early 1950s, Berkeley Manor after it opened in 1962, or Watkins Village following its opening in 1977. Beginning in the late 1960s, the Marine Corps began construction at French Creek to house members of the Camp Lejeune’s Force Troops.¹²¹

¹¹⁷ ATSDR, “Analyses and Historical Reconstruction of Groundwater Flow, Contaminant Fate and Transport, and Distribution of Drinking Water Within the Service Areas of the Hadnot Point and Holcomb Boulevard Water Treatment Areas of the Hadnot Point and Holcomb Boulevard Water Treatment Plants and Vicinities, U.S. Marine Corps Base Camp Lejeune, North Carolina, Chapter A: Summary and Findings” (Atlanta, GA: ATSDR, March 2013), (ATSDR 2013). CLJA_HEALTHEFFECTS-0000221326, at *0000221356.

¹¹⁸ Legend Sheet for Division Training Area, Camp Lejeune Training Area, Camp Lejeune, North Carolina Showing Conditions on 30 June 1979, sheet 10A of 24, CLJA_USMC_PWD_0000173796.

¹¹⁹ There are two legends for Image 4, that list all of the structures and training areas in what in 1946 was called the Division Training Area. See, Legend Sheet 5A of 9.PDF and Legend Sheet 5A of 10.PDF, CLJA_USMC_PWD_0000126642, and *0000126643.

¹²⁰ Index 09.05-3/24/70-00368, CLJA_LANTDIV_0000000914, at *0000001590.

¹²¹ The Second Marine Division was, and remains, comprised of the Second, Sixth, Eighth and Tenth Marine Regiments. Also attached to the Second Marine Division at Hadnot Point were the Second Anti-Tank Battalion, Second Medical Battalion, Second Motor Transport Battalion, Second Pioneer Battalion, Second Reconnaissance Battalion, and the Second Service Battalion. The Marine Corps Force Troops

In 1979, headquarters of Camp Lejeune remained in Building 1 at Hadnot Point and included the offices of the base headquarters and the base's legal offices.¹²²

In some ways the area of Hadnot Point south of Wallace Creek was unchanged from 1946, although, as discussed in the next section, changes in housing had occurred with the construction of Berkeley Manor in the early 1960s, the development of the French Creek area beginning in the late 1960s, and the opening of Watkins Village in 1977. Recreational facilities available on the Mainside in the 1960s, included "bowling alleys, movie theaters, swimming pools, horse stables, and skeet ranges."¹²³ Also in the 1960s the old Non-Commissioned Officers' Club (NCO) club at Marston Pavilion was converted to a youth center to serve the growing number of teenagers who lived at Camp Lejeune.¹²⁴

stationed at Camp Lejeune were located at Hadnot Point, USMC, *Camp Lejeune, NC, Telephone Directory*, 6/1959, (June 1959 Telephone Directory), CLJA_USMCGEN_0000074318, at *0000074319; Headquarters, Marine Corps Base at, *0000074356-76; Second Marine Division at, *0000074382-96; Force Troops at, *0000074398-402.

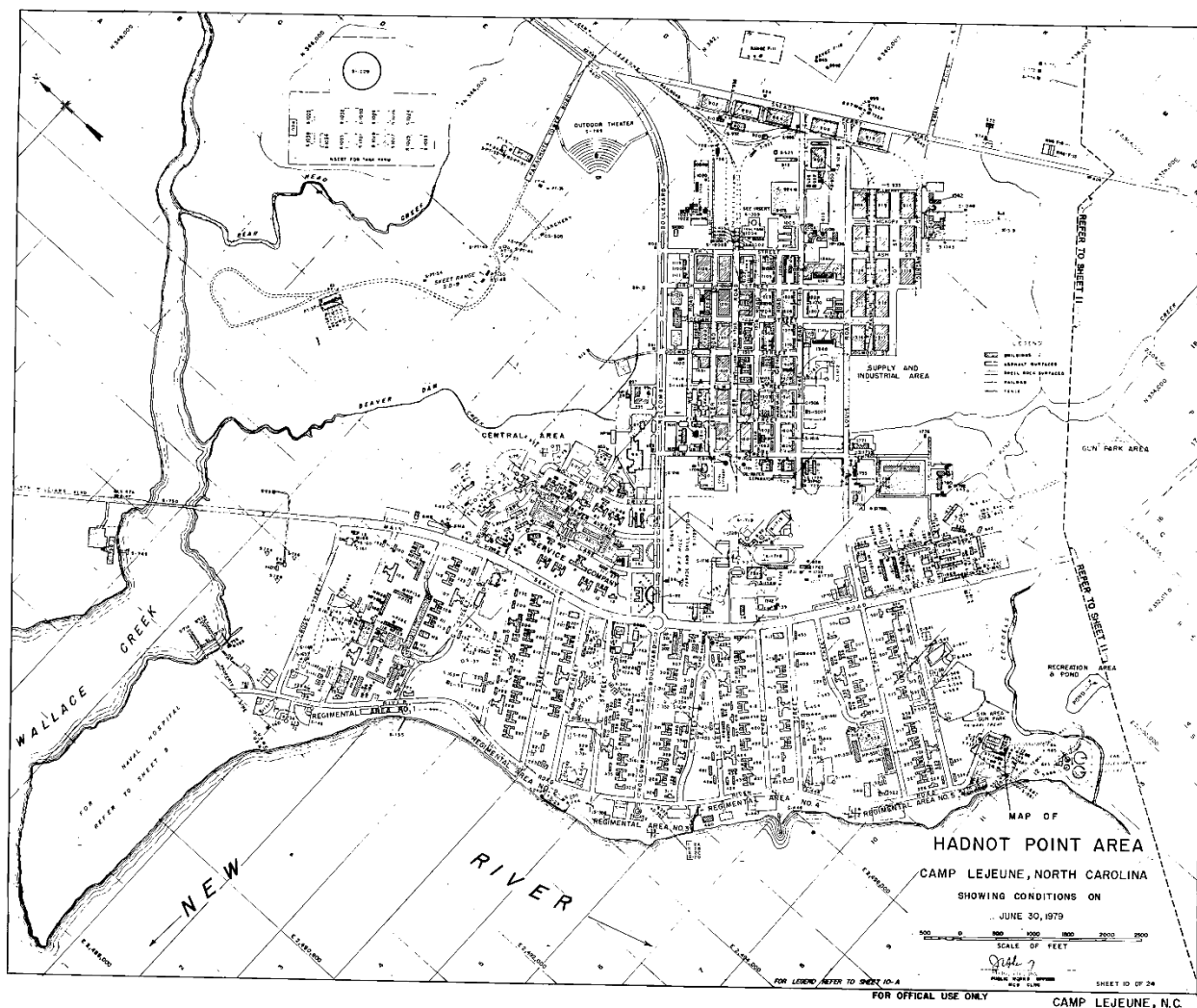
¹²² Legend Sheet for Division Training Area, Camp Lejeune Training Area, Camp Lejeune, North Carolina Showing Conditions on 30 June 1979, CLJA_USMC_PWD_0000173785.

¹²³ *Semper Fidelis, A Brief History of Onslow County*, 63-66, Exhibit 2. In 1959 at MCAF New River 325 family housing units were built for enlisted Marines and 110 for officers, *ibid.*, 66.

¹²⁴ *Semper Fidelis, A Brief History of Onslow County*, 66, Exhibit 2.

Image 22

Hadnot Point, June 30, 1979¹²⁵



The French Creek area is to the south of Hadnot Point (see Image 2) and was one area of new construction that took place in the Hadnot Point area after World War II and the Korean War. This area was called French Creek because it is on the north bank of the French Creek. It is part of Hadnot Point WTP service area.

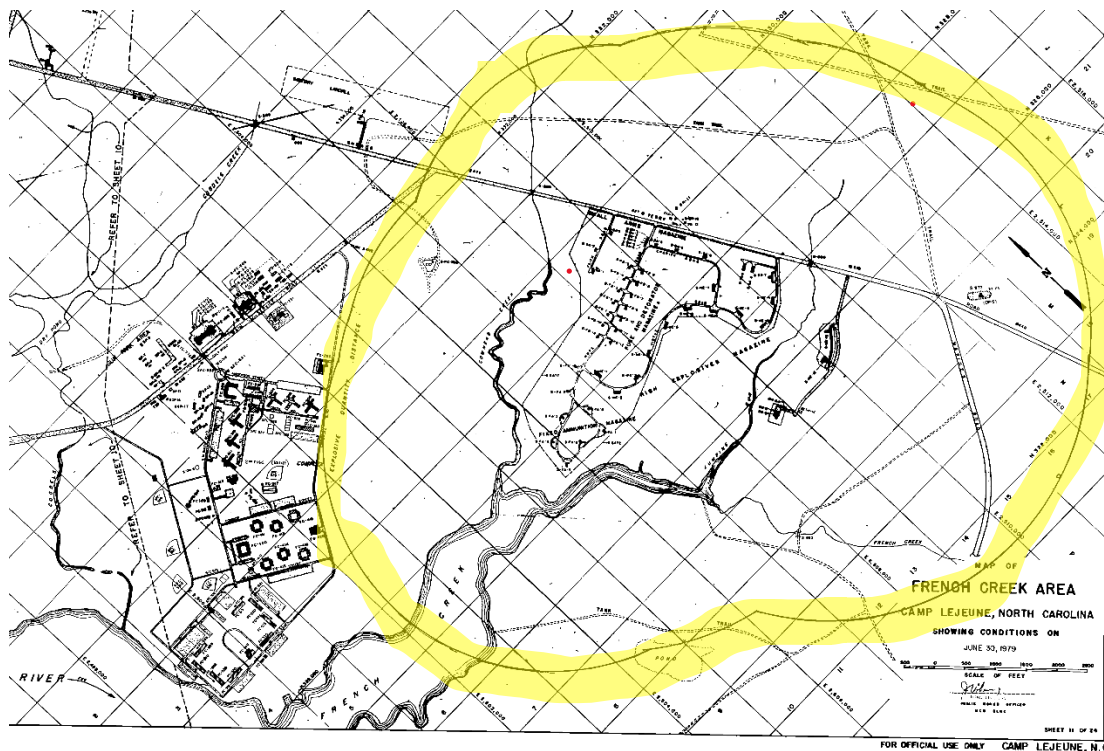
Image 23 shows a portion of the French Creek area that is to the immediate south of Hadnot Point. Ever since World War II, the area shown on Image 23 within the yellow highlighting on the map is the demarcation line for the “explosive quantity distance” that is

¹²⁵ Map of Hadnot Point Area, Camp Lejeune, North Carolina, Showing Conditions on June 30, 1979, (Sheet 10 of 24), CLJA_USMC_PWD_0000173785. The 1979 Existing Condition Maps are the last available ones that show the entirety of the main part of Hadnot Point.

inside the perimeter of the line. In the middle of the yellow highlighting, the area is labeled as “high explosive magazine.”¹²⁶ This is the area wherein high explosives were stored and the highlighted yellow line is the distance from the storage area deemed safe.

Image 23

French Creek Area of Camp Lejeune, June 1979¹²⁷



Just beyond the yellow highlighting in the lower lefthand corner are numerous building that do not appear on the existing conditions map of this area dated June 30, 1963.¹²⁸ The structures at the bottom left near the confluence of the New River and French Creek are barracks and sheds that lack use description. The building to the north of the barracks and sheds are bachelor enlisted quarters where enlisted Marines would live. Other buildings included an administration building, two mess halls and a dining facility, an enlisted men’s clubs, a dispensary, a heating plant, a maintenance building, and a number of other structures, and

¹²⁶ See, “Map of Magazine Area, Camp Lejeune, New River, NC, Showing Conditions on 30 June 1943” (Sheet 6 of 9), CLJA_USMC_PWD-0000126647.

¹²⁷ Map of French Creek Area, Camp Lejeune, North Carolina, Showing Conditions on June 30, 1979, (Sheet 11 of 24). Highlighting added. CLJA_USMC_PWD_0000173841.

¹²⁸ See, “Map of Magazine Area, Camp Lejeune, North Carolina, Showing Conditions on 30 June 1963” (Sheet 11 of 18), CLJA_USMC_PWD-0000126202. This map identifies storage areas for fixed ammunition magazines, high explosive magazines, and small arms magazines.

numerous softball fields and basketball courts. There was also a 300,000 gallon elevated water tank and eight pump houses for eight wells.¹²⁹ These structures were built in the late 1960s during the Vietnam War. In 1968, elements of the Force Troops—those Marines assigned to Camp Lejeune who supported the activities of the Second Marine Division—began to move into the French Creek area, although construction was not yet complete. The bachelor enlisted quarters were “motel-like” units with two- to four-man bedrooms.¹³⁰ Additional housing at French Creek was built in the 1980s.¹³¹

The 1970 Master Plan noted that geographically “the French Creek area is not too remote from the main facilities at Hadnot Point to consider consolidation; however, the billeting load [the number of people that could live in an area] at French Creek was too large to be absorbed into the existing (or expanded) Community facilities at Hadnot Point.” Because of that, -- except for the “Main Exchange, the Commissary,” and some “certain special amenities,” most of the community facilities at Hadnot Point were built at French Creek.¹³²

The 1986 Master Plan Update discussed the importance of moving the 2nd Force Service Support Group (FSSG) to the French Creek area. The document noted that in 1958 the 2nd FSSG, had moved to various locations on Hadnot Point. The unit’s barracks were relocated to areas within Second Marine Divisions’ regimental area and the industrial area on Hadnot Point.¹³³ The authors of the Master Plan Update continued:

These inefficient operating conditions prompted the development of a new, consolidated barracks and shops complex designed solely for the 2nd FSSG at French Creek. During the summer of 1968, 2nd FSSG units were relocated to the first phase of the newly-constructed Creek Complex. The barracks constructed were the first in a series of modern configurations which included private two- and four-man air-conditioned rooms and integrated mess facilities.¹³⁴

Construction at French Creek for the Force Troops continued into the 1970s. The 1970 unofficial Camp Lejeune base guide described a new area for the Force Troops as follows:

¹²⁹ Legend Sheet for French Creek Area Camp Lejeune, North Carolina, Showing Conditions on June 30, 1979, (Sheet 11A of 24), CLJA_USMC_PWD_0000173824.

¹³⁰ *Semper Fidelis, A Brief History of Onslow County*, 70, Exhibit 2.

¹³¹ *Semper Fidelis, A Brief History of Onslow County*, 80, Exhibit 2.

¹³² 1970 Camp Lejeune Master Plan, CLJA_USMCGEN_0000336978, at *0000337153-337155.

¹³³ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326610.

¹³⁴ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326610.

The new, ultra-modern Force Troops Complex, currently under construction in the French Creek area has recently been opened to the first 1,000 Marines. The completed first phase of the complex is comprised of four barracks, one administrative building, one 1,500 man mess hall, two storage buildings, one dispensary and one classroom building. The development, with a projected completion date in the 1970's is an innovation for the Marine Corps. Gone are the legendary wall-lockers, footlockers, and bunks . . . The buildings are constructed of pre-cast concrete panels, brick masonry and tinted glass, and will house 3,500 Marines in two and four-man rooms, when completed.¹³⁵

2. Holcomb Boulevard

The Holcomb Boulevard WTP began operating in June 1972.¹³⁶ On the south, Wallace Creek separates the areas serviced by the Holcomb Boulevard WTP from those serviced by the Hadnot Point WTP. To the north, the Northeast Creek separates the areas serviced by the Holcomb Boulevard WTP from those serviced by the Tarawa Terrace WTP. Until the Holcomb Boulevard WTP became operational in 1972, the Hadnot WTP provided water to what became the Holcomb WTP service area.¹³⁷ For purposes of clarity in this report I will use "Holcomb Boulevard" to describe the area between Wallace and Northeast Creeks and east of Paradise Point for the years prior to the construction of the Holcomb WTP and establishment of the Holcomb Boulevard water system area.

When it went online in June 1972, the Holcomb Boulevard WTP provided water to the Midway Park and Berkeley Manor housing areas where Marines and their families lived. At

¹³⁵ No author, "The Coast of North Carolina Salutes Camp Lejeune," (Lubbock TX: Boone Publications, Inc., 1970), (1970 Base Guide), Base_Guides_0000000254, at *0000000269. The purpose of the base guides was to "provide information to all personnel on the facilities and services available at Camp Lejeune," No author, "Information Booklet," Marine Corps Base, Camp Lejeune, North Carolina, 9/11/1962, (1962 Base Guide), Base_Guides_0000000077, at *0000000078.

The 1971 guide noted that the Force Troops had been activated in April 1951, and originally consisted of fifteen battalions and companies with each fulfilling a specific role at Camp Lejeune. By 1971, only five of the original units were still in existence: the 8th Motor Transport Battalion, 8th Engineer Battalion, 2d Amphibian Tractor Battalion, Headquarters Company, and the 2d Air and Naval Gunfire Liaison Company. However, other units had been activated or converted and were part of the Force Troops in 1970 that included the 2d Force Service Regiment, the 2d Field Artillery Group, 8th Communication Battalion, 2d Tank Battalion, 2d Radio Battalion, 2d Force Reconnaissance Company, 2d Bridge Company, 2d Topographic Company, 2d Hospital Company, 2d Separate Surgical Company, and the 22nd Dental Company. In addition, the 2d, 4th, 6th, 8th, 10th, and 12th Interpreter Teams, the 2d, 4th, 6th, 8th, 10th, 12th, and 14th Interrogator-Translator Teams, and the 2d Counterintelligence Team are part of the Force Troops command, No author, "The Coast of North Carolina Salutes Camp Lejeune," (Lubbock TX: Boone Publications, Inc., 1971) (1971 Base Guide), Base_Guides_0000000391; at *0000000401.

¹³⁶ See Table 1.

¹³⁷ For a map of the WTP service areas see, Image 3.

Midway Park there were 700 units available to corporals and junior officers while at Berkeley Manor there were 677 air conditioned three- and four-bedroom units for non-commissioned officers. The Holcomb Boulevard WTP also supplied water to 523 housing units for officers—ranked captain and higher—at Paradise Point, of which 123 had central air conditioning.¹³⁸ When Watkins Village opened in 1977, another 250 townhomes became available for Marines and their families. Watkins Village also received water from the Holcomb Boulevard WTP.¹³⁹

From 1942 to 1972, the Hadnot Point WTP furnished water to Midway Park and Paradise Point, and from 1962 to 1972 to Berkeley Manor. Under ATSDR's analysis, from 1953 to June 1972, these areas received water potentially contaminated with perchloroethylene ("PCE"), trichloroethylene ("TCE"), trans-1,2-dichloroethylene ("1,2-tDCE"), vinyl chloride ("VC"), and benzene). However, when the Holcomb Boulevard WTP went online in 1972, it furnished water to these areas, as well as to Watkins Village, except when the Hadnot Point WTP occasionally supplied contaminated water between 1972 and 1985.¹⁴⁰

Image 24 is a 1984 map of MCBCL that shows the Holcomb Boulevard WTP area between Wallace and Northeast Creeks. The highlighted areas are the housing units that the Holcomb Boulevard WTP served starting in June 1972. As noted in the 1986 Master Plan Update:

The Holcomb Boulevard distribution system serves the Paradise Point, Berkeley Manor, Watkins Village and Midway Park quarters, as well as the new U.S. Naval Hospital facility on Brewster Boulevard. The facilities served include Brewster Junior High School on Brewster Boulevard, Lejeune High School on Stone Street, the Berkeley Manor Elementary School and the Stone Street Elementary School.¹⁴¹

¹³⁸ 1970 Base Guide, Base_Guides_0000000254, at *0000000273-74.

¹³⁹ *Semper Fidelis, A Brief History of Onslow County*, 66, 74, Exhibit 2. The Berkeley Manor housing replaced the 464 housing units at Midway Park built in 1944, *ibid.*, 66. Watkins Village was named after Medal of Honor winner Staff Sergeant Lewis G. Watkins.

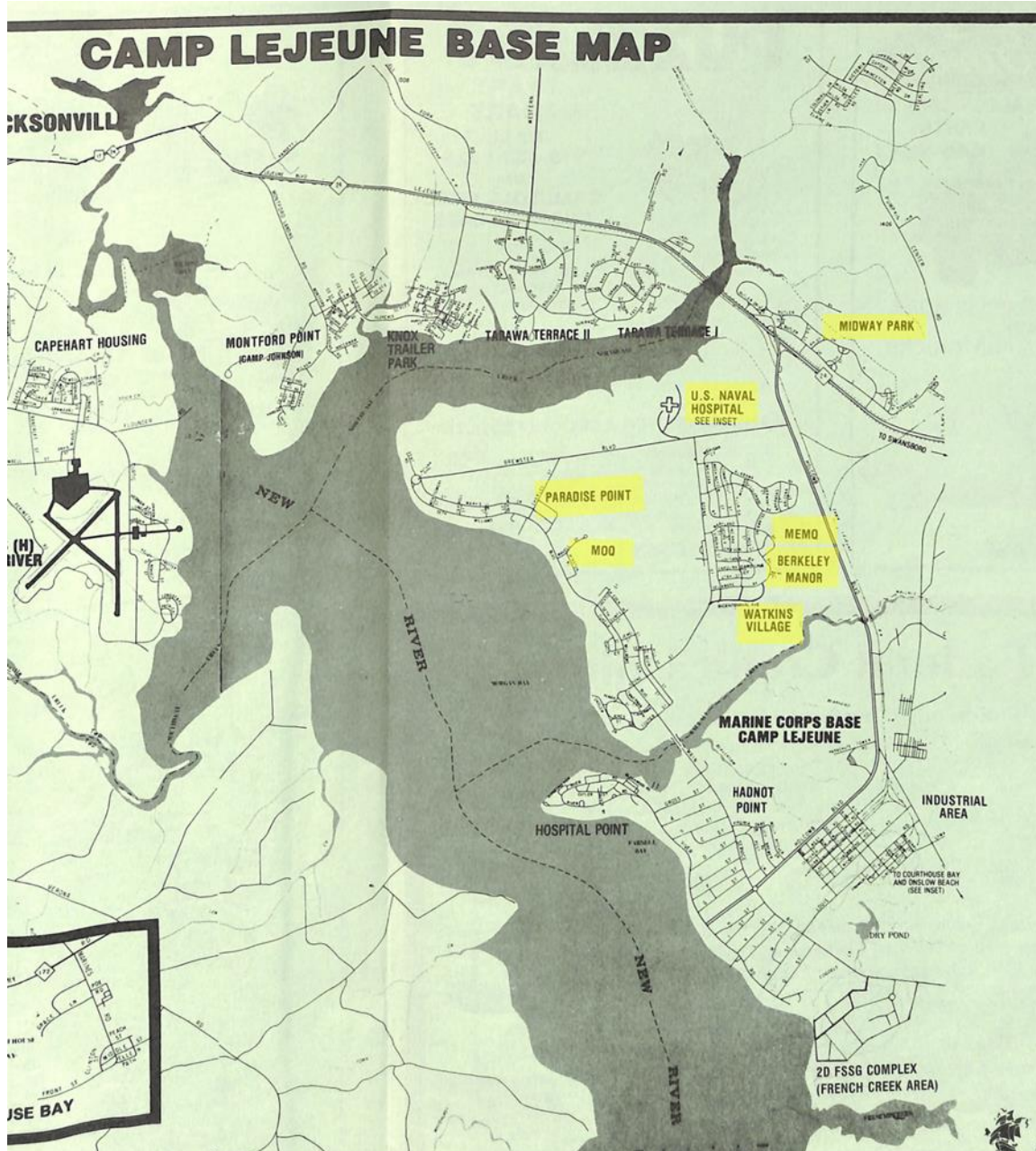
¹⁴⁰ ATSDR 2013, CLJA_HEALTHEFFECTS-0000221326, at *0000221350-52, and *0000221362. The ATSDR reports that the Hadnot Point and Holcomb Boulevard WTPs were "rarely connected—exceptions being some documented intermittent connections that occurred during the late spring and early summer months of 1978-1986," *ibid.*, *0000221362 and *0000221378. In June 1978, the Hadnot Point WTP furnished contaminated water to the Holcomb Boulevard water system that included the Berkeley Manor housing area. Also, from January 28-February 4, 1985, the Hadnot Point WTP provided water to housing in the Holcomb Boulevard, *ibid.*, *0000221351.

¹⁴¹ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326766.

Image 24

The Holcomb Boulevard Service Area -

Excerpt From Camp Lejeune Base Map, 1984¹⁴²



The Midway Park housing area is among the oldest at Camp Lejeune dating to World War II. Because of when it was built and its location, it developed apart from the main area of

¹⁴² No author, "Camp Lejeune," (El Cajon, CA: National Military Publications, 1984), (1984 Base Guide), Base_Guides_0000000871, at *0000000907.

Hadnot Point. As shown in Image 24, the Midway Park area is northeast of Hadnot Point on the east side of Northeast Creek and on the north side of State Highway 24. The 1986 Master Plan Update noted that Midway Park, Tarawa Terrace I and II, and MCAS New River—were “relatively close in proximity to off-Base commercial resources, while access to Marine Corps/Navy commercial community and medical facilities is less direct.”¹⁴³

The Midway Park housing was both refurbished and phased out in the 1960s, 1970s and 1980s. In 1962, when Berkeley Manor was completed, 464 Midway Park houses were “phase[d] out.”¹⁴⁴ In 1982, another \$9.7 million was spent to improve the housing at Midway Park and the officers’ quarters at Paradise Point. The cost per unit at Midway Park was \$13,500.¹⁴⁵

3. Tarawa Terrace

As discussed in Section IV, the Tarawa Terrace WTP became operational in 1952 and it serviced Tarawa Terrace housing areas I and II.¹⁴⁶ In June 1951, construction began on the Tarawa Terrace I housing complex for officers and NCOs and their families.¹⁴⁷ In September 1952, work began on the similar Tarawa Terrace II housing development located west of Tarawa

¹⁴³ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326649.

In 1959, given its status as generally a housing area, there were few of the types of buildings and associated amenities available to Marines and their families in the Midway Park area as compared to Hadnot Point. There was, however, a fire station, a gas station, a maintenance shop, schools, a nursery, and a shopping center that included a beauty shop, a drug store, a grocery store, a post office, a theater, and classrooms in buildings 4000, 4014, 4022, and 4003, see June 1959 Telephone Directory, CLJA_USMCGEN_0000074318, at *0000074360, *0000074362, and *0000074366; and USMC, *Camp Lejeune, NC, Telephone Directory*, 10/1959, (October 1959 Telephone Directory), CLJA_USMCGEN_0000074318: *0000074412, at *0000074459.

The 1970 *Camp Lejeune Telephone Directory* provides similar information on amenities and services available to residents of Midway Park that included: a beauty salon, a branch of the base exchange, a nursery, a post office, a soda fountain, a laundromat, and a theater, see USMC, *Camp Lejeune, NC, Telephone Directory*, 11/1970, (November 1970 Telephone Directory), CLJA_USMCGEN_0000077468, at *0000077529. Similar amenities were available to Marines and their families ten years later. The 1980 telephone book includes listings at Midway Park for a barber shop, a beauty salon, a chapel, a community center, a post exchange, a fire department, a gas station, a nursery, a post office, and a theater, see USMC, *Camp Lejeune, NC, Telephone Directory*, 1/1980, (January 1980 Telephone Directory), CLJA_USMCGEN_0000089039, at *0000089062, *0000089070.

¹⁴⁴ *Semper Fidelis, A Brief History of Onslow County*, 66, Exhibit 2.

¹⁴⁵ *Semper Fidelis, A Brief History of Onslow County*, 80, Exhibit 2.

¹⁴⁶ See Table 1. Also see Section V.B.4 where multiple sources indicate that Knox Trailer Park was serviced by both the Tarawa Terrace and Montford Point / Camp Johnson WTPs at times between 1952 and 1987.

¹⁴⁷ “Tarawa Terrace Doors [Open] to First Families; [Units] Available Weekly,” *The Globe*, 9/13/1951, 00897_PLG_0000054027. The 1953 article is referencing Tarawa Terrace II’s opening.

Terrace I. These housing complexes served as family housing for Marines and their families, and as discussed in Section IV, were constructed because the influx of Marines to Camp Lejeune during the Korean War created a housing shortage. In November of 1952, construction began on a shopping center to serve those living in the Tarawa Terrace housing areas. The Tarawa Terrace elementary school opened in 1953.¹⁴⁸

When Tarawa Terrace I and II opened in the early 1950s, they each had 1,054 housing units.¹⁴⁹ These housing units have been remodeled several times. The first remodel was in January 1959, when the Marine Corps announced that 1,200 units at Tarawa Terrace would be renovated by July of that year. Renovations included electrical upgrades, repair of windows and floors, and replacing countertops. Another 592 one- and two-bedroom homes would be converted into 336 three-bedroom homes the following fiscal year.¹⁵⁰ The conversion of one- and two- bedrooms to three-bedroom homes reduced the number of Tarawa Terrace housing units by 256. As stated in the 1966 and 1971 base guides, there were 1,851 units at the Tarawa Terrace housing areas.¹⁵¹ In 1984 there were 1,846 housing units at Tarawa Terrace.¹⁵²

The authors of *Semper Fidelis* wrote that in 1962, \$1 million in renovations at Tarawa Terrace had been completed. From 1981 to 1984, the government spent \$5 million to improve Tarawa Terrace.¹⁵³

The Tarawa Terrace I and II housing areas are north of Northeast Creek. Tarawa Terrace was and remains largely a residential area and there were few industrial, maintenance, or military operations similar to those at Hadnot Point and other areas of the base. However, there were amenities that one might typically associate with a residential area. In 1959, similar to Midway Park, the shopping center in Tarawa Terrace included a drug store, barber shop, beauty shop, a

¹⁴⁸ *Semper Fidelis, A Brief History of Onslow County*, 52, Exhibit 2.

¹⁴⁹ As noted, when constructed Tarawa Terrace I and II each had 1,054 housing units, see “Officials Greeting Marks Project’s Opening Day,” *The Globe*, 1/22/1953, 00897_PLG_0000053464.

¹⁵⁰ “[illegible] Building, Renovation, ‘Boom’ in Full Swing,” *The Globe*, 1/22/1959, 00897_PLG_0000050082, at *0000050084.

¹⁵¹ 1966 Base Guide, Base_Guides_0000000098, at *0000000120 and 1971 Base Guide, Base_Guides_0000000391, at *0000000411.

¹⁵² 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326703.

¹⁵³ *Semper Fidelis, A Brief History of Onslow County*, 70 and 80, Exhibit 2.

dry cleaners, a service station, and a variety store. There was also a school, a dentist office, and a maintenance shop.¹⁵⁴

The 1970 base telephone directory provides information on amenities and other services available to people living at Tarawa Terrace. They included a bank, a beauty salon, a branch of the post exchange, a dry cleaner, a post office, two elementary schools with cafeterias, and a community center.¹⁵⁵ Just as at Midway Park, similar services existed at Tarawa Terrace in 1980 including a bank, a community center, a beauty shop, a service station, a barber shop, a dry cleaners, a gas station, a post exchange, a snack bar, a post office, and two elementary schools.¹⁵⁶

Images 25 and 26 show Tarawa Terrace housing areas south of Highway 24 and west of Northeast Creek. As shown in these images, there were elementary schools at both Tarawa Terrace housing complexes.¹⁵⁷

¹⁵⁴ June 1959 Telephone Directory, CLJA_USMCGEN_0000074318, at *0000074362, *0000074366, and *0000074368.

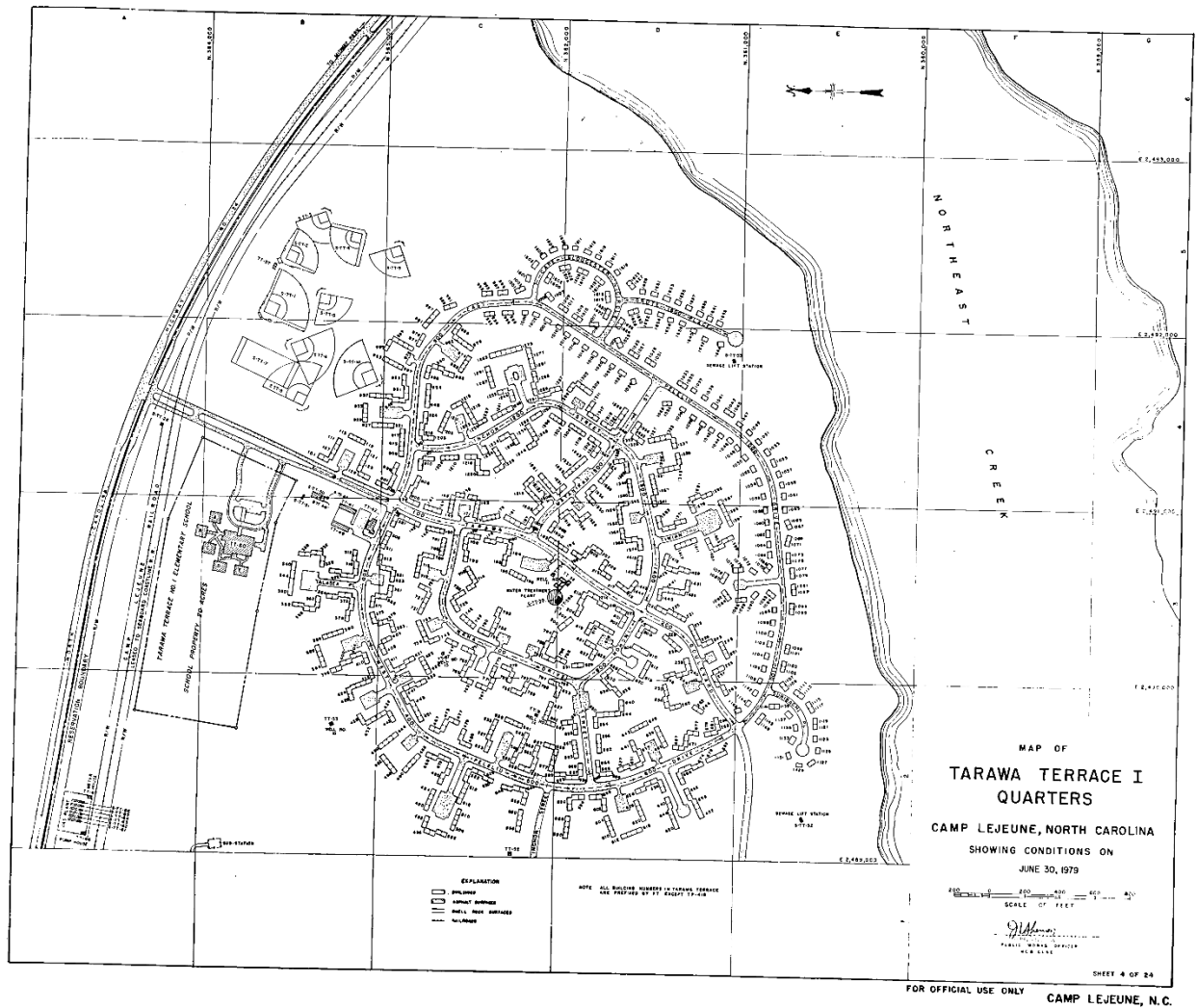
¹⁵⁵ November 1970 Telephone Directory, CLJA_USMCGEN_0000077468, at *0000077522, *0000077527, *0000077528, *0000077530, *0000077531, and *0000077533.

¹⁵⁶ January 1980 Telephone Directory, CLJA_USMCGEN_0000089039, at *0000089074-75.

¹⁵⁷ The 1986 Master Plan Update confirms that there were two elementary schools at Tarawa Terrace, CLJA_USMCGEN_0000326502, at *0000326767.

Image 25

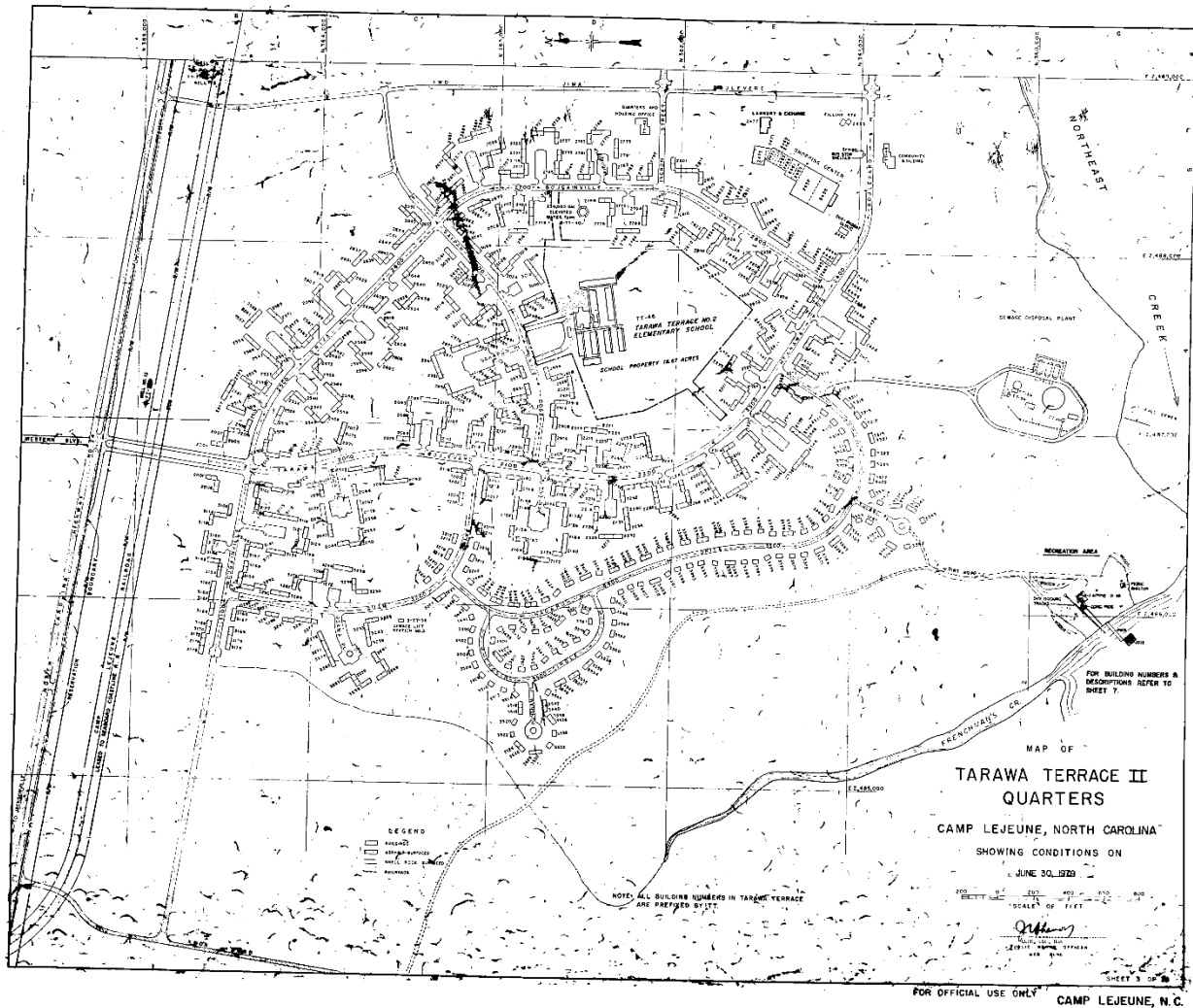
Tarawa Terrace I, June 30, 1979¹⁵⁸



¹⁵⁸ Map of Tarawa Terrace I Quarters, Camp Lejeune, North Carolina, Showing Conditions on June 30, 1979, (Sheet 4 of 24), CLJA_USMC_PWD_0000173822.

Image 26

Tarawa Terrace II, June 30, 1979¹⁵⁹



4. Knox Trailer Park

In 1953, there were 212 trailers at Knox Trailer Park and contracts for an additional 250 to be installed.¹⁶⁰ In 1962, there were 451 trailers at Knox Trailer Park and another 300 parking

¹⁵⁹ Map of Tarawa Terrace II Quarters, Camp Lejeune, North Carolina, Showing Conditions on June 30, 1979, (Sheet 3 of 24), CLJA_USMC_PWD_0000173840.

¹⁶⁰ "First Marine Families Occupy Tarawa Terrace Two: Official Greeting Marks Project's Opening Day," *The Globe*, 1/22/1953, 00897_PLG_0000053464.

spaces for privately-owned trailers.¹⁶¹ And in 1983 there were “112 spaces.”¹⁶² Knox Trailer Park is in the upper middle of Image 24.

Multiple documents, including primary sources from the statutory period and two ATSDR reports, indicate that Knox Trailer Park received water both from the Montford Point / Camp Johnson WTP and the Tarawa Terrace WTP until 1986 or 1987, at which point it was serviced by the Holcomb Boulevard WTP.¹⁶³ On the other hand, two non-primary source documents state that the Tarawa Terrace WTP furnished water to this area until 1986 or 1987.¹⁶⁴

C. Areas Not Identified by the ATSDR as Contaminated

1. The Six WTPs Not Investigated by ATSDR

Six of the nine historic WTPs were not investigated by ATSDR. These were located on the parts of the base they served and were at Montford Point / Camp Johnson, Camp Gieger, MCAS New River, Onslow Beach, the Rifle Range at Stone Bay, and Courthouse Bay. Table 1

¹⁶¹ 1962 Base Guide, Base_Guides_0000000077, at *0000000081.

¹⁶² 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326703. Note: the 1986 Master Plan Update is reporting on 1983 figures. According to Base Guides from 1966, 1967, 1970 and 1971, the trailers were “four and six sleeper trailers,” see 1966 Base Guide, Base_Guides_0000000098, at *0000000120; No author, “The Coast of North Carolina Salutes Camp Lejeune,” (Lubbock TX: Boone Publications, Inc., 1967) (1967 Base Guide), Base_Guides_0000000180, at *0000000202; 1970 Base Guide, Base_Guides_0000000254, at *0000000273; and 1971 Base Guide, Base_Guides_0000000391, at *0000000413.

¹⁶³ The 1986 Master Plan Update stated that the Montford Point / Camp Johnson WTP included a line connecting it to Knox Trailer Park, and the discussion of the Tarawa Terrace WTP does not mention any lines to or service of Knox Trailer Park, CLJA_USMCGEN_0000326502, at *0000326662. In April 1982, when water samples were being collected, a researcher noted: “an extra sample taken in the Knox Trailer Park Area, which switches back and forth from Tarawa Terrace to Montford Point Systems.” E. Betz, Memorandum for the Record” 4/27/1982, CLJA_WATERMODLELING_07-0001176746, at *0001176746.

A map in a June 2007 ATSDR report reads “Camp Knox served by Montford Point and Tarawa Terrace water supplies at various historical times,” see ATSDR, “Analyses of Groundwater Flow, Contaminant Fate and Transport, and Distribution of Drinking Water at Tarawa Terrace and Vicinity, U.S. Marine Corps Base Camp Lejeune, North Carolina: Historical Reconstruction and Present Day-Conditions, Executive Summary, (Atlanta, GA: ATSDR, June 2007), CLJA_HEALTHEFFECTS-0000132803, at *0000132808.

¹⁶⁴ ATSDR 2013 (Tarawa Terrace WTP provided water to Camp Knox until 1987 at which time the Holcomb Boulevard WTP started to provide water to that area), CLJA_HEALTHEFFECTS-0000221326, at *0000221362; National Research Council 2009, CLJA_HEALTHEFFECTS-0000000431, at *0000000486 (the Tarawa Terrace WTP furnished drinking water to the Knox Trailer Park from 1952 to 1986, and the Holcomb Boulevard WTP supplied water from 1987 to 2000).

lists the dates of operation of each of these WTPs. As noted in Table 1 and shown in Image 19, the Camp Geiger WTP went offline in 1976, and its water distribution system was connected to the MCAS New River WTP. As also noted in Table 1 and depicted in Image 21, in 1987 the Montford Point / Camp Johnson WTP went offline and that area started to receive water from the Holcomb Boulevard WTP.¹⁶⁵ None of these WTPs have been identified as sources of contaminated water in the current litigation.¹⁶⁶

2. Montford Point / Camp Johnson

Montford Point, later renamed Camp Johnson, was constructed during World War II and “originally designed for the basic tactical training of all Negro troops.”¹⁶⁷ The camp was located on approximately 1,600 acres between the New River and the southern boundary of Jacksonville, N.C.¹⁶⁸ As listed in Table 1, and shown in Images 15 and 21, the Montford Point / Camp Johnson WTP operated from 1957 to 1987.¹⁶⁹

One of the MCBCL’s missions is to “conduct specialized schools and other training.”¹⁷⁰ During the statutory period, the specialized schools at Montford Point / Camp Johnson broadly fit into two categories: (a) the Field Medical Service School and (b) the Support / Supply

¹⁶⁵ ATSDR 2013, CLJA_HEALTHEFFECTS-0000221326, at *0000221362.

¹⁶⁶ D. Harned, O. Lloyd, Jr., M. Treece, Jr., “Assessment of Hydrologic and Hydrogeologic Data at Camp Lejeune Marine Corps Base, NC,” U.S. Geological Survey, Water-Resources Investigations Report 89-4096, 1989, (USGS Report 89-4096, 1989) CLJA_WATERMODELING_01-0000131765, at *0000131781; National Research Council 2009), CLJA_HEALTHEFFECTS-0000000431, at *0000000486 and *0000000488.

¹⁶⁷ 1970 Camp Lejeune Master Plan, CLJA_USMCGEN_0000336978, at *0000337073. Also, the USMC renamed Montford Point in April 1974 in honor of Sergeant Major Gilbert “Hashmark” Johnson, an original Montford Point Marine, see <https://www.lejeune.marines.mil/News/Article/Article/513343/camp-johnson-lejeune-recognize-montford-point-marines/> and *Semper Fidelis, A Brief History of Onslow County*, 75, Exhibit 2.

¹⁶⁸ 1970 Camp Lejeune Master Plan, CLJA_USMCGEN_0000336978, at *0000337049.

¹⁶⁹ As noted in Table 1, the Holcomb Boulevard WTP began providing water to this area in 1987.

¹⁷⁰ 1962 Base Guide, Base_Guides_0000000077, at *0000000080; 1966 Base Guide, Base_Guides_0000000098, at *0000000101; No author, “The Coast of North Carolina Salutes Camp Lejeune,” (Lubbock TX: Boone Publications, Inc., 1967) (1967 Base Guide), Base_Guides_0000000180, at *0000000183; and 1970 Base Guide, Base_Guides_0000000254; at *0000000257.

Schools, which included food service, automotive maintenance and driving, administrative supply and disbursement.¹⁷¹

In 1969, at Montford Point / Camp Johnson there were 136 officers and 1,126 enlisted Marines (including Marines stationed permanently at MCBCL and student trainees) as well as seven civilian staff for a total of 1,269 people.¹⁷² In 1983, the area had an effective service population of 2,768.¹⁷³

a. The Marine Corps Field Medical School

The Marine Corps Field Medical School at Camp Lejeune dates to World War II when, on April 8, 1943, it was activated as the “Field Medical Training Battalion-East (FMTB-E).” Deactivated immediately after the war, the school was reactivated on October 1, 1950, as the Field Medical Service School and was relocated to what is now Camp Johnson. The goal of the school’s staff is to meet the growing need for medically trained Naval officers and enlisted men to support combat Marines. The 1970 Master Plan describes the school “[a]s a small unit working somewhat autonomously” and “located in the available facilities at Montford Point, remote from any essential relationship to other Commands.”¹⁷⁴ The school remained at Camp Johnson throughout the statutory period.¹⁷⁵

b. Marine Corps Service Support / Supply Schools

The service support schools at Montford Point / Camp Johnson have included supply schools, the Food Service School Company, and the Motor Transport School Company,¹⁷⁶ as

¹⁷¹ 1962 Base Guide, Base_Guides_0000000077, at *0000000080; and 1966 Base Guide, Base_Guides_0000000098, at *0000000101.

¹⁷² 1970 Camp Lejeune Master Plan, CLJA_USMCGEN_0000336978, at *0000337057, *0000337059, and *0000337067.

¹⁷³ The effective service population takes into account the proportional parts of each day that military and civilian personnel and dependents” are in an area, 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326746.

¹⁷⁴ 1970 Camp Lejeune Master Plan, CLJA_USMCGEN_0000336978; at *0000337084.

¹⁷⁵ In 2000, the Field Medical School “celebrated more than fifty years of continuous training and support of the Marine Corps aboard Camp Johnson, see “Field Medical Training Battalion – East,” History, <https://www.fmtbneast.marines.mil/>; 1966 Base Guide at Base_Guides_0000000098, at *0000000103 and No author, “Camp Lejeune,” (San Diego, CA: Military Publishers, 1976) (1976 Base Guide), Base_Guides_0000000559, at *0000000567.

¹⁷⁶ The Camp Lejeune telephone directory dated June 1, 1953, included a listing for “Supply School Battalion” and the “Supply School Company,” see USMC, *Camp Lejeune, NC, Telephone Directory*, 6/1953, (June 1953 Telephone Directory), CLJA_USMCGEN_0000100173, at *0000100222-23. See also the 1970 telephone directory (“Food Service School Company”), November 1970 Telephone Directory,

well as cooking, baking, training of military instructors, and disbursing.¹⁷⁷ The 1986 Master Plan Update noted that training facilities classrooms were “scattered throughout the developed areas” and represented almost 21 percent (48 acres) of the developed area, making them the “second largest land use category existing” at Camp Johnson.¹⁷⁸

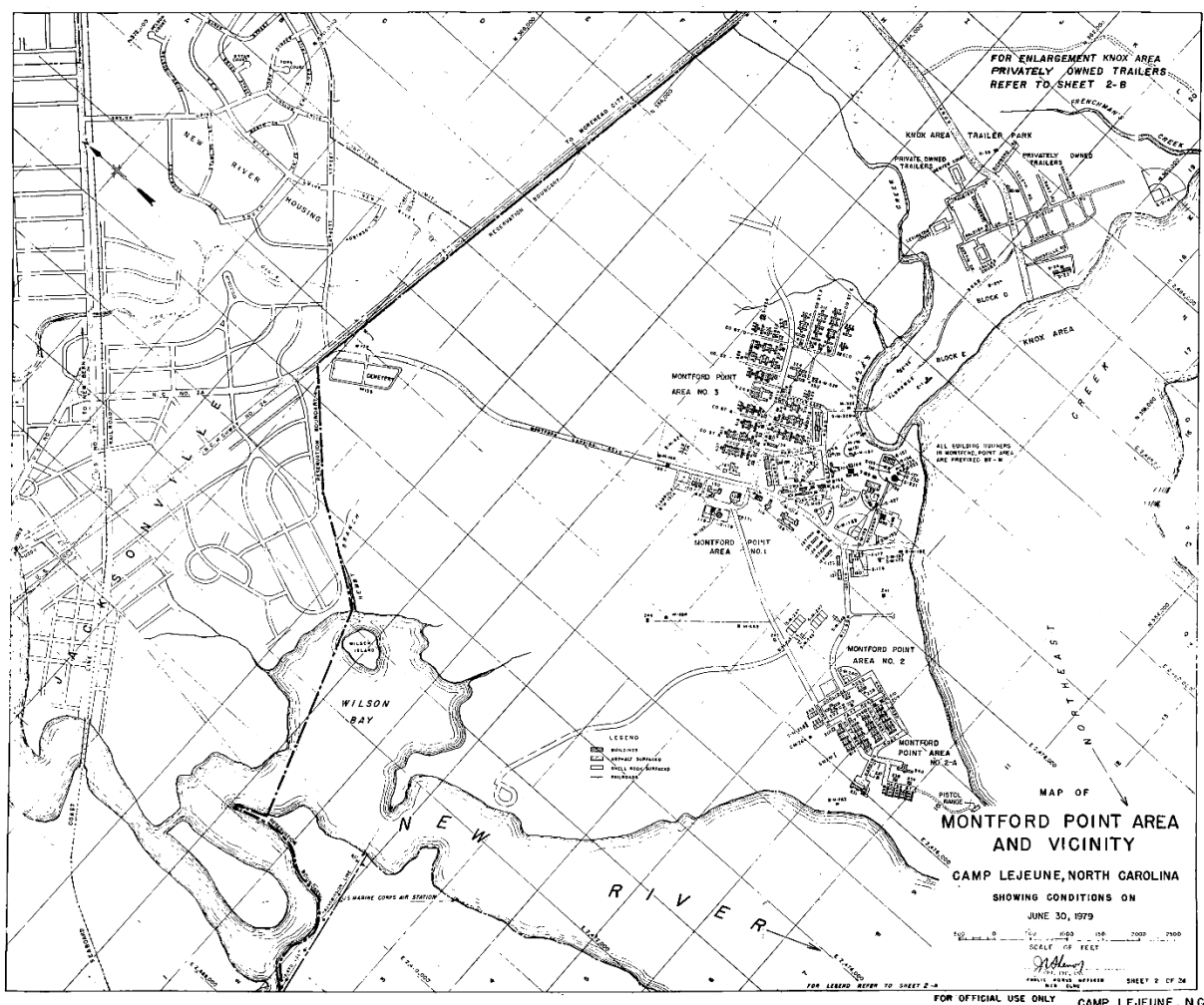
CLJA_USMCGEN_0000077468, at *0000077541-43; and USMC, *Camp Lejeune, NC, Telephone Directory*, 10/1986 (October 1986 Telephone Directory) (“Motor Transport School Company”), CLJA_USMCGEN_0000089039; CLJA_USMCGEN_0000089437, at *0000089475-77.

¹⁷⁷1966 Base Guide, Base_Guides_0000000098, at *0000000103; No author, “Eastern Carolina Salutes Camp Lejeune/New River,” (San Diego, CA: Military Publishers, 1978) (1978 Base Guide), Base_Guides_00000000695; at *00000000699.

¹⁷⁸ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326737.

Image 27

Montford Point / Camp Johnson Area, June 30, 1979¹⁷⁹



c. Housing

The base architectural plan stated that Montford Point / Camp Johnson “experienced a large initial development in the 1940s” but then remained mostly unchanged until the mid-1980s.¹⁸⁰

Regarding housing at Montford Point / Camp Johnson, as depicted in Image 27, there were numerous World War II era H-style barracks in the area. In the 1980s, motel-style barracks

¹⁷⁹ Map of Montford Point Area and Vicinity, Camp Lejeune, North Carolina, Showing Conditions on June 30, 1979, (Sheet 2 of 24), CLJA_USMC_PWD_0000173821.

¹⁸⁰ HBA Architecture & Interior Design, Inc., “Marine Corps Base Camp Lejeune, BEAP, Base Exterior Architectural Plan,” 2010, CLJA_USMC_PWD_0000164812, at *0000164974.

were built at Camp Johnson.¹⁸¹ According to the 1986 Master Plan Update, “[o]f the 233 acres of development” at Camp Johnson, “35 percent (32 acres) consist of troop housing.”¹⁸² There was no family housing at Camp Johnson.¹⁸³

d. Amenities

In addition to housing, other World War II era structures in this area included the swimming pool that was used for combat training, a post office, a theater, and a recreation hall.¹⁸⁴

The 1959 base telephone directory lists amenities and facilities at Montford Point that were similar—although on a smaller scale—to those located at Hadnot Point. For example, there was one theater at Montford Point compared to the several theaters at Hadnot Point. Among the other structures and facilities at Montford Point noted in this directory were a boat house, a library, a sewage plant, a steam plant, a water plant, a dispensary, a Marine Corps Exchange, a pharmacy, a mess hall, a service club, a staff NCO club, a chapel, a swimming pool, bachelor officer quarters, a dental clinic, a post office, two commissioned officers mess halls, a fire station, a gas station, a woodworking shop, a maintenance shop, an indoor theater, and a school.¹⁸⁵

The 1967 base directory listings at Montford Point included a chapel, an alteration shop, a barber shop, a cleaning and pressing shop, two laundromats, a recreation center, a service station, an outdoor theater, a post office, a library, and several clubs, including an enlisted service club, a Staff NCO Club, and an Officer’s Club.¹⁸⁶ The 1970 directory included Montford Point listings for a library, a post exchange, mess halls, a staff NCO club, a swimming pool, bachelor officers’ quarters, a dental clinic, a post office, commissioned officers mess halls, a gas

¹⁸¹ *Semper Fidelis, A Brief History of Onslow County*, 80, Exhibit 2.

¹⁸² 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326737.

¹⁸³ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326712 and *0000326703.

¹⁸⁴ Carraway, *Camp Lejeune Leathernecks*, 8, 11, 35, Exhibit 1.

¹⁸⁵ June 1959 Telephone Directory, CLJA_USMCGEN_0000074318, at *0000074358, *0000074361-63, and *0000074366-67; and October 1959 Telephone Directory, CLJA_USMCGEN_0000074318, at *0000074412, *0000074420, *0000074456-59, *0000074462-63, and *0000074466. Although the telephone directories only list one mess hall, the legend for the 1958 Existing Conditions Map of Montford Point lists four mess halls including one at the staff NCO club and one at the cooks and bakers building, see, Legend Sheet for Montford Point Camp and Vicinity, Camp Lejeune, North Carolina, Showing Conditions on 30 June 1958, (Sheet 3A of 14), CLJA_USMC_PWD_0001771150.

¹⁸⁶ 1967 Base Guide, Base_Guides_0000000180, at *0000000207-09, *0000000212-13, and *0000000215.

service station, a gymnasium, a swimming pool, an airline ticket office, an enlisted recreation center, an enlisted service club, and a dry cleaner.¹⁸⁷ Similar facilities were at Camp Johnson in 1986.¹⁸⁸

e. Separation from Mainside

As indicated by the above telephone directories, by 1959, Montford Point / Camp Johnson had the types of services and amenities that made frequent trips to the Mainside unnecessary. This may have been due, in part, to necessity. The 1970 Master Plan described the unique considerations for Montford Point / Camp Johnson development, stating that “[b]ecause of the planned isolation of this unit, community facilities were established within this geographical area with a minimum of dependence upon the Base Mainside for social, recreational, and tactical support.”¹⁸⁹ Moreover, the 1986 Master Plan Update contained these statements that illustrate the size of the base and the associated travel times between locations:

Lengthy Travel Distances Between Areas

Lengthy travel distances are involved in traveling from areas such as MCAS (H), New River, Montford Point and Tarawa Terrace I and II to the main community facilities located at Hadnot Point. Travel times from outlying areas should be minimized to the extent that is cost-effective.

Proposed Bypass

Construction of a Highway 17 Bypass south of the present facility would be one solution to reducing travel distances between Complex areas: however, alignment selection is critical in maintaining the integrity of the Montford, Point Camp Geiger, and MCAS (H), New River. . . .¹⁹⁰

¹⁸⁷ November 1970 Telephone Directory, CLJA_USMCGEN_0000077468, at *0000077521, *0000077523, *0000077525, *0000077528-29, *0000077531-33, and *0000077541.

¹⁸⁸ October 1986 Telephone Directory, CLJA_USMCGEN_0000089039: CLJA_USMCGEN_0000089437, at *0000089472-80, *0000089484, and *0000089492.

¹⁸⁹ 1970 Camp Lejeune Master Plan, CLJA_USMCGEN_0000336978, at *0000337073. See also *ibid.*, at *0000337093 (“Montford Point is geographically isolated from other basic functions”).

¹⁹⁰ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326656. The Master Plan also notes: “Family housing at the Air Station is even less accessible to Marine Corps/naval personnel support facilities at Hadnot Point, *ibid.*, *0000326649. The “H” stands for helicopter.

Thus, according to this plan, the long travel times and perhaps heavy traffic were disincentives for those not living on the Mainside (including those living at Montford Point/ Camp Johnson) to make the trip to the Mainside.

An image on the front page of *The Globe* in August 1972 depicts the artists view of Camp Lejeune traffic problems and the long travel times on the base.

Image 28

The Globe, August 10, 1972¹⁹¹



¹⁹¹ *The Globe*, 8/10/1972, 00897_PLG_0000042448.

3. Camp Geiger

Image 29 shows the location of the Camp Geiger cantonment area as of June 1979. As discussed earlier in this report, construction at Camp Lejeune began in this area, then called Tent Camp No. 1, in 1941. Construction workers and the 1st Marine Division were the first to live here and it served as the base's headquarters.¹⁹² Camp Geiger then became home to the Force Troops, Fleet Marine Force, Atlantic, activated on April 1, 1951, and they remained there "until 1958 when most of the units, including the Headquarters, moved to the present location at Hadnot Point."¹⁹³ In 1953, the USMC formed an Infantry Training Regiment (ITR) at Camp Geiger, "established to conduct basic unit tactical training of recent recruits."¹⁹⁴ A few years later, nuclear, biological, and chemical training began at Camp Geiger's "NBC [Nuclear, Biological, and Chemical] School."¹⁹⁵ By at least the fall of 1978 the 8th Marine Regiment had relocated to Camp Geiger due to overcrowding at Hadnot Point and remained there through the end of the statutory period.¹⁹⁶

As I discussed in Section III.B.2, the Camp Geiger Water Treatment Plant was the first functioning water treatment plant developed on Camp Lejeune and it operated from 1941 to 1977 (See Table 1 and Images 6 and 20).¹⁹⁷ After the Camp Geiger WTP went offline, the Marine Corps Air Station WTP furnished water to Camp Geiger.¹⁹⁸

¹⁹² 1966 Base Guide, Base_Guides_0000000098, at *0000000103. After World War II, the 1st Marine Division moved to Camp Pendleton and, in 1946, the 2d Marine Division was permanently assigned to Camp Lejeune, where it has been located ever since.

¹⁹³ 1966 Base Guide, Base_Guides_0000000098, at *0000000112.

¹⁹⁴ <https://www.soieast.marines.mil/Units/Infantry-Training-Battalion/>; the USMC established another Infantry Training Regiment at Camp Pendleton at the same time. Also see 1970 Camp Lejeune Master Plan, CLJA_USMCGEN_0000336978, at *0000337049.

¹⁹⁵ P. Lewis, "NBC defense is important today," *The Globe*, 6/21/1979, 00897_PLG_0000038241, at *0000038244.

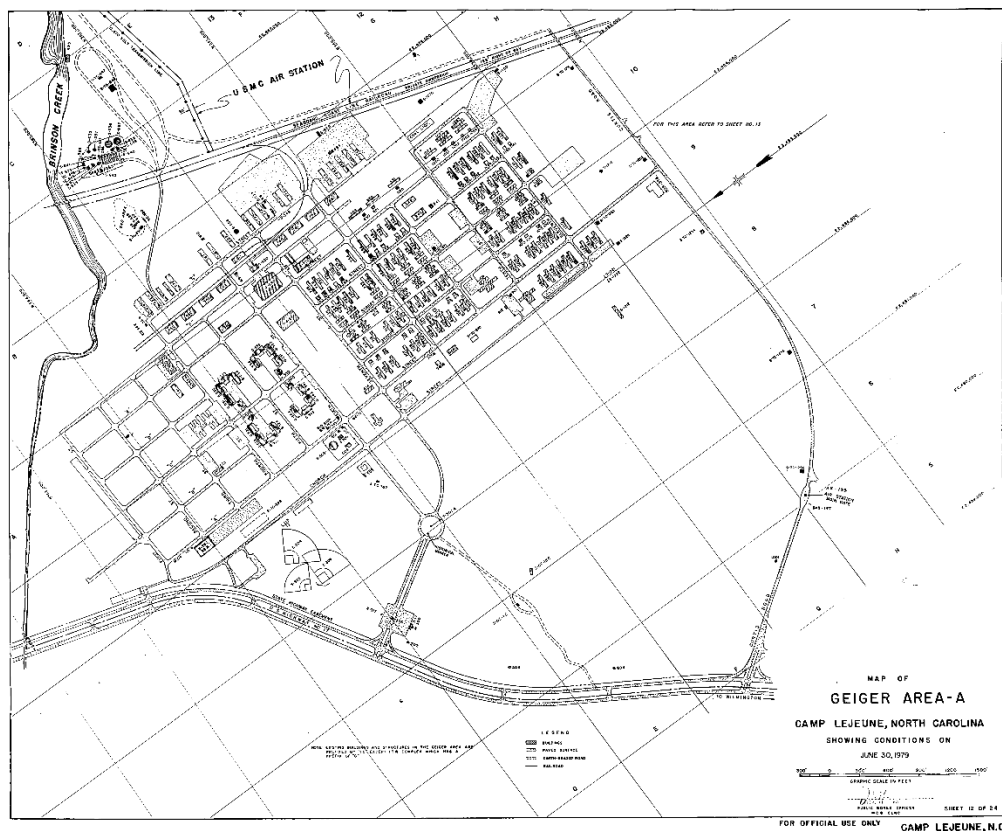
¹⁹⁶ *The Globe*, 10/12/1978, 00897_PLG_0000038623, at *0000038627. The 1986 Master Plan Update states that the 8th Regiment was "slated" to be moved back to Hadnot Point by 1990, CLJA_USMCGEN_0000326502 at *0000326608.

¹⁹⁷ As I discussed in Section III, the Camp Geiger WTP went online in the fall of 1941 and was the first WTP at Camp Lejeune.

¹⁹⁸ USGS Report 89-4096, 1989, CLJA_WATERMODELING_01-0000131765, at *0000131781 and National Research Council 2009, CLJA_HEALTHEFFECTS-0000000431, at *0000000486.

Image 29

Camp Geiger Area A Map, June 30, 1979¹⁹⁹



a. The Infantry Training Regiment (ITR)

As noted above, one of MCBCL's missions is to conduct specialized schooling, and the largest training school at the base during the statutory period was the Infantry Training Regiment (ITR) located at Camp Geiger.²⁰⁰ The ITR "conducts the bulk of the training for six-month reservists who enlist under the program calling for six months of active duty and several years of membership in the Marine Corps Reserve."²⁰¹

¹⁹⁹ Map of Geiger Area - , Camp Lejeune, North Carolina, Showing Conditions on June 30, 1979, (Sheet 12 of 24), CLJA_USMC_PWD_0001789197.

²⁰⁰ 1966 Base Guide, Base_Guides_0000000098, at *0000000103; 1967 Base Guide, Base_Guides_0000000180, at *0000000185; and 1970 Base Guide, Base_Guides_0000000254, at *0000000271.

²⁰¹ 1962 Base Guide, Base_Guides_0000000077, *at 0000000080; also see the January 1954 issue of *The Globe*, noting that the Reserve Training Battalion had moved from Hadnot Point to Camp Geiger where it

The 1966 Base Guide stated the ITR training was a nineteen-day course (by 1970, this was described as a thirty-six-day course) including “over 200 hours of instruction in small unit tactics, night combat, the firing of weapons under simulated combat conditions, conditioning hikes, and lectures examining both conventional and guerilla warfare.”²⁰² Given an emphasis on night fighting tactics, the guide further noted that Marines would spend “several evenings on bivouac in the field.”²⁰³ At Camp Geiger in 1969, there were 4,212 military personnel, including 39 officers and 4,173 enlisted, the majority of whom were students.²⁰⁴ In late 1972, the ITR at Camp Lejeune was “reduced to Infantry Training Detachments.” Six years later in August 1979, the Marine Corps reactivated the detachment as an Infantry Training School (“ITS”).²⁰⁵

In April 1980, a *Globe* article discussed “ITS” or Infantry Training Schools at Camp Geiger. The four-week training included basic riflemen, machine gunners, mortarmen, and antitank assault men before the Marines in each group transferred to the Fleet Marine Force. The four-week course included classroom and field work. The article states that the “training builds upon the foundations laid in boot camp and prepares these young men for transfer to the Fleet Marine Force.”²⁰⁶

The July 18, 1985, edition of *The Globe* included a story on the Infantry Training School at Camp Geiger. The author of this article noted that ITR school gave, “newly graduated Marines their first chance to practice combat skills before departing [ITS]...skills required to function in a fleet command.”²⁰⁷ The training took more than five weeks and was divided into two phases. In the first phase, training focused on “land navigation, nuclear, biological and chemical warfare, first aid, combat formation, and hand and arm signals.” During the second phase, the training

would be attached to an Infantry Training Regiment (ITR), “Res. Training Bn. Switched to New Operational Site,” *The Globe*, 1/14/1954, 00897_PLG_0000053338.

²⁰² 1966 Base Guide, Base_Guides_0000000098, at *0000000117; and 1970 Base Guide, Base_Guides_0000000254; at *0000000271.

²⁰³ 1966 Base Guide, Base_Guides_0000000098, at *0000000117; and 1970 Base Guide, Base_Guides_0000000254; at *0000000271.

²⁰⁴ 1970 Camp Lejeune Master Plan, CLJA_USMCGEN_0000336978, at *0000337057, *0000337059, and *0000337067.

²⁰⁵ *Semper Fidelis, A Brief History of Onslow County*, 75, Exhibit 2. The authors of *Semper Fidelis* note that the ITR was “reduced to Infantry Training Detachments after Congress questioned why it required more time to train a Marine than enlisted personnel in other services,” *ibid*.

²⁰⁶ S. Rogers, “‘ITS’ the best in training, Preparing for the FMF,” *The Globe*, 4/17/1980, 00897_PLG_0000037757, at *0000037762.

²⁰⁷ “Infantry school Marines spend two days applying newly learned new combat skills,” *The Globe*, 7/18/1985, 00897_PLG_0000029712, at *0000029717.

focused on specialized weapons training “such as machine gunners, [M47] Dragons and tube launched, optically tracked, wire command link guided missile (TOW), mortars and infantrymen.” Upon completion of the second phase, Marines conducted a “two-day wrap-up” that included an amphibious landing at Onslow Beach before moving to “Combat Town” at Camp Geiger to practice urban warfare tactics. At night, ITS instructors filled the air with “60mm mortar and small arms rounds streaking through the night air to their targets. The second day started with helicopter assault drills.”²⁰⁸

b. The Nuclear, Biological, and Chemical School

The Nuclear, Biological, and Chemical School (NBC School) started at Camp Geiger in 1956, the year the Atomic Energy Commission issued the school its first license. Each year the NBC School trained 600 Marines, sailors, and civilians. Upon completion of the two and one-half week training, qualified students were certified “as NBC defense specialists.” A two-day class on field decontamination followed completion of the NBC School training.²⁰⁹ Similar NBC training occurred in June 1979.²¹⁰

c. Housing

After the majority of activity moved from Tent City to Hadnot Point, Tent City was renamed Camp Geiger and “was established as the location of primary unit tactical training for recent recruits from the Parris Island basic training complex.”²¹¹

In terms of housing, the most notable change that occurred in this area since 1946 was the addition of the Camp Geiger Trailer Park that was part of the Korean War housing expansion at the base. In 1962, there were 904 trailers at the Camp Geiger Trailer Park,²¹² in 1970 there were 448 trailers,²¹³ and the trailer park existed through 1983.²¹⁴ As at the Camp Knox Trailer Park,

²⁰⁸ A. Vaughan, “Infantry school Marines spend two days applying newly learned combat skills,” *The Globe*, 7/18/1985, 00897_PLG_0000029712, at *0000029717-18.

²⁰⁹ D. Smith, “NBC School: FMFLant school trains approximately 600 Marines, sailors and civilians annual,” *The Globe*, 7/20/1978, 00897_PLG_0000038791, at 0000038794.

²¹⁰ P. Lewis, “NBC defense is important today,” *The Globe*, 6/21/1979, 00897_PLG_0000038241, at *0000038244.

²¹¹ 1970 Camp Lejeune Master Plan, CLJA_USMCGEN_0000336978, at *0000337073.

²¹² 1962 Base Guide, Base_Guides_0000000077, at *0000000081.

²¹³ No author, “Jacksonville Salutes New River Marine Corps Air Station,” (Lubbock TX: Boone Publications, Inc., 1970), (1970 MCAS Base Guide), Base_Guides_0000000328, at *0000000342.

²¹⁴ The 1986 Master Plan Update makes two references to the Camp Geiger Trailer Park, although it does not provide information on the number of units available, CLJA_USMCGEN_0000326502, at

according to the 1966 and 1970 base guides, there were “four and six sleeper trailers” at the Camp Geiger Trailer Park.²¹⁵ The Camp Geiger Trailer Park was southwest of the Camp Geiger’s permanent structures, just south of Curtis Road and visible in the lower left-hand corner of Image 29.

In 1972, several new barracks, which were “three-story, open-bay facilities,” were constructed for the Infantry Training Regiment.²¹⁶

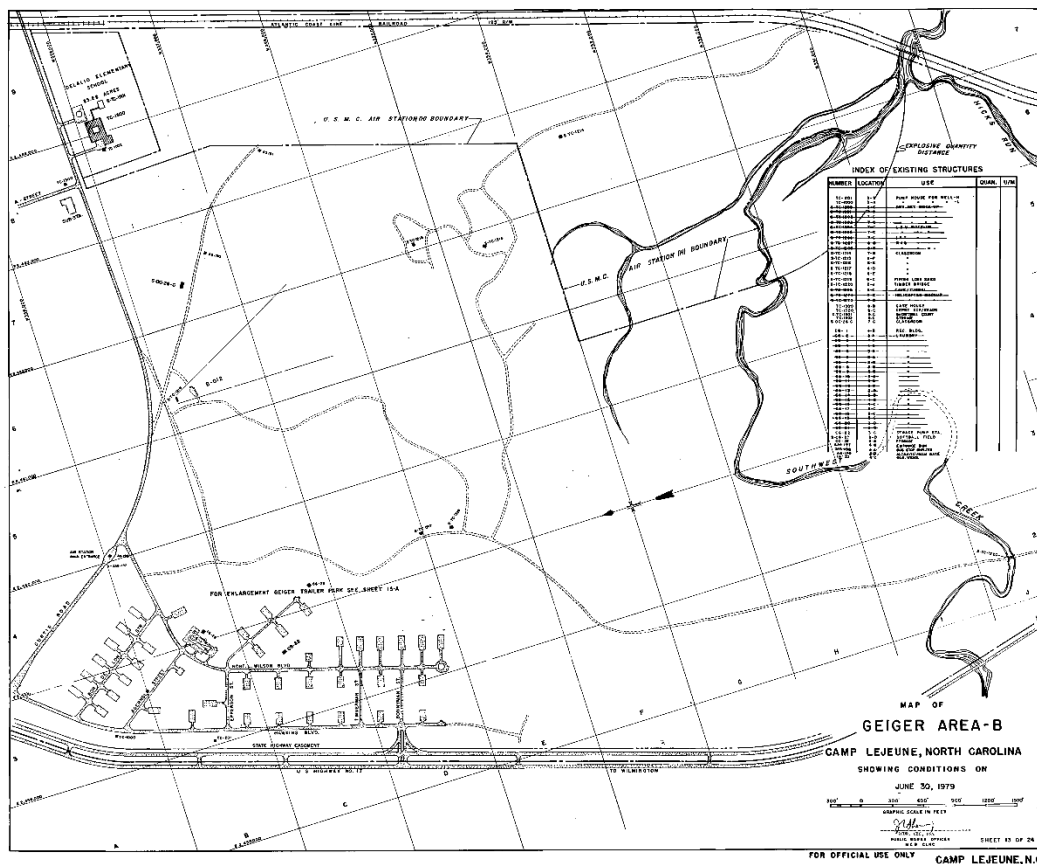
*0000326662 and 0000326596. Geiger Trailer Park was likely serviced by the same water treatment plant as the rest of Camp Geiger, as the 1986 Master Plan Update noted that Geiger Trailer Park was serviced by the MCAS WTP (which after 1977 serviced the Camp Geiger area), see 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326662. The 1970 Master Plan noted that the Geiger Trailer Park was “within the boundary of Lejeune . . . allocated to family housing. By directive, housing was excluded from this study,” 1970 Master Plan, CLJA_USMC_GEN_0000336978, at *0000337049.

²¹⁵ 1966 Base Guide, Base_Guides_0000000098, at *0000000120; and 1970 Base Guide, Base_Guides_0000000254, at *0000000274.

²¹⁶ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326608.

Image 30

Camp Geiger Area B Map, June 30, 1979²¹⁷



The 1986 Master Plan Update stated that “a mixture of new and old facilities” existed at Camp Geiger,” including troop housing.²¹⁸ This plan also noted there was no family housing at Camp Geiger and there were 54 acres of troop housing.²¹⁹ It further stated that “[t]raining tends to be conveniently accessible by foot from troop housing although less accessible from community uses, such as the dining facilities.”²²⁰

²¹⁷ Map of Geiger Area - B, Camp Lejeune, North Carolina, Showing Conditions on June 30, 1979, (Sheet 13 of 24), CLJA_USMC_PWD_0000173829.

²¹⁸ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326700, *0000326736, and *0000326712.

²¹⁹ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326736-37.

²²⁰ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326737.

d. Amenities

As for amenities, by 1959, if not earlier, Camp Geiger, much like Montford Point / Camp Johnson, had the types of services and amenities that made frequent trips to the Mainside unnecessary. Among the Camp Geiger facilities and services listed in the 1959 telephone directory were an airline ticket office, a railroad depot (the Atlantic Coast Line Railroad), a chapel, a bank, two commissioned officers' mess halls, a dental clinic, a fire station, an auto repair shop, a laundry, a maintenance shop, a sewage treatment plant, a steam plant, a WTP, three mess halls, two service clubs, a service station, a staff NCO club, an indoor theater, an outdoor theater, a boat house, cleaning and pressing shops within the Marine Corps Exchange, a gas station, an automobile and woodworking shop, a post office, a printing plant, and a clothing store.²²¹

Marines at Camp Geiger in 1970 had access to many of the same facilities and amenities as they did in 1959. Such facilities and amenities included the airline ticket office, an American Red Cross office, a bank, a barber shop, a bus station, a chaplain, a commissioned offices mess hall, a dentist, a recreation center for enlisted Marines, a base exchange store, a dry cleaner, a photographic studio, a watch repair store, service station, dispensary, two mess halls, two post offices, a passenger train office, an enlisted service club, a community center, a staff NCO club.²²² Additional mess facilities, as well as dental and medical clinics, were constructed at Camp Geiger in the early 1970s.²²³

By November 1986, some of the services and facilities available to Camp Geiger residents no longer existed such as the airline ticket office, the American Red Cross Office, and the passenger train office, but many others remained. Those still available included an ambulance service, a bank, bachelor officer housing, a chapel, an enlisted club, a non-commissioned officers club, a dental clinic, a fire station, an automotive hobby shop, a service station, a barber shop, a dry cleaners, a post exchange, a snack bar with an arcade, a theater, and a laundry.²²⁴

²²¹ June 1959 Telephone Directory, CLJA_USMCGEN_0000074318, at *0000074358-67; and October 1959 Telephone Directory, CLJA_USMCGEN_0000074318, *0000074412, at *0000074453-54, *0000074456, *0000074460, *0000074462, and *0000074459.

²²² November 1970 Telephone Directory, CLJA_USMCGEN_0000077468, at *0000077521-23, *0000077525-28, *0000077530, and *0000077533.

²²³ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326700.

²²⁴ October 1986 Telephone Directory, CLJA_USMCGEN_0000089039: CLJA_USMCGEN_0000089437, at *0000089472-79, *0000089484, and *0000089489.

e. Separation from Mainside

The 1970 plan noted that Camp Geiger was one of the “somewhat isolated parts of the Base,” and the long “travel distance . . . to the main areas of Hadnot Point [was] prohibitive.”²²⁵ Due to this lengthy travel distance and isolation, “the Community facilities [at Camp Geiger] were determined to be of necessity somewhat self-sufficient.”²²⁶ Moreover, as discussed in Section V.C.2, above, the 1986 Master Plan Update also noted that there were long travel distances from Montford Point / Camp Johnson to the main community facilities at Hadnot Point, as Camp Geiger was even farther from Hadnot Point than Montford Point / Camp Johnson, these travel distances were even longer from Geiger. This plan also highlights the importance of considering Camp Geiger’s relationship to the MCAS, located to its south: “Recent commercial and community development at the Curtis Road Triangle serves effectively to pull the orientation of Geiger southward.”²²⁷

4. Marine Corps Airfield / Marine Corps Air Station New River

In 1951, the Marines reopened the airfield (previously called Peterfield Point airfield), naming it Marine Corps Air Facility (MCAF) New River. In 1954, the first helicopter group—Marine Aircraft Group-26 (MAG-26)—was stationed at the airfield.

The airfield was redesignated as the Marine Corps Air Station (MCAS) on September 1, 1968.²²⁸ In 1970, the air station was manned by approximately 4,000 Marines, and was the base of operations for Marine Aircraft Group-26 (the above-mentioned helicopter group), Marine Helicopter Training Group-40 (which provided specialized helicopter training to pilots and aircrewmembers)²²⁹ and Marine Air Control Squadron-5 (which provided “air surveillance and control of aircraft and surface-to-air missiles for anti-air warfare”²³⁰).²³¹ In 1972, “a major

²²⁵ 1970 Master Plan, CLJA_USMC_GEN_0000336978, at *0000337153. The other isolated areas noted were Courthouse Bay and Mile Hammock Bay, which was near Onslow Beach.

²²⁶ Ibid.

²²⁷ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326737.

²²⁸ 1977 Base Guide, Base_Guides_0000000627, at *0000000654.

²²⁹ 1970 MCAS Base Guide at Base_Guides_0000000328, at *0000000337.

²³⁰ 1970 MCAS Base Guide at Base_Guides_0000000328, at *0000000338.

²³¹ 1970 MCAS Base Guide at Base_Guides_0000000328, at *0000000334.

reorganization occurred,” and MHTG-40 [the helicopter training group] was deactivated and Marine Aircraft Group 29, another helicopter group, was born.”²³²

From at least 1977 through the 1980s, the principle Second Marine Aircraft Wing tenants were MAG 26 and MAG-29.²³³ MAG 26 and 29 have similar missions and tasks, namely, to provide helicopter support to Fleet Marine Force, perform logistical and administrative support for other Marine air Group units, and helicopter training for pilots and aircrewmembers.²³⁴ According to the 1986 Master Plan Update, the “Air Station is primarily a helicopter base with an increasing contingent of fixed-wing aircraft.”²³⁵

a. Housing and Amenities

In 1951, when the Marines reopened the airfield, the area did not have housing, so single Marines stationed at the airfield lived at Camp Geiger and married Marines lived in family housing across the New River took a ferry to and from work at MCAF New River. In 1954, with the arrival of MAG-26, six new barracks opened to the west of the airfield located close to the hangar, a mess hall, a service club, and the Staff NCO Club.²³⁶ In 1956, there was a Marine Corps Exchange and bachelor officers’ quarters at MCAF.²³⁷

In 1959, there were six barracks at the MCAF that housed Marines from ten units. There was a dental office, a mess hall, a commissioned officers’ mess hall, an infirmary, a Marine Corps Exchange, a maintenance and public works division, a staff NCO club, and a supply department.²³⁸ In 1959, construction started on ranch-style housing for families stationed at New

²³² 1977 Base Guide, Base_Guides_0000000627, at *0000000654.

²³³ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326945; 1977 Base Guide, Base_Guides_0000000627, at *0000000654.

²³⁴ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326946.

²³⁵ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326945.

²³⁶ *Semper Fidelis, A Brief History of Onslow County*, 60, Exhibit 2. Also see 1970 MCAS Base Guide, Base_Guides_0000000328, at *0000000334; and 1977 Base Guide, Base_Guides_0000000627, at *0000000654.

²³⁷ USMC, *Camp Lejeune, NC, Telephone Directory*, 7/1/1956 (July 1956 Telephone Directory), CLJA_USMCGEN_0000059706: CLJA_USMCGEN_0000059854, at *0000059863.

²³⁸ June 1959 Telephone Directory, CLJA_USMCGEN_0000074318, at *0000074363 and *0000074405-06.

River. The complex was located east of the airfield's runways and included 325 houses for enlisted Marines and 110 houses for officers.²³⁹

When MHTG-40 was activated, and Marines attached to this unit lived in a three-story air-conditioned barracks and trained in a 13,000 square-foot air-conditioned building. Amenities at MCAS in 1970 included a bowling alley, medical and dental facilities, a mess hall, and bachelor officer quarters for fifty men.²⁴⁰ Other facilities and amenities available to Marines and their families in 1970 at the air station included a credit union, a shoe repair, a dry cleaner, a service station, a toy store, a post office, and a mess hall.²⁴¹

In 1975, new construction included "another avionics facility, simulator training building, and additional enlisted housing."²⁴² The 1977 Camp Lejeune base guide noted the following housing options at MCAS: Bachelor Officers' Quarters (144-man unit with central heating and air conditioning), Bachelor Staff Noncommissioned Officers' Quarters (80-man unit with 20 single-man rooms and 40 two-man rooms); and Married Quarters – 110 Married Officers' Quarters and 325 Married Enlisted Men Quarters.²⁴³ Facilities at MCAS in 1977 included a dispensary, a Marine Corps Exchange, a cafeteria, a commissary store, a cleaners, a bank, schools, officers' clubs, a marina, a pool, and a bowling center, among others.²⁴⁴

In the 1980s, "motel-style barracks were built at MCAS."²⁴⁵ The 1986 Camp Lejeune phone directory for the MCAS included a subsection titled "Special Services" which listed an athletic facility, an auto hobby shop, a bowling center, camper rentals, a ceramic hobby shop, a child care center, a gymnasium, a library, a marina, a mini-school, a swimming pool for the enlisted, a theater, a weight room, and a woodworking hobby shop. Other facilities listed in the

²³⁹ *Semper Fidelis, A Brief History of Onslow County*, 66, Exhibit 2.

²⁴⁰ *Semper Fidelis, A Brief History of Onslow County*, 66, Exhibit 2. The 1970 MCAS Base Guide includes listings for housing for married officers and for married enlisted men, see 1970 MCAS Base Guide at Base_Guides_0000000328, at *0000000355.

²⁴¹ 1970 MCAS Base Guide, Base_Guides_0000000328, at *0000000340-52.

²⁴² 1977 Base Guide, Base_Guides_0000000627, at *0000000654.

²⁴³ 1977 Base Guide, Base_Guides_0000000627, at *0000000658.

²⁴⁴ 1977 Base Guide, Base_Guides_0000000627, at *0000000658-64.

²⁴⁵ *Semper Fidelis, A Brief History of Onslow County*, 74, 80, Exhibit 2. Also see 1977 Base Guide, Base_Guides_0000000627, at *0000000654. Between 1983 and 1988, the Marine Corps estimated that approximately 5,040 people were assigned to MCAS New River, see 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326951.

1986 Camp Lejeune phone directory were barbers shops, a beauty shop, a dry cleaners, several snack bars, an optical shop, a service station and a thrift shop.²⁴⁶

In at least 1966 through 1977, children from the Air Facility attended DeLalio Elementary.²⁴⁷ Middle- and high school-aged children living at the Air Facility attended Lejeune Junior - Sr High School in 1966, and Brewster Junior High School and then Lejeune High School in 1967 through at least 1977.²⁴⁸

a. Separation from Mainside

The 1986 Master Plan Update noted that there were long travel distances from MCAS, New River to the main community facilities at Hadnot Point.²⁴⁹ This plan also noted that family housing at the air station is less accessible to the main facilities at Hadnot Point than the housing located on Highway 24 (presumably Midway Park, and Tarawa Terrace I and II), which themselves were “less accessible” to these facilities.²⁵⁰ Moreover, as discussed in Section V.C.3, the 1970 plan noted that Camp Geiger—which was closer to Hadnot Point than MCAS, New River— was one of the “somewhat isolated parts of the Base” where the travel distances to the main areas of Hadnot Point “were prohibitive.”²⁵¹ Since, MCAS was even farther from Hadnot Point than Camp Geiger, this analysis presumably applies to MCAS, New River as well.

²⁴⁶ October 1986 Telephone Directory, CLJA_USMCGEN_0000089039; CLJA_USMCGEN_0000089437, at *0000089467.

²⁴⁷ 1966 Base Guide at Base_Guides_0000000098, at *0000000122; 1967 Base Guide at Base_Guides_0000000180, at *0000000204; 1970 Base Guide at Base_Guides_0000000254, at *0000000276; 1971 Base Guide, Base_Guides_0000000391, at *0000000419; 1972 Base Guide, Base_Guides_0000000466; at *0000000503; 1976 Base Guide, Base_Guides_0000000559; at *0000000590; 1977 Base Guide, Base_Guides_0000000627; at *0000000644.

²⁴⁸ 1966 Base Guide at Base_Guides_0000000098, at *0000000122-23; 1967 Base Guide at Base_Guides_0000000180, at *0000000204; 1970 Base Guide at Base_Guides_0000000254, at *0000000276; 1971 Base Guide, Base_Guides_0000000391, at *0000000419; 1972 Base Guide, Base_Guides_0000000466; at *0000000503; 1976 Base Guide, Base_Guides_0000000559; at *0000000590; 1977 Base Guide, Base_Guides_0000000627; at *0000000644; *Semper Fidelis, A Brief History of Onslow County*, 71, Exhibit 2; and “Camp Lejeune School Bells Ring Again,” *The Globe*, 8/25/1967, 00897_PLG_0000044834, at *0000044837. Brewster Junior High and Lejeune High School are located on the Mainside.

²⁴⁹ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326656.

²⁵⁰ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326649.

²⁵¹ 1970 Master Plan, CLJA_USMC_GEN_0000336978, at *0000337153. The other isolated areas noted were Courthouse Bay and Mile Hammock Bay, which is near Onslow Beach

5. Rifle Range at Stone Bay

The Camp Lejeune Rifle Range is located next to Stone Bay on the west side of the New River (see Image 31). Stone Bay Rifle Range dates to World War II when the Marine Corps activated the Rifle Range Battalion.²⁵²

Only a “small number” of Marines were assigned to the Rifle Range.²⁵³ Instead, the Rifle Range was “utilized on a revolving basis by personnel throughout the Camp Lejeune Complex.”²⁵⁴ According to the Camp Lejeune, Special Training Analysis, every Marine had to spend at least five days a year at the Rifle Range for their rifle qualification.²⁵⁵ Moreover, according to the 1970 Master Plan, “all” Marines at Camp Lejeune lived at the Rifle Range for the two week period of their requalification of rifle skills.²⁵⁶ Similarly, the 1986 Master Plan Update notes that Marines lived at the Rifle Range for the two week period they were assigned to “range training.”²⁵⁷

Structures built during the war at the Rifle Range included the four barracks, “three 50-target ranges and a pistol range,” a post office, a theater, and a recreation hall.²⁵⁸

²⁵² Completion Report, Vol. I, CLJA_USMCGEN_0000287341, at *0000287344.

²⁵³ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326605. Other documents indicate that at least some Marines lived at the Rifle Range: legends of the 1964 and 1979 existing condition map for the Rifle Range lists five officers’ quarters for married Marines (Excerpt Map of Rifle Range Area, Camp Lejeune, North Carolina, Showing Conditions on June 30 1964, Sheet 13 of 18, CLJA_USMC_PWD_0000126207; and Map of Rifle Range Area, Camp Lejeune, North Carolina, Showing Conditions on June 30 1979, Sheet 16 of 24, CLJA_USMC_PWD_0000173849); and the “Personnel Listing” in the 1970s telephone directory includes individuals whose addresses are bachelor officers’ quarters and other quarters at the Rifle Range (USMC, *Camp Lejeune, NC, Telephone Directory*, 11/1970, CLJA_USMCGEN_0000077468, at *0000077482-83, *0000077485; and Base Guides from 1967, 1970, 1971, 1972, and 1976 all indicate that kids from the Rifle Range attend Stone Street elementary school (1967 Base_Guides_0000000180 at *0000000204; 1970 Base_Guides_0000000254 at *0000000276; 1971 Base_Guides_0000000391 at *0000000419; 1972 Base_Guides_0000000465, at *0000000502; 1976 Base_Guides_0000000559, at *0000000590)

²⁵⁴ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326701.

²⁵⁵ Camp Lejeune, North Carolina, Special Training Analysis, April 1986, CLJA_USMCGEN_0000027381, at *0000027509.

²⁵⁶ 1970 Camp Lejeune Master Plan, CLJA_USMCGEN_0000336978, at *0000337095.

²⁵⁷ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326605.

²⁵⁸ Completion Report Vol. I, CLJA_USMCGEN_0000287341, at *0000287465, *0000287471, and *0000287505; and Carraway, *Camp Lejeune Leathernecks*, 6, 8, 11, 21, 35, Exhibit 1.

The 1959 base telephone directory listed the buildings at the Rifle Range that included: four barracks, a bachelor officer quarters, a carpenter shop, maintenance shop, firehouse, mess hall, library, Marine Corps Exchange, post office, service club, service station, steam plant, and theater. There was also a dispensary, a dental office, a medical office, and a sick bay on site.²⁵⁹ Amenities and facilities available to those at the Rifle Range in 1970 and 1986 were similar to those available in 1959 and included bachelor officers' quarters, a dental clinic, an enlisted recreation center, a dispensary, mess hall, post office, an enlisted service club, and theater.²⁶⁰

a. Separation from Mainside

The 1970 Master Plan noted that the Rifle Range is “isolated,” and the “travel distance between the major billeting [housing] areas at Hadnot Point and Rifle Range” require that personnel requalifying their rifle skills reside at the Rifle Range. The plan further noted that the practice of “billeting personal for a two week period, at the Rifle Range, for requalification [of rifle skills], is . . . expensive to maintain due to the duplication of housing and support facilities.”²⁶¹

The 1986 Base Master Plan also described the Rifle Range as “isolated,” and noted that “Lengthy travel distance makes use [of Rifle Range] less than convenient to troops billeted at the Hadnot Point regimental area.”²⁶²

²⁵⁹ June 1959 Telephone Directory, CLJA_USMCGEN_0000074318, at *0000074360-65, *0000074367, and *0000074372.

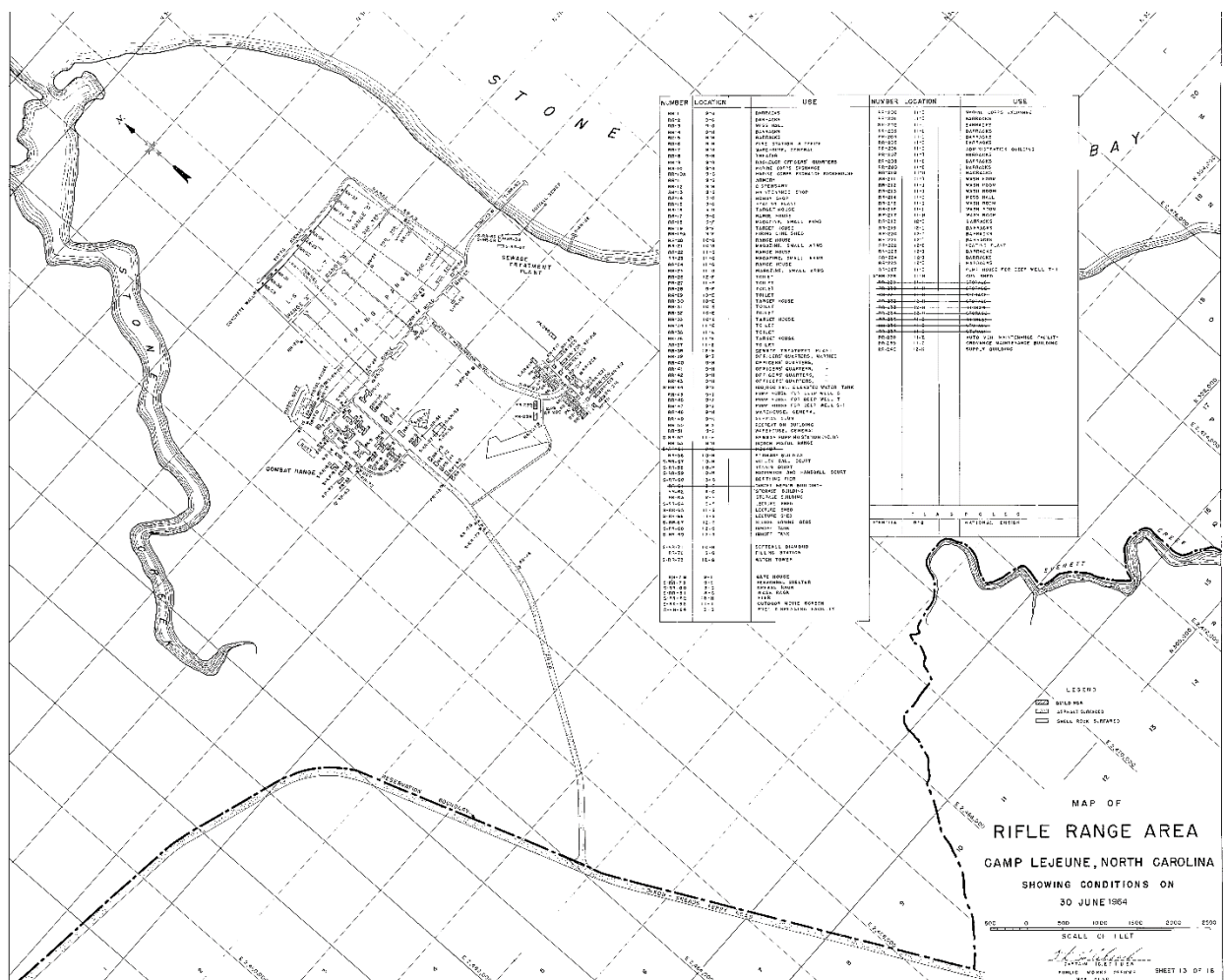
²⁶⁰ November 1970 Telephone Directory, CLJA_USMCGEN_0000077468, at *0000077521, *0000077525, and *0000077532; October 1986 Telephone Directory, CLJA_USMCGEN_0000089039: CLJA_USMCGEN_0000089437, at *0000089472 and *0000089475-81.

²⁶¹ 1970 Camp Lejeune Master Plan, CLJA_USMCGEN_0000336978, at *0000337095.

²⁶² 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *000032647-28, and *000032659-60.

Image 31

Map showing location of the Rifle Range Area, June 30, 1964²⁶³



areas during World War II beyond the main part of Hadnot Point, there were numerous structures at Onslow Beach.²⁶⁵ Completion Report, Volume III notes: “Signal School facilities provided housing, mess and training facilities for 750 troops. It is located in the beach area between the dunes and Intercoastal Waterway.”²⁶⁶ Three barracks, a mess hall, and heating plant were also listed.²⁶⁷

Onslow Beach has also been an area where Marines and their families would visit for recreation. One author estimated during the summer of 1945, 10,000 Marines visited Onslow Beach each Sunday in the summer. Buses transported Marines to and from the beach. Among the amenities the Marines could enjoy were, an officers’ club, and a “beach house for enlisted Marines with 1,000 lockers, snack bars, and a motion picture auditorium,” and “pavilion for Negro Marines.”²⁶⁸

The 1959 *Camp Lejeune Telephone Directory* included listings for the Onslow Beach snack bar and canteen and a “Senior Guest House” with seven rooms. A steam plant served the area and the “Water Plant – Onslow Beach” is also listed in the 1958 telephone directory. Other structures listed include a Marine Corp Exchange, dispensary, mess hall, chapel, enlisted pavilion, officers pavilion, staff NCO pavilion, and a commissioned officers mess hall.²⁶⁹

In the 1970 base telephone directory there were only a few structures listed which were the enlisted recreation center, mess hall, and a staff NCO club. However, in 1986, the Onslow Beach Pavilion, a commissioned officers mess hall, barber shop, post exchange, three snack bars, and quarters for officers and enlisted men, and a medical clinic were listed in the directory.²⁷⁰ The 1986 Master Plan stated that there was no family housing and minimal troop housing.²⁷¹

Onslow Beach is near Mile Hammock Bay, and the 1970s master plan notes that “the travel distance[]” from Mile Hammock Bay to Hadnot Point was “prohibitive,” requiring that Mile Hammock Bay (and, presumably, Onslow Beach) have its own community facilities.

²⁶⁵ Carraway, *Camp Lejeune Leathernecks*, 6, 8, 11, 21, 35.

²⁶⁶ Completion Report, Vol. III, CLJA_USMCGEN_0000209879, at *0000209909. Add short explanation about signal school activities (i.e. communications)

²⁶⁷ Completion Report, Vol. III, CLJA_USMCGEN_0000209879, at *0000209991.

²⁶⁸ Carraway, *Camp Lejeune Leathernecks*, 6, 8, 11, 21, 35.

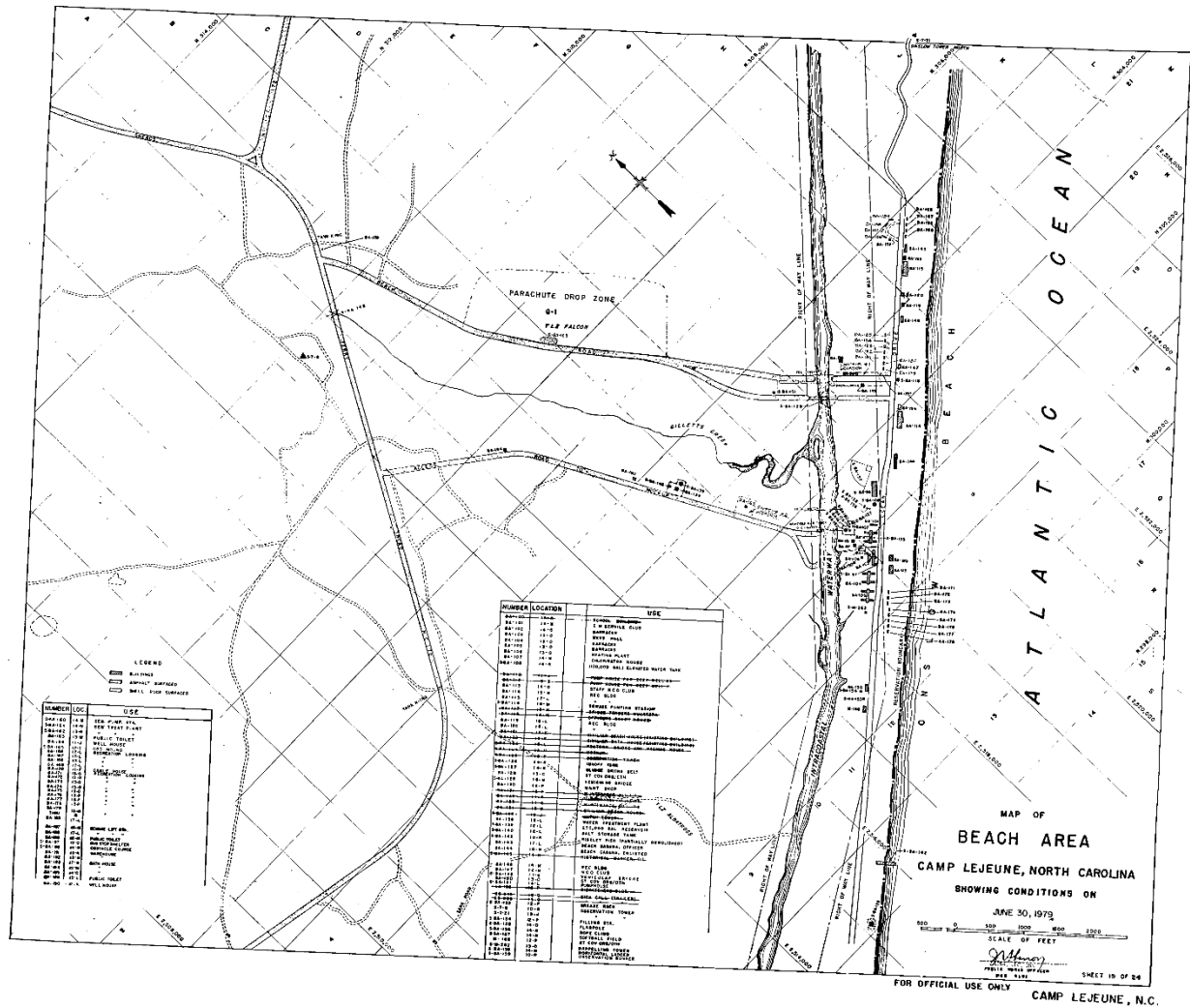
²⁶⁹ USMC, *Camp Lejeune, NC, Telephone Directory*, 6/1959, 27, 30, 33-34; and USMC, *Camp Lejeune, NC, Telephone Directory*, 10/1959, 27, 31, 35. The Onslow Beach Water Plant was first listed in the September 1958 MCBCL telephone directory, see, USMC, *Camp Lejeune, NC, Telephone Directory*, 6/1959, MCBCL *Telephone Directory*, 62.

²⁷⁰ USMC, *Camp Lejeune, NC, Telephone Directory*, 11/1970, MCBCL *Telephone Directory*, 60-62; and USMC, *Camp Lejeune, NC, Telephone Directory*, 10/1986, MCBCL *Telephone Directory*, 21-22, 26-28, 86. The 1986 directory does not indicate if the quarters were permanent residences or vacation rentals.

²⁷¹ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326712 and *0000326729..

Image 32

Onslow Beach, June 30, 1979²⁷²



²⁷² Existing Condition Maps 1979, Beach Area, 019.pdf. Exhibit 14.

7. Courthouse Bay

The Courthouse Bay WTP operated from 1969 to 2000 and the ATSDR did not study this WTP (see Table 1 and Image 18).²⁷³ During World War II, the Amphibian Base was located at Courthouse Bay and it received pumped well water that had been treated with chlorine.²⁷⁴

Courthouse Bay takes “its name from the bay of water on a narrow portion of New River” and “is the area designated for the Marine Corps Combat Support Schools.”²⁷⁵ Plans for the development of this area began in 1942 “with the construction of barracks, training and support facilities for one battalion of Balloon Barrage Training and Amphibious operations.”²⁷⁶ The 1986 Master Plan Update noted that once “balloon training became obsolete, these facilities were occupied by a series of Marine Corps units and eventually became the home of the Engineer School.”²⁷⁷ Image 32 shows the various engineer and amphibian troop areas at Courthouse Bay in June 1979.

²⁷³ See Table 1 and Image 18.

²⁷⁴ Completion Report, Vol. II, CLJA_USMCGEN_0000161226, at *0000161430; and “Water Treatment Plant,” *The Globe*, 12/2/1948, 00897_PLG_0000055167, at *0000055174.

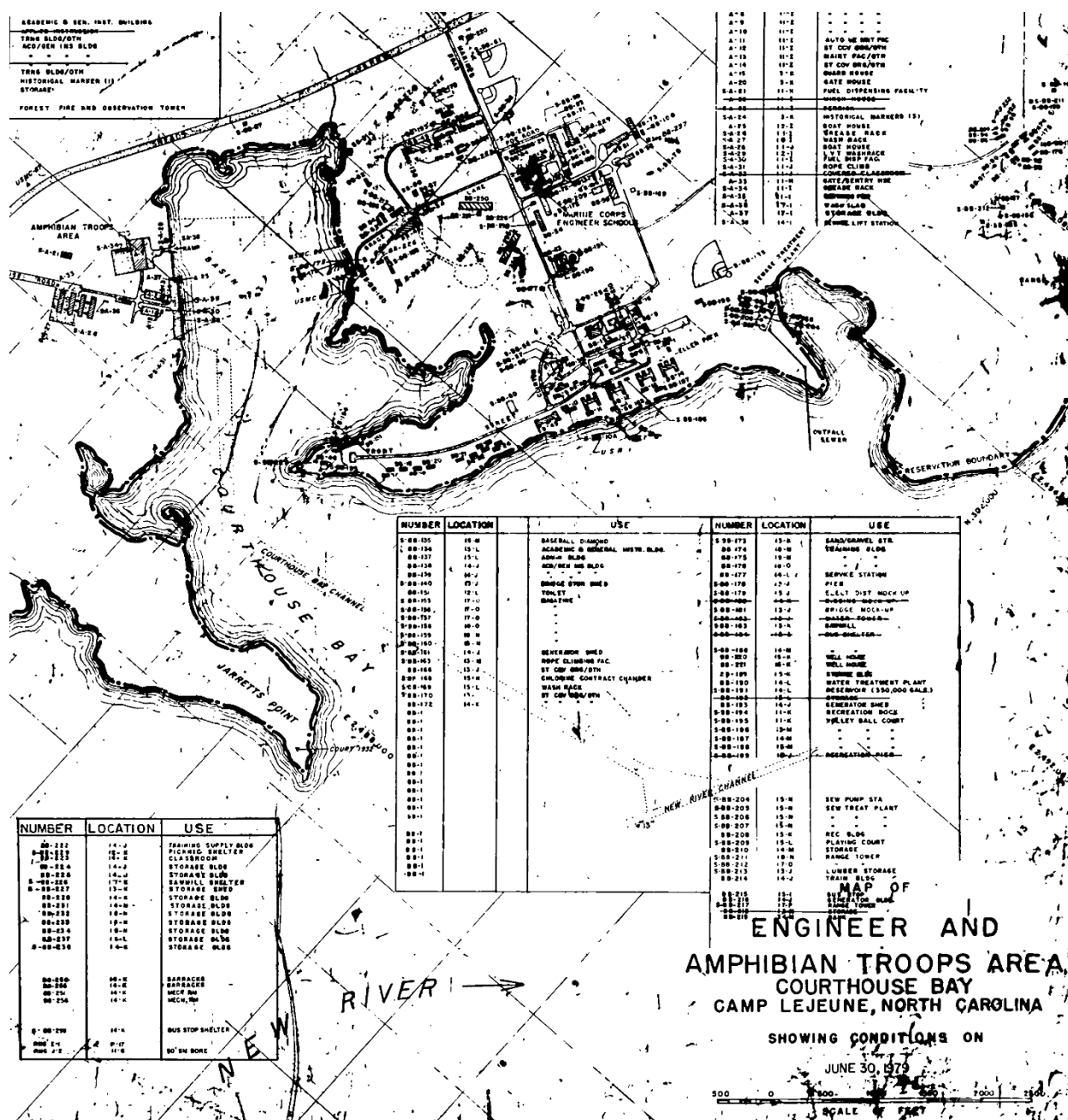
²⁷⁵ 1970 Master Plan, CLJA_USMCGEN_0000336978, at *0000337051. This document further notes that the Combat Service Support School (the Engineer School) conducts training in all types of combat support functions,” *ibid.*, at *0000337053.

²⁷⁶ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326608.

²⁷⁷ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326608.

Image 33

Courthouse Bay Area, June 30, 1979²⁷⁸



²⁷⁸ Existing Condition Maps 1979, Courthouse Bay, 017.pdf. Exhibit 15.

a. The Engineer School

During World War II, the following subjects were taught at the school: “Basic Surveying, Bridging, Drafting, Aerial Photographic Interpretation, Field Electrician, Map Reproduction and Photography . . . Shop, Engineer Equipment, Water Supply and Well Drilling. After a period of disbandment following World War II, the school was reactivated in January 1949 and in April 1952 was renamed the Marine Corps Engineer School.”²⁷⁹ In 1969, there were at 616 military personnel at Courthouse Bay (Engineer School) that included 246 permanent military personnel of which 21 were officers.²⁸⁰ In addition, the summary of the FY-1969 academic program for the Engineer School showed that sixteen courses were offered ranging from “combat engineer basic specialist” (85 four-week classes that had a total of 2,374 students) to “utility chief” (one 17-week that had a total of fifteen students).²⁸¹ The Marines reorganized the school during the winter of 1976-1977 and created four companies: “Headquarters and Service Company, Engineer Equipment Instruction Company, Utilities Instruction Company, and Combat Engineer Instruction Company.”²⁸²

b. Housing

While troop and family housing were generally concentrated in other areas of the base, there was some housing at Courthouse Bay.²⁸³ There was a small number of family housing units in the Courthouse Bay area, likely to house instructors and their families.²⁸⁴ In 1979 housing in the area included engineering student barracks, four additional barracks, bachelor officers’ quarters, and married officers housing.²⁸⁵ In 1983 some troop housing, and there were 8 family housing units in Courthouse Bay. In the 1980s, construction started on “hotel-style barracks at Courthouse Bay.”²⁸⁶

²⁷⁹ “Marine Corp Engineer School,” History, <https://www.mces.marines.mil/>.

²⁸⁰ 1970 Camp Lejeune Master Plan, CLJA_USMCGEN_0000336978, at *0000337057, and *0000337059.

²⁸¹ 1970 Camp Lejeune Master Plan, CLJA_USMCGEN_0000336978, at *0000337057, *0000337059, and *0000337065.

²⁸² “Marine Corp Engineer School,” History, <https://www.mces.marines.mil/>.

²⁸³ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326648-49.

²⁸⁴ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326703, and *0000326644. There are eight units listed at Courthouse Bay, *ibid*, at *0000326703.

²⁸⁵ J.E. Sirrine Company, “A Utility Study for Courthouse Bay Area, Marine Corps Base Camp Lejeune, NC” 1/31/1979, CLJA_USMC_CAGE_0000200592, at *0000200608

²⁸⁶ *Semper Fidelis, A Brief History of Onslow Beach*, 80, Exhibit 2.

c. Amenities

In terms of amenities, the 1959 *Camp Lejeune Telephone Directory* lists various facilities and structures at Courthouse Bay, including a boat house, two mess halls including one for commissioned officers, a dental clinic, firehouse, library, maintenance shop (two structures), steam plant, Marine Corps Exchange, service club, staff NCO club, indoor theater, gas station, and a post office.²⁸⁷ The 1966 base guide features for the Courthouse Bay area include a chapel, barbershop, cleaning and pressing shop, Exchange, laundromat, food service, theater, library, enlisted service club, staff NCO club, and an officers' club.²⁸⁸ There were also "[t]wo tennis courts, one handball court, two softball/football fields, one basketball court, one volleyball court and one badminton court" and a recreation center.²⁸⁹

The 1970 Master Plan noted that ten percent of the "community facilities" at the base were at Courthouse Bay, which is in almost direct proportion to the number of Troops being handled at this area.²⁹⁰ The plan lists several such facilities at Courthouse Bay, including "a small Library, Theater, Recreation facilities, and Hobby Shops" as well as a Dental Clinic.²⁹¹

In 1984, of the 255 acres of development at Courthouse Bay, the Training Facilities accounted for "the largest single land use."²⁹² "Commercial, community and medical facilities [were] consolidated and centralized relative to troop housing and training classrooms."²⁹³ The 1986 Master Plan Update mentioned a dental annex as well as ancillary supply and storage facilities at Courthouse Bay.²⁹⁴

²⁸⁷ June 1959 Telephone Directory, CLJA_USMCGEN_0000074318, at *0000074358-63; and *000074368; and October 1959 Telephone Directory, CLJA_USMCGEN_0000074318; CLJA_USMCGEN_000007441, at *0000074453-64, and *0000074466.

²⁸⁸ 1966 Base Guide at Base_Guides_0000000098, at *0000000125-127, *0000000131, and *0000000133.

²⁸⁹ 1966 Base Guide at Base_Guides_0000000098, at *0000000136, and *0000000138-139.

²⁹⁰ 1970 Master Plan, CLJA_USMCGEN_0000336978, at *0000337153.

²⁹¹ 1970 Master Plan, CLJA_USMCGEN_0000336978, at *0000337155, *0000337147.

²⁹² 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326728-729.

²⁹³ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326891.

²⁹⁴ 1986 Master Plan Update, CLJA_USMCGEN_0000326502, at *0000326618 and *0000326648.

d. Separation from Mainside

The 1970 Base Master Plan noted that “the travel distance[]” from Courthouse Bay to Hadnot Point was “prohibitive,” such that in Courthouse Bay and other similar “somewhat isolated portions of the Base,” required “Community facilities . . . [that were] of necessity somewhat self-sufficient.”²⁹⁵

The above discussion in Section V.C supports my opinion two.

VI. Life at Camp Lejeune

A. Swimming Pools

As discussed, pool training at Camp Lejeune dated to World War II when two swimming pools were built at Hadnot Point that were “used for teaching combat methods in water.” These pools were located in building 236, Area 2 pool and building 540, Area 5 pool. During World War II, a training pool was also built at Montford Point. Each of the World War II pools measured 110 by 60 feet.²⁹⁶ Marines and their families continued to use the Camp Lejeune pools through the statutory period.²⁹⁷

In February 1970, *The Globe* included an article titled, “Base pools offer summer comfort when temperatures dive to zero.” According to the story’s author, during the winter two of the base’s five pools remained open and brought “78-degree heated water to all Marines and their dependents.” The story continued that during summer the two indoor pools and three outdoor pools were open. Of the three outdoor pools, one was at the commissioned officers mess hall at Hadnot Point (Paradise Point) and the other two were at the MCAS-New River. There were two

²⁹⁵ 1970 Master Plan, CLJA_USMCGEN_0000336978, at *0000337155, *0000337147.

²⁹⁶ Carraway, *Camp Lejeune Leathernecks*, 6-8, 23, Exhibit 1. During the statutory period the training pools on Hadnot Point drew water from the Hadnot Point WTP. During World War II, the Hadnot Point Training pools were connected to Hadnot Point WTP system and the Montford Point Pool was filled “untreated water directly from the distribution system that served Hadnot Point, see Completion Report, Vol. III, CLJA_USMCGEN_0000209879, at *0000210107 and *0000210110. The Montford Point pool drew water from the Montford Point / Camp Johnson WTP until 1987 when Holcomb Boulevard WTP started to serve Camp Johnson.

²⁹⁷ See for example 1967 Base Guide, Base_Guides_0000000180, at *0000000221-22; 1976 Base Guide, Base_Guides_0000000669, at *0000000596; and 1984 Base Guide Base_Guides_0000000871, at *.

swimming clubs at Camp Lejeune, a scuba club and the Devil Fish Swim team.²⁹⁸ Table 2 contains information about each of the pools at Camp Lejeune.

²⁹⁸ “Base pools offer summer comfort when temperatures dive to zero,” *The Globe*, 2/13/1970, 00897_PLG_0000043316, at *0000043324.

Table 2**Camp Lejeune Swimming Pools²⁹⁹**

Pool	Area of Base	Years Open During the Statutory Period	Indoor or Outdoor	Uses	Size
Area 2, Building 236 ³⁰⁰	Hadnot Point	Entire Statutory period (1953-1987)	Indoor	Appears to be used for training and recreation in 1962, and normally used for recreation from at least 1966 through the end of the statutory period	110 by 60 feet.
Area 5, Building 540 ³⁰¹	Hadnot Point	Entire Statutory period (1953-1987)	Indoor	Generally reserved for training, though the swim team also used this pool	110 by 60 feet.
Montford Point, Building M-139 ³⁰²	Montford Point	Entire Statutory period (1953-1987)	Indoor	Appears to be used for training and recreation in 1962, and normally used for recreation from	110 by 60 feet

²⁹⁹ The information in Table 2 is compiled from extant Camp Lejeune Base Guides for select years between 1952 – 1988 (as follows), unless otherwise noted: 1952 Base Guide, Base_Guides_0000000058, at *0000000072 and *0000000073; 1962 Base Guide at Base_Guides_0000000077, at *0000000085; 1966 Base Guide at Base_Guides_0000000098, at *0000000139-40; 1967 Base Guide at Base_Guides_0000000180, at *0000000221-22; 1970 Base Guide at Base_Guides_0000000254, at *0000000295; 1970 MCAS Base Guide at Base_Guides_0000000328, at *0000000347 and *0000000351; 1971 Base Guide, Base_Guides_0000000391; at *0000000413-17; No author, “Camp Lejeune,” (Lubbock TX: Boone Publications, Inc., 1972) (1972 Base Guide), Base_Guides_0000000465; at *0000000514-15; 1976 Base Guide, Base_Guides_0000000559; at *0000000596; 1977 Base Guide, Base_Guides_0000000627; at *0000000649; 1978 Base Guide, Base_Guides_0000000695; at *0000000718; No author, “Eastern Carolina Salutes Camp Lejeune/New River,” (San Diego, CA: Military Publishers, 1979) (1979 Base Guide), Base_Guides_0000000759; at *0000000782; No author, “Eastern Carolina Salutes Camp Lejeune/New River,” (San Diego, CA: MARCOA Publishing, 1980) (1980 Base Guide), Base_Guides_0000000829; at *0000000852-53; 1984 Base Guide, Base_Guides_0000000871, at *0000000881 and *0000000895; and 1988 Base Guide, Base_Guides_0000000923, at *0000000937 and *0000000951.

³⁰⁰ Carraway, *Camp Lejeune Leathernecks*, 6-8, 23, notes the pool was opened in World War II era.

³⁰¹ Carraway, *Camp Lejeune Leathernecks*, 6-8, 23, notes the pool was opened in World War II era.

³⁰² Carraway, *Camp Lejeune Leathernecks*, 6-8, 23, notes the pool was opened in World War II era.

				at least 1966 through the end of the statutory period	
Paradise Point Officers' Club ³⁰³	Holcomb Boulevard	Entire Statutory period (1953-1987)	Outdoor	Recreation	
MCAS New River Officer's Club	MCAS New River	1963 through end of statutory period ³⁰⁴	Outdoor ³⁰⁵	Recreation	
Station Pool	MCAS New River	[open by 1970, through end of statutory period]	Outdoor	Recreation	
Tarawa Terrace	Tarawa Terrace	August 1983, through the end of the statutory period (1987) ³⁰⁶	Outdoor ³⁰⁷	Recreation ³⁰⁸	

B. Schools for Base Dependents

³⁰³ Carraway, *Camp Lejeune Leathernecks*, 6-8, 23, notes the pool was opened in World War II era.

³⁰⁴ MCAS Officers Pool and bathhouse, construction drawings approved 10/25/1962, drawing 959483, CLJA_USMC_PWD_0000131483.

³⁰⁵ "Base pools offer summer comfort when temperatures dive to zero," *The Globe*, 2/13/1970, 00897_PLG_0000043316, at *0000043324.

³⁰⁶ New pool approved," *The Globe* 6/11/1981, 00897_PLG_0000037094, at *0000037107; and "New pool," *The Globe*, 8/11/1983, 00897_PLG_0000033941, at *0000033943

³⁰⁷ "May 17: Tarawa Terrace outdoor pool opens," *The Globe*, 4/10/1986, 00897_PLG_0000028215, at *0000028220.

³⁰⁸ See for example, "Devil Fish Club, summer program registration," *The Globe*, 5/30/1985, 00897_PLG_0000029988, at *0000030028; "Tarawa Terrace pool is now open for recreational swimming," *The Globe*, 5/22/1986,; 00897_PLG_0000027907, at *0000027942; "Innertube Water Polo at Tarawa Terrace Pool," *The Globe*, 7/31/1986, 00897_PLG_0000027497, at *0000027508; and "A Moonlight Swim will be conducted for adults at Tarawa Terrace Outdoor Pool..." *The Globe*, 5/21/1987, 00897_PLG_0000025999, at *0000026026.

The first schools at Camp Lejeune opened during World War II. Carraway in *Camp Lejeune Leathernecks* wrote that during World War II kids grades kindergarten through fifth grade attended the Midway Park school and kids sixth grade through high school attended the Paradise Point school.³⁰⁹ The 1952 base guide states that there was a kindergarten and that kids grades 1-4 attended the Midway Park School. Students grades 5-12 attended the Camp School.³¹⁰ No new schools opened at the base until the Tarawa Terrace elementary school opened in 1953.³¹¹ By 1962, the base had five elementary schools and a combined junior and senior high school. Within five years, two more elementary schools and separate junior and senior high schools were built.³¹²

The information in Table 3 is drawn from the extant Camp Lejeune Base Guides as indicated in the citation column.³¹³

Table 3
Camp Lejeune Nursery Schools During the Statutory Period³¹⁴

³⁰⁹ Carraway, *Camp Lejeune Leathernecks*, 10.

³¹⁰ No author, “Welcome Aboard, Guidebook to 2nd Marine Division and Camp Lejeune, N.C., Base_Guides_0000000058, at *0000000066.

³¹¹ *Semper Fidelis, A Brief History of Onslow County*, 52.

³¹² *Semper Fidelis, A Brief History of Onslow County*, 66.

³¹³ The information in Table 3 is compiled from extant Camp Lejeune Base Guides (BG) for select years between 1952–1988 (as follows), unless otherwise noted: 1952 Base Guide, Base_Guides_0000000058, at *0000000066; 1962 Base Guide at Base_Guides_0000000077, at *0000000082-83; 1966 Base Guide at Base_Guides_0000000098, at *0000000122-24; 1967 Base Guide at Base_Guides_0000000180, at *0000000204-06; 1970 Base Guide at Base_Guides_0000000254, at *0000000276-78; 1970 MCAS Base Guide at Base_Guides_0000000328, at *0000000344-46; 1971 Base Guide, Base_Guides_0000000391; at *0000000418-19; 1972 Base Guide, Base_Guides_0000000466; at *0000000503; 1976 Base Guide, Base_Guides_0000000559; at *0000000590; 1977 Base Guide, Base_Guides_0000000627; at *0000000644.

³¹⁴ The information in Table 3 is compiled from extant Camp Lejeune Base Guides (BG) for select years between 1952–1988 (as follows), unless otherwise noted: 1952 Base Guide, Base_Guides_0000000058, at *0000000066; 1962 Base Guide at Base_Guides_0000000077, at *0000000082-83; 1966 Base Guide at Base_Guides_0000000098, at *0000000122-24; 1967 Base Guide at Base_Guides_0000000180, at *0000000204-06; 1970 Base Guide at Base_Guides_0000000254, at *0000000276-78; 1970 MCAS Base Guide at Base_Guides_0000000328, at *0000000344-46; 1971 Base Guide, Base_Guides_0000000391; at *0000000418-19; 1972 Base Guide, Base_Guides_0000000465; at *0000000495, *0000000503; 1976 Base Guide, Base_Guides_0000000559; at *0000000584, *0000000590; 1977 Base Guide, Base_Guides_0000000627; at *0000000644.

School Name	Grades / Ages Enrolled	WTP System	Operational Dates	Housing Areas Served	Citation
Midway Park Nursery	Ages 2-6	Hadnot Point	1962 to 1970	Midway Park	1962BG 1967BG 1970BG
Tarawa Terrace Nursery	Ages 4 months-10 years / Kindergarten for five year olds (1962BG, 1970BG), 2 months-14 years (1967BG)	Tarawa Terrace	1962 to 1970	Nursey (Base Wide), Kindergarten (Military Personnel On/Off Base)	1962BG, 1966BG, 1967BG, 1970BG
Paradise Point	Nursery School (1966BG, 1967BG, 1970BG-1972BG), Kindergarten (1970BG)	Hadnot Point	1966 to 1971	Dependents of Officers Only (1967BG)	1966BG, 1967BG, 1970BG, 1971BG, 1972BG, 1976BG

Table 4
Camp Lejeune Elementary Schools During the Statutory Period

The extant base guides for 1978, 1979, 1980, 1984, and 1985 do not list individual base schools. Instead, they have language stating that at the base there are five elementary schools, a junior high, and a high school.³¹⁴ Information in the Camp Lejeune Telephone directories for years 1979, 1980, 1983, 1985, and 1986 corroborates the school information in each of these base guides. These schools were listed in each of the telephone directories: This document lists the following schools: Lejeune High School, Brewster Junior High School, Berkeley Manor Elementary School, DeLalio Elementary School, Stone Street Elementary School, Tarawa Terrace I Elementary School, and Tarawa Terrace II Elementary School, see 1978 Base Guide, Base_Guides_0000000695; at *0000000710; 1979 Base Guide, Base_Guides_0000000759; at *0000000774; 1980 Base Guide, Base_Guides_0000000829; at *0000000844; 1984 Base Guide, Base_Guides_0000000871, at *0000000899; and 1988 Base Guide, Base_Guides_0000000923, at *0000000955.

School Name	Grades / Ages Enrolled	WTP System	Operational Dates	Housing Areas Served	Citation
Midway Park Elementary School	Grades 1-4 (1952BG), Grades 1-3 (1962BG), Grades 1-4 (1966BG), Grades 1-6 (1967BG), Kindergarten (1970BG-1972BG)	Hadnot Point	Beginning of statutory period to 1967, Kindergarten 1970-1972	Base Wide (1952BG), Midway Park (1962BG), Midway Park, Knox Trailer Park and 5 th graders from Berkeley Manor (1967BG)	1952BG, 1962BG, 1966BG, 1967BG, 1970BG-1972BG
Tarawa Terrace I (TT I) Elementary School	Grades 1-6 (1962BG), Grades 1-5 (1966BG, 1967BG), Grades 1-6 (1970BG-1972BG), Kindergarten (1970BG-1971BG) Grades 1-3 TT I and Kindergarteners Base Wide (1976BG), Grades 1-2 TTI and all Kindergarteners Base Wide (1977BG)	Tarawa Terrace	Entire statutory period	Tarawa Terrace I	1962BG, 1966BG, 1967BG, 1970BG, 1971BG, 1972BG, 1976BG, 1977BG
Tarawa Terrace II (TT II) Elementary School	Grades 1-6 and Grade 6 from Tarawa Terrace I (1967BG),		1967 to the end of the statutory period	Tarawa Terrace II	1967BG, 1970BG, 1971BG, 1972BG, 1976BG, 1977BG

	Grades 1-6 (1970BG- 1972BG) All TT II students, TT I Grades 4-6, Midway Park and Knox Trailer Park Grades 1-6 (1976BG), All TT II, Midway Park and Knox Trailer Park grades 1-6, and TT I grades 3-6 (1977BG)				
Montford Point Elementary School	Grades 1, 3, & 5 (1962BG), Grades 1-4 (1966BG)	Montford Point / Camp Johnson	Beginning of statutory period to 1966 ³¹⁵	Knox Trailer Park (1966BG)	1962BG, 1966BG
Stone Street Elementary School (Paradise Point)	Grades 1-6 (1962BG), Grades 1-5 (1966BG), Grades 1-6 (1967BG, 1970BG, 1971BG, 1976BG, 1977BG)	Hadnot Point	1959through statutory period ³¹⁶	Paradise Point and Berkeley Manor (1966 BG), Paradise Point, Rifle Range, Courthouse Bay (1967 BG), Paradise Point, Rifle Range, Courthouse Bay, Navy Hospital	1962BG, 1966BG, 1967BG, 1970BG, 1971BG, 1972BG, 1976BG, 1977BG

³¹⁵ Camp Lejeune Telephone Directory, 6/1/1953, CLJA_USMCGEN_0000100173; at 0000100219.

³¹⁶ Construction drawings approved 10/4/1957, , Drawing 765257, CLJA_USMC_PWD_0001278135. As-built drawings of water and sewer utilities dated 4/6/1959, drawing 765386, CLJA_USMC_PWD_0001675806.

				(1970BG-1971BG), [in 1972 some students from Berkeley Manor (1972BG)], [in 1976 same as 1972 except Center Hospital instead of Navy Hospital (1976BG), 1977BG	
Geiger School	Grades 1-6 (1962BG)	Camp Geiger	1962 ³¹⁷ TO 1965	Camp Geiger Trailer Park, MCAS (1962BG)	1962BG
1943 Russell Elementary School ³¹⁸ In 1952 and 1959 also known as Camp School From 1962-1966 named Brewster Elementary School	Grades 5-12 (1952BG), Grades 4-7 (1962BG), Grades 5-7 (1966BG)	Hadnot Point	Entire statutory period	Base Wide (1962BG, 1966BG)	1952BG, 1962BG, 1966BG,

³¹⁷ "3200 Pupils Expected To Begin Classes," *The Globe*, 8/31/1961, 00897_PLG_0000048420; at *0000048422.

³¹⁸ Construction drawings, revisions approved 8/30/1943, Contract 43-P1500, drawing 287748, no as-built drawings, CLJA_USMC_PWD_0000131522.

Berkeley Manor Elementary School	Grades 1-4 (1967BG), Grades 1-6 (1970BG-1972BG, 1976BG, 1977BG)	Hadnot Point	1967 to the end of the statutory period	Berkeley Manor	1967BG, 1970BG, 1971BG, 1972BG, 1976BG, 1977BG
DeLalio Elementary School	Grades 1-5 (1966BG), Grades 1-6 (1967BG, 1970BG-1972BG, 1976BG, 1977BG) Kindergarten (1970BG, 1972BG)	MCAS-New River	1965 to the end of the statutory period	MCAS-New River and Camp Geiger Trailer Park) Beginning in 1976 only MCAS students	1966BG, 1967BG, 1970BG, 1971BG, 1972BG, 1976BG, 1977BG

Table 5

Camp Lejeune Junior and High Schools During the Statutory Period

School Name	Grades / Ages Enrolled	WTP System	Operational Dates	Housing Areas Served	Citation
Brewster Junior High School starting in 1967	Grades 6-8 (1967BG), Grades 7-8 (1970BG-1972BG, 1976BG, 1977BG)	Hadnot Point	Entire statutory period	Base Wide 1970BG-1972BG)	1967BG, 1970BG, 1971BG, 1972BG, 1976BG, 1977BG,
Lejeune Junior – Senior High School	Grades 7-12 (1962BG), Grades 8-12 (1966BG), Grades 9-12 (1967BG, 1970BG-1972BG,	Hadnot Point	Entire statutory period	Base Wide	1962BG, 1966BG, 1967BG, 1970BG, 1971BG, 1972BG, 1976BG, 1977 BG

	1976BG, 1977BG)				
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C. Air Conditioning at Camp Lejeune

In the mid-1950s, few American homes had air conditioning. By 1980, more than half of the country's homes were air conditioned.³¹⁹ In 1959, a Marine Corps order allowed air conditioning to be installed in all new residential construction in areas where the wet-bulb temperature was 67 degrees or higher during 2200 hours during the six hottest months of the year. At Camp Lejeune the average was 2898 hours.³²⁰ According to data reviewed, all housing built after 1959, included air conditioning in the original construction drawings.³²¹ The 1959 Marine Corps order recommended a priority system for adding air conditioning to existing personnel living spaces. Based on its climate, Camp Lejeune was in priority three of five.³²² According to available drawings, no residential properties built prior to 1959 received air conditioning retrofits in the 1960s.

In 1971, the Department of Defense (DOD) released new guidance that prioritized installing air conditioning in both new and existing housing units in more climate locations.³²³ In the early 1970s, DOD leadership recommended adding air conditioning to existing barracks at Camp Lejeune, like those at Hadnot Point.³²⁴ Additionally, air conditioning was added to existing family housing, such as at Tarawa Terrace, in the early 1970s.³²⁵

³¹⁹ J. Biddle, "Explaining the Spread of Residential Air Conditioning, 1955-1980," *Explorations in Economic History*, v. 45 (2008), 402-423, at 402, Exhibit 10.

³²⁰ Lt. Gen R. Hogabloom, Marine Corps Order 11380.1A, re: Air Conditioning, Evaporative Cooling, dehumidification and mechanical ventilation; procurement and installation of, 8/6/1959, p. 4. For wet bulb temperature data at Camp Lejeune see Enclosure 1 to Marine Corps Memo 11380.1A, p. 4 (PDF page 7 of 15). Exhibit 11

³²¹ See Attachment 3: Air Conditioning at Various Camp Lejeune Housing Projects.

³²² Lt. Gen R. Hogabloom, Marine Corps Order 11380.1A, re: Air Conditioning, Evaporative Cooling, dehumidification and mechanical ventilation; procurement and installation of, 8/6/1959, p. 3, Exhibit 11.

³²³ A copy of OASD(I&L) Construction Criteria Manual 4270.1-M, 6/17/1971, has not been located, but is referenced in United States General Accounting Office, "DOD's Requirement For Air-Conditioning Military Family Housing In Hawaii Is Unnecessary," B-172376, 5/20/1974, Exhibit 12.

³²⁴ "Military Construction Appropriations for 1974, Part 3" *Hearing Before the House Military Construction Appropriations Subcommittee*, 6/6/1973, pp. 432-434, Exhibit 13.

³²⁵ See Attachment 3: Air Conditioning at Various Camp Lejeune Housing Projects and "Air Conditioning of Family Qtrs, Tarawa Terrace I and II," PWO 73-B-1062, Drawing 4007891, "As-Built" 9/12/1974, CLJA_USMC_PWD-0001281657.

Some facilities at Camp Lejeune did not appear to follow these trends. For example, some Naval Hospital housing received air conditioning renovations prior to the 1970s, whereas guest houses at Onslow Beach may not have received it until 1985. Yet the larger trends point to new housing built after 1959 likely to have air conditioning and pre-1959 housing retrofitted with air conditioning during the 1970s.³²⁶

D. Activities at Camp Lejeune During the Statutory Period

In the statutory period, most of the areas of the base had similar services and recreational activities available to Marines and their dependents that existed on the Mainside, although fewer in number. Most of the areas of the base away from the Mainside had similar amenities, services and recreational activities available to Marines and their dependents as existed on the Mainside, although fewer in number. Many of the base guides, telephone directories, and the master plans cited in Section V.C provided information on community centers, areas to hold parties, and the many clubs on base, and other recreational opportunities on base.

The 1976 unofficial directory and guide noted community centers located at Tarawa Terrace, Midway Park, and Knox Trailer Park with each offering classes and social activities. Those interested in outdoor activities could use the picnic areas at Hospital Point, Gottschalk Marina, or Onslow Beach. Onslow Beach had two areas for enlisted Marines and one for officers during summer. Several clubs were for Marine wives including the Staff NCO Wives Club opened to wives of Marines and Sailors with a pay grade higher than E-6. Activities included picnics, lunches, and banquets. There was also a club for officer's wives that had eight-unnamed-groups. This club raised money to fund scholarships for the base's high school students.³²⁷

In 1976, numerous services clubs were available to Marines on the base. Eleven clubs for enlisted Marines included four at Hadnot Point, and one at each of the following: Courthouse Bay, Camp Geiger, French Creek, Montford Point, Rifle Range, and Onslow Beach. For the NCOs—sergeants and corporals—the main NCO club was at Hadnot Point with annexes at Montford Point, Camp Geiger, and Courthouse Bay. At each location there was a tavern and sometimes live entertainment. Staff noncommissioned officers could visit the main base staff NCO club at Hadnot Point for live entertainment, dancing, dinner, and drinks. There were other staff NCO clubs at Montford Point, Courthouse Bay, Camp Geiger, and during the summer at Onslow Beach. Officers could visit the main officers club at Paradise that has numerous amenities including, “a formal bar, casual bar, snack bar, cafeteria, dining room, and barber shop.” Three times a band provided music and during the summer the outdoor swimming pool and children's pool were open. Annex Officers clubs were at Camp Geiger, Courthouse Bay, and

³²⁶ See Attachment 3: Air Conditioning at Various Camp Lejeune Housing Projects.

³²⁷ 1976 Base Guide, Base_Guides_0000000559, at *0000000587.

Montford Point.³²⁸ As listed in the 1976 base telephone directory there were barber shops, post exchange outlets, service stations, and theaters at most of the areas of the base.³²⁹

The 1984 Camp Lejeune guide has much of the same information as the 1976 guide regarding clubs for Marines, although a club for wives of enlisted men had been formed since 1976. In addition to the Officers Wives Club at Paradise Point, one had also been established at MCAS-New River.³³⁰ The 1984 publication included a listing of on and off base recreational activities including discounts for amusement parks, an archery club, activities at Onslow Beach, boating, bowling, camping, the Devilfish Swim Team, fishing and hunting, golf, horseback riding, intermural sports, and activities at the community centers at Tarawa Terrace and Midway Park and Marston Pavilion for those that lived at Paradise Point, Berkeley Manor and Watkins Village.³³¹

The above discussion in Section VI.D supports my opinion two.

³²⁸ 1976 Base Guide, Base_Guides_0000000559, at *0000000587-88.

³²⁹ October 1976, *Telephone Directory*, CLJA_USMCGEN_0000077468: CLJA_USMCGEN_0000077996, at *0000078024 and *0000078045-46.

³³⁰ 1984 Base Guide, Base_Guides_0000000871, at *0000000896-97.

³³¹ 1984 Base Guide, Base_Guides_0000000871, at *0000000892-92.

VII. Water Trailers – Water Provided During Training

Potable water at Camp Lejeune and other military installations is transported to field training areas by mobile water tanks mounted on trailers. “Water Bulls” and “Water Buffalos” are colloquial terms to reference trailer-mounted water. To transport water, “The Marine Corps uses a water trailer commonly known as a water buffalo which holds 400 gal [ons] of water. This is the most widely used method of transporting water from the water point to the troops.”³³² Trucks tow the water trailers to and from their destination.

Historically, Marines at Camp Lejeune used at least two models of 400-gallon water trailers to transport water. From at least the beginning of the statutory period, Marines transported water in an oval-shaped water trailer. Image 32 is a photograph from Technical Manual 9-875B dated October 1951, showing a water tank attached to a water tank trailer M106.

³³² Field Water Supply and Water Purification Equipment, SR-UT-P02, Marine Corps Engineer School, Marine Corps Base Camp Lejeune, North Carolina, circa 1974, (Field Water Supply and Water Purification Equipment), CLJA_WATERMODELING_07-0001368605: CLJA_WATERMODELING_07-0001368902, at *0001368935. In this document the year 1974 appears at *0001368661 and *0001369459.

Image 32

Oval-Shaped Water Trailer, October 1951³³³

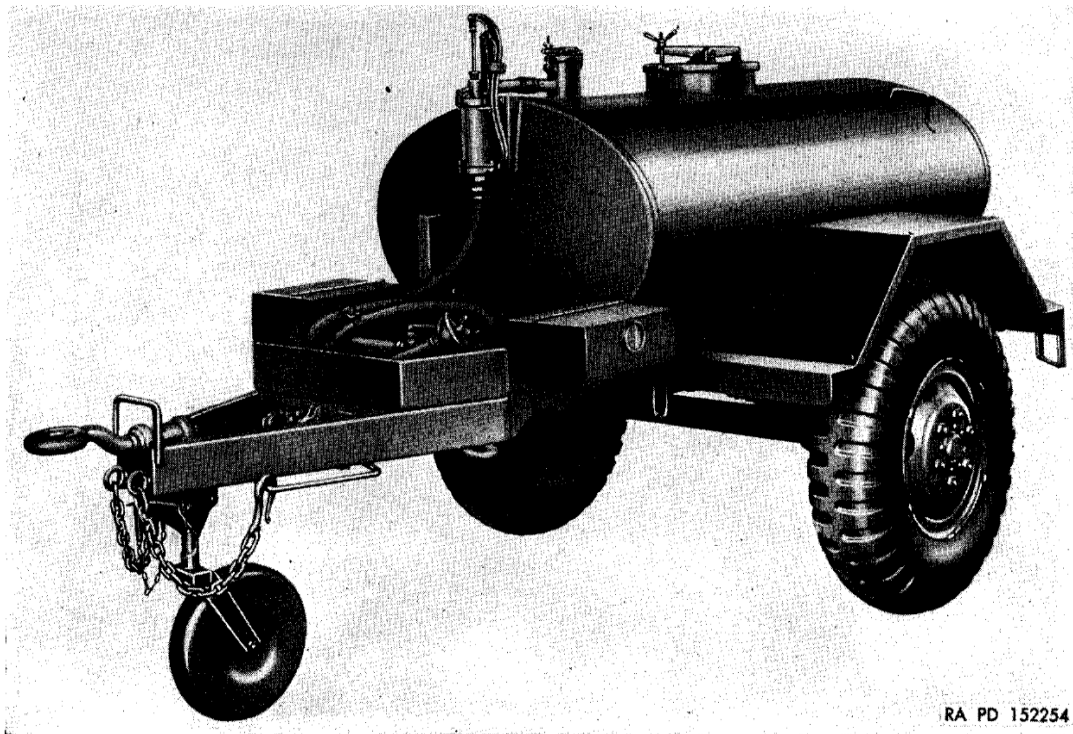


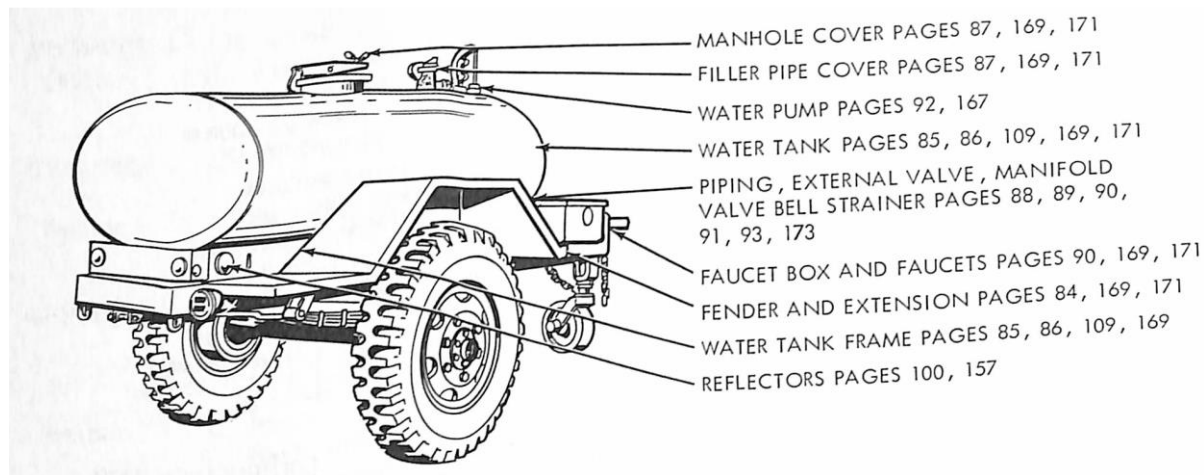
Figure 4. Left-front view of water tank trailer M106.

³³³ Department of the Army Technical Manual, TM 9-875B, 1½ Ton, 2-Wheel Cargo Trailer M104 and 1½ Ton, 2-Wheel Water Tank Trailer M106, 9, Exhibit X. In his history of the Marine Corps when discussing Vietnam, the Corps' supply system and associated problems, Millet noted that: "The Corps' dependence on the same suppliers who served the Army did not help." See Millett, *Semper Fidelis*, 580. Exhibit 14.

Image 33 is a drawing from a 1964 technical manual that also shows an oval-shaped water bull attached to a water tank trailer.

Image 33

Oval-Shaped Water Trailer, January 1964³³⁴



In January 1977, cold weather engulfed Jacksonville, N.C. and Camp Lejeune when “Commex 1-77,” a five-day training exercise was underway. The picture below, Image 34, accompanied the article titled “Frigid field training.” In the picture, Lance Corporal Mark Long appears to be drawing water from an oval-shaped water tank mounted on the water trailer.

³³⁴ Department of the Army Technical Manual, TM 0-2330-213-14, Operator, Organization and Field Maintenance Instructions, Including Repair Parts and Special Tools List for Chassis Trailer: 1 1/2 Ton, 2-Wheel M103A1, M103A2, M103A3, M103A2, M103A3C, M103A4, and M103AC; Trailer, Cargo: 1 1/2 Ton, 2-Wheel M104, M104A1, M105A1, M105A2, and M104A2C; Trailer, Tank, Water: 1 1/2 Ton, 2-Wheel M106, M106A1, M107A2, and M107A2C; and Trailer, Van, Shop: Folding Sides, 1 1/2 Ton, 2-Wheel, M448, Headquarters, Department of the Army, January 1964, iv. Exhibit 15.

Image 34

Oval-Shaped Water Trailer in the Field, January 27, 1977³³⁵



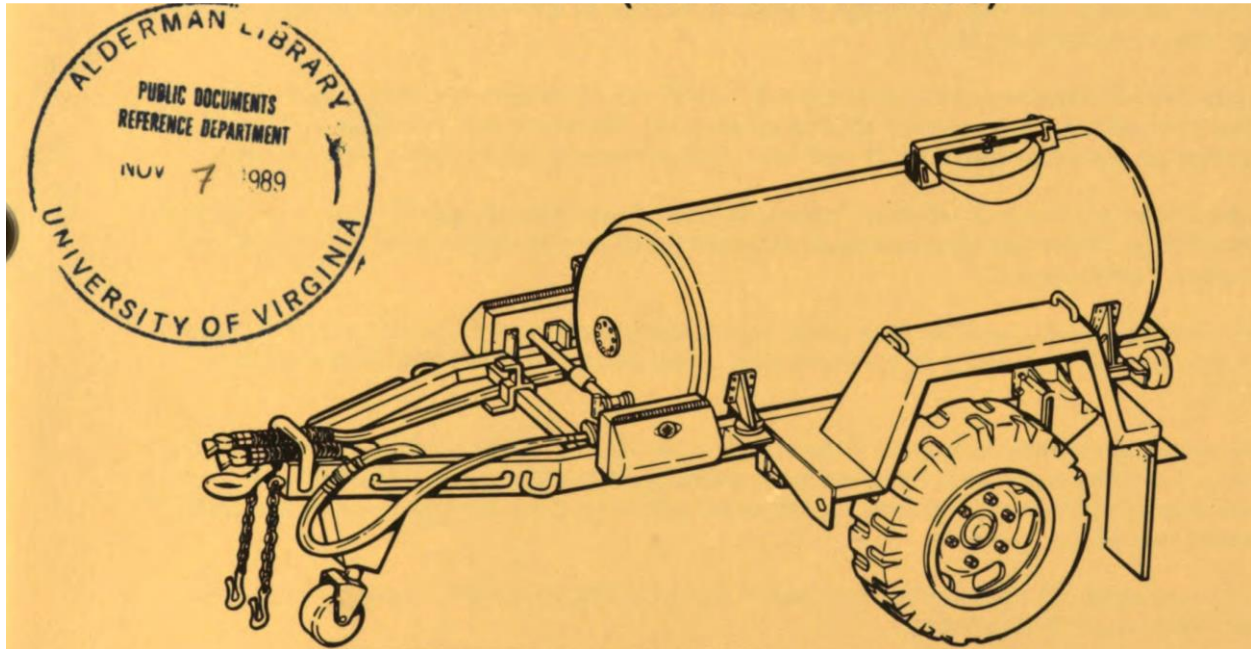
An iteration of Technical Manual M149A2, dated February 1981, depicts a water trailer with a round water tank (Image 35). In March 1984, the military revised this technical manual. An image in this technical manual depicts a round-shaped water trailer.³³⁶

³³⁵ W. Goodloe, "Frigid field training," *The Globe*, 1/27/1977, 00897_PLG_0000039705, at *0000039707.

³³⁶ An article appearing in *The Globe* in December 1977, "'Water buffalo hunts' near 'Little Hardees,'" by Staff Sergeant James Gladowski, noted that 500 Marines were living in tents for four days during a Marine Amphibious Force Command exercise. They started each morning by looking for water trailers to fill their canteens, *The Globe*, 12/15/1977, 00897_PLG_0000039153, at *0000039158.

Image 35

Round-Shaped Water Trailer, February 1981³³⁷



Marines filled water trailers from standpipes. Standpipes were structures attached to a water line with an attached hose used to fill the water trailer.

In a 1970s-era technical manual that discusses the development of potable water points to support field operations, there is a discussion about water development on the frontlines and in rear areas. *“The extent to which a water point is developed depends primarily on the time, labor, troops, and materials available to do the work. At frontline installations, development is held to a minimum consistent with supplying enough potable water to the troops. However, in rear areas*

³³⁷ Department of the Army Technical Manual, TM 9-2330-213-14&P, Operator, Organizational, Direct Support and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Trailer, Tank, Potable Water, 400 Gallons, 1½ Ton, 2-Wheel, M149 (2330-00-542-2039), M149A1 (2330-00-832-8801), and M625 (2330-00-782-6059), Headquarters, Department of the Army, February 1981, front cover. Exhibit 16.

On the cover of a technical manual dated July 1991 it is noted “This manual supersedes TM9-2330-267-14&P, dated February 1981, and all changes since the first iteration of the manual in February 1981. See, Technical Manual TM 9-2330-267-14&P, Operator’s, Organizational, Direct Support, and General Support Maintenance Manual (Including Repair Parts and Special Tools Lists) for Trailer, Tank, Water: 400 Gallon 1-1/2 Ton, 2 Wheel M-149 (NSN 2330-00-542-2039), M149A1 (NSN2330-000832-8801), and M149A2 (NSN 2330-01-108-7376), Headquarters, Department of the Army, 7/1991.

*the extent of development varies with the size of the water point, the problems to be overcome, and the permanency of the installation.”*³³⁸

This document includes a discussion and diagram of a standpipe (see Image 36) that explains: “A water-point standpipe is a rigid pipe which supplies water under pressure from an outlet high enough to service water trailers. The usual construction is a 2-in. pipe fastened to a vertical timber support. Several standpipes can be supplied from a common underground header,”³³⁹ implying that they can be installed anywhere with existing underground potable water pipes, like those that existed during the statutory period not only at Mainside, but also at Camp Geiger, Camp Johnson, Courthouse Bay, and MCAS New River as well.

³³⁸ Field Water Supply and Water Purification Equipment, CLJA_WATERMODELING_07-0001368605, at *0001368931 (Emphasis added).

³³⁹ Field Water Supply and Water Purification Equipment, CLJA_WATERMODELING_07-0001368605, at * 0001368933.

Image 36

Description and Diagram of a Standpipe Circa 1970³⁴⁰

f. Standpipes (fig 1-26). A water-point standpipe is a rigid pipe which supplies water under pressure from an outlet high enough to service water trailers. The usual construction is a 2-in. pipe fastened to a vertical timber support. Several standpipes can be supplied from a common underground header. The most satisfactory outlet for standpipes is a short length of rubber suction hose with a safety nozzle. The safety nozzle should be suspended so that it cannot touch the ground and become contaminated. In the absence of a safety nozzle for the hose, a valve may be inserted in the standpipe.

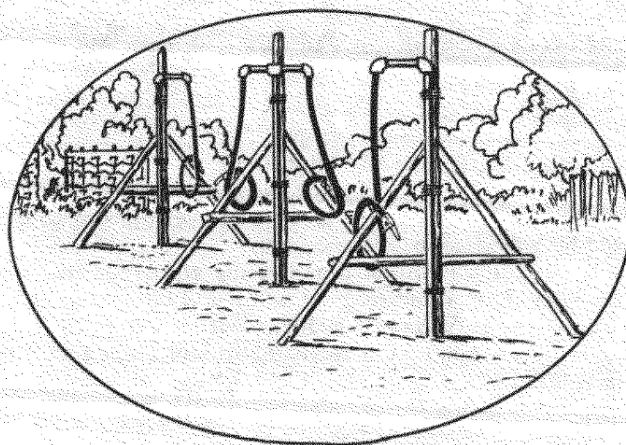


Fig 1-26. Standpipes.

A photograph of a standpipe at Hadnot Point appeared in a December 1975 article in *The Globe* after a staff sergeant wrote a letter to the editor stating that the valve had “been constantly leaking for the past year” and the person considered the situation “a great waste of one of our natural resources” (Image 37).³⁴¹ While the article was not intended to describe the standpipe to the community, the infrastructure aligns visually with what was described in the 1970s technical manual cited above.

³⁴⁰ Field Water Supply and Water Purification Equipment, CLJA_WATERMODELING_07-0001368605, at *07-0001368933.

³⁴¹ “Leaking for the past year, fixed in the past few weeks,” *The Globe*, 12/4/1975, 00897_PLG_0000040390, at *0000040394.

Image 37

Standpipe at Building 1400 at Hadnot Point, December 12, 1975³⁴²



All of the WTPs at Camp Lejeune had the infrastructure to support the installation of standpipes in their respective areas including Hadnot Point, Camp Geiger, Camp Johnson/Montford Point, MCAS, Rifle Range, Courthouse Bay and Onslow Beach. The travel times from Hadnot Point to other places on Camp Lejeune proximate to training activities would present significant “problems to be overcome,” and “the permanency of the installation” would be further reason for constructing standpipes in areas closer to training activities than Hadnot Point.³⁴³

The discussion above in Section VII supports opinion four of the current report.

³⁴² “Leaking for the past year, fixed in the past few weeks,” *The Globe*, 12/4/1975, 00897_PLG_0000040390, at *0000040394.

³⁴³ Field Water Supply and Water Purification Equipment ,CLJA_WATERMODELING_07-0001368605, at *CLJA_WATERMODELING_07-0001368931.

Attachment 1

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EDUCATION

Ph.D., American History, The University of California, Riverside, CA, 1992

M.A., American History, The University of Maryland, College Park, MD, 1986

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CAREER SUMMARY

After receiving his Ph.D. from the University of California, Riverside (UCR), Dr. Brigham taught at UCR; the University of Nevada, Las Vegas; and Arizona State University. His areas of expertise include American Political History, the American West, and Environmental History. The University of Kansas published his book on the public power movement *Empowering the West: Electrical Politics Before FDR*, in 1998. Dr. Brigham has also authored several articles, written book reviews, and delivered presentations on the history of energy, the West, and the environment. He has authored expert witness reports that examined public policy issues during World War I, World War II and the Korean War, energy issues, mining cases, U.S. Army Corps of Engineer dredging, and Takings cases for the U.S. Department of Justice and for private law firms. Dr. Brigham has given expert testimony in U.S. District Courts and the U.S. Court of Federal Claims and is presently serving as an expert witness on several Superfund cases involving issues dating from World War I through the Cold War, Takings cases, as well as cases involving Native Americans.

PROFESSIONAL EXPERIENCE

Morgan, Angel, Brigham & Associates, LLC, Washington, DC

Managing Partner, 2014-present

Partner, 2009-2013

Senior Research Associate, 2000-2008

Research Associate, 1997-1999

Arizona State University, Tempe, AZ

Senior Visiting Lecturer, 1996-1997

University of Nevada, Las Vegas, NV

Visiting Assistant Professor, 1995-1996

University of California, Riverside, CA
Visiting Assistant Professor, 1992-1995

EXPERT WITNESS EXPERIENCE

Retained by the United States Department of Justice in the following CERCLA cases:

Texaco Facilities Cleanup, Star Lake Canal Superfund Site Discussions.

City of Torrance v. Hi-Shear Corporation.

101 Frost Street Associates, L.P. Next Millennium Realty LLC. v. U.S., GTE Sylvania Incorporated, et al., (E.D.N.Y) Civ. No. 2:17-CV-03585-JMA-ARL.

Discussions Regarding Shell Oil Company Refineries in CA, TX, LA, IL, and KS.

Discussions Regarding the Haystack Mines etc., McKinley County, New Mexico.

Discussions Regarding Chevron U.S.A., Inc.'s Mariano Lake Mine Site, Navajo Nation Reservation, near Gallup, N.M.

EnPro Holding, Inc.'s Cameron Region Uranium Mines Discussions.

Gold King Mine MDL Litigation, (D. N.M.) No. 1:18-md-02824-WJ. Deposition testimony was given in this case.

Expert Report (submitted to Department of Justice, 2021).

BASF Corp. v. Albany Molecular Research, Inc.; AMRI-Rensselaer, Inc. f/k/a Organichem Corp.; E.I. Dupont de Nemours and Co.; GE Healthcare, Inc.; Sanofi US Services, Inc.; STWB, Inc; and the United States of America, (N.D. N.Y.) No. 1:19-cv-134.

Former Holden Mine Site, Cost Recovery Claim.

Boeing Mediations at the Former Torrance Site.

United States of America v. General Dynamics Corp. and Dow Chemical.

Chevron Mining Inc. v. United States of America, (D. N.M.) No. 1:13-cv-00328. Deposition testimony and trial testimony were given in this case.

Expert Report (submitted to Department of Justice, 2019).

Valero Companies v. United States of America, (E.D. MI.) 2:17-cv-11174. Deposition testimony was given in this case.

Expert Report (submitted to Department of Justice, 2020).

Zatika Properties, LLC v. General American Transport Corporation, n/k/a GATC Corp.; United States Department of Energy; and United States Army Corps of Engineers, (D. N.J.) CV No. 2:16-CV-09289(ES)(SCM).

Government of Guam v. United States of America, (D. D.C.) 3:17-CV-00371.

Fort DuPont Landfill Site, Cost Recovery Claim.

Chevron Oil Company World War II Aviation Gasoline Production Discussions.

United States of America and State of Wisconsin v. NCR Corp. et al., (E.D. WI.) 10-CV-91-WCG.

Expert Report (submitted to Department of Justice, 2016).

Gowanus Canal Superfund Site (E.D. N.Y.).

Cranbury Brick Yard, LLC v. United States of America, et al., (D. N.J.) 3:15-CV-02789-PGS-LHG. Deposition testimony was given in this case.

Expert Report (submitted to Department of Justice, 2017).

Electric Boat Corporation v. United States of America, (D. R.I.) Civil Action No. 15-461.

United Nuclear Corporation, El Paso Natural Gas Company, LLC, and Homestake Mining Company of California v. United States of America, (D. N.M.) 1:15-CV-411.

United States of America v. Honeywell International, Inc., Onondaga Lake Superfund Site Settlement Negotiations.

United States of America and California Department of Toxic Substances Control v. Sterling Centrecorp, Inc., Stephen P. Elder, and Elder Development, Inc., (E.D. CA., Sacramento Division) 2:08-CV-02556-MCD-JFM.

LCP Chemicals Superfund Sites Mediation.

Atlantic Richfield Company v. United States of America, et al., (D. N.M.) 1:1CV-56.

Expert Report (submitted to Department of Justice, 2021)

Former Vanadium Corporation of America and Climax Uranium Company Mines on the Navajo Reservation, Discussions.

El Paso Natural Gas Company, LLC v. United States of America, et al., (D. AZ.) 3:14-CV-8165. Trial testimony was given in this case.

Expert Report (submitted to Department of Justice, 2016).

Boeing Mediations at the Former Long Beach Site and the Former Wichita Site.

Navajo Nation Abandoned Uranium Mines Discussions.

PPG Industries, Inc., v. United States of America, (D. N.J.) 2:12-CV-0352(KM)(MF).
30(b)(6) testimony and deposition testimony were given in this case.

Expert Report (submitted to Department of Justice, 2016).

United States of America v. Federal Resources Corporation, (D. ID.) 2:11-CV-000127-BLW. Deposition testimony was given in this case.

Expert Report (submitted to Department of Justice, 2013).

Lockheed Martin Corporation v. United States of America, (D. D.C.) 06-1438-RJL.

Expert Report and Rebuttal Report (submitted to Department of Justice, 2013).

Exxon Mobil Corporation v. United States of America, (D. LA.) 4:11-CV-1914.

Exxon Mobil Corporation v. United States of America, (S.D. TX., Houston Division)
H:10-2386.

Exxon Mobil Corporation v. United States of America, (S.D. TX.) C. A. Nos. H-10-2386
and H-11-1844 and (CFC) Nos. 09-165C and 09-0882C.

Deposition testimony and trial testimony were given in the above Exxon Mobil cases.

Expert Reports (submitted to Department of Justice, 2012, 2014, and 2016).

National Fireworks, Inc. and Security Signals, Inc., Mediation involving plant in Cordova, TN.

United States of America v. Washington State Department of Transportation, (W.D. WA.) 3:08-CV-05722-RJB. Deposition testimony and trial testimony were given in this case.

Expert Report (submitted to Department of Justice, 2010).

Texas Instruments Incorporated, f/k/a Metals and Controls Corp., M&C Nuclear, Inc. v. United States of America, (CFC) 09-701.

AVX Corporation v. Horry Land Company, Inc., and United States of America, (D. S.C., Florence Division) 4:07-CV-3299-TLW-TER. Deposition and trial testimony were given in this case.

Expert Report (submitted to Department of Justice, 2009).

Appleton Papers, Inc. and NCR Corporation v. George Whiting Paper Company, et al., (E.D. WI.) 08-CV-00016-WCG (Consolidated with 08-CV-0895). Deposition testimony was given in this case.

Expert Report (submitted to Department of Justice, 2009).

City of Fresno v. United States of America, et al., (E.D. CA.) 1:06-CV-01559-OW-LJO. Deposition testimony was given in this case.

Expert Report (submitted to Department of Justice, 2009).

American International Specialty Lines Insurance Company v. United States of America, (C.D. CA.) CV06-4686 AHM (RZx). Deposition testimony and trial testimony were given in this case.

Expert Report and Rebuttal Report (submitted to Department of Justice, 2009).

Litgo New Jersey, Inc., et al. v. Mauriello, (D. N.J.) 06-2891 (AET) (TB). Deposition testimony and trial testimony were given in this case.

Expert Report and Supplemental Report (submitted to Department of Justice, 2009).

Blue Tee Matter, Mediation involving the former American Zinc plant in Dumas, TX.

TDY Holdings, LLC and TDY Industries, Inc. v. United States of America, (S.D. CA.) 07-cv-0787-JAH (POR). Deposition testimony and trial testimony were given in this case.

Expert Report and Rebuttal Report (submitted to Department of Justice, 2009).

Raytheon Aircraft Company v. United States of America, (D. KS.) 05-CV-2328. Deposition and trial testimony were given in this case.

Rebuttal Report (submitted to Department of Justice, 2007).

Hudson RiverKeeper Fund Inc. v. Atlantic Richfield Co., (S.D. N.Y.) 94-CV-2741 (WCC). Deposition testimony was given in this case.

Expert Report (submitted to Department of Justice, 2007).

Tar Creek Superfund Site, Ottawa County, OK, EPA ID OKD980629844, Discussions.

Ford Motor Company v. United States of America, (E.D. MI.) 04-CV-72018.

Reynolds Metals Co. and Alcoa Inc. v. United States of America, et al., (W.D. PA.) Civil Action No. 03-1180.

United States of America v. Horsehead Industries, Inc., et al., (M.D. PA.) Civil Action No. 3: CV-98-0654.

United States of America v. Monsanto, (S.D. IL.) Civil Action No. 99-63-DRH.

Alcoa, Inc. v. United States of America, et al., (W.D. PA.) Civil Action No. 96-1098.

Old American Zinc Superfund Site, Fairmont, IL, EPA ID IL0000034355, Mediation.

Exxon Mobil, Inc. Mediations at the Sharon Steel Fairmont Coke Works.

Martin-Dennis Mediation involving Chemical Land Holding.

Retained by the United States Department of Justice in the following takings cases:

Baxter Brothers Farms, et al., v. United States of America, (CFC) 1:19-cv-00428-VJW.

Riverview Farms, et al., v. United States of America, (CFC) 18-cv-1099 L. Deposition testimony was given in this case.

Expert Report (submitted to Department of Justice, April 2023).

Illinois Central Railroad Company v. United States of America, (CFC) 17-cv-826L.

Land Grantors in Henderson, Union, & Webster Counties, KY & Their Heirs (Taking Realty), (CFC) Congressional Reference No. 93-648X. Trial testimony was given in this case.

Expert Report (submitted to Department of Justice, 2004).

Retained by the United States Department of Justice in the following cases involving Native Americans:

Ute Indian Tribe of the Uintah and Ouray Indian Reservation v. United States of America, (CFC) 18-359 L and (D. D.C.) 18-cv-547.

Debra Jones, et al., v. United States of America, (CFC) 1:13-cv-00227-MBH.

White Mountain Apache Tribe v. United States of America, (CFC) 17-359 L.

Grace Goodeagle v. United States of America, (CFC) 12-431L.

Quapaw Tribe of Oklahoma (O-Gah-Pah) v. United States of America, (CFC) 12-592L.

T.C. Bear v. United States of America, (CFC) Congressional Reference No. 13-cg-00051X. Deposition testimony was given in the *Goodeagle*, *Quapaw*, and *Bear* cases.

Expert Report (submitted to Department of Justice, 2016).

James Richard, Sr., et al., v. U.S., (C.F.C.) 10—503 C.

Seminole Nation of Oklahoma v. Salazar, et al., (E.D. OK.) Case No. CIV-06-556-SPS CV-935-L; and Seminole Nation of Oklahoma v. United States of America, (CFC) 06-CV-935-L.

Ute Tribe of Uintah and Ouray Tribes v. United States of America, (CFC) 06-CV-00866.

Confederated Tribes of the Warm Springs Reservation of Oregon v. United States of America, (CFC) Case No. 02-126L.

The Shoshone and Arapahoe Tribes of the Wind River Indian Reservation v. United States of America, (CFC) Dockets 458-79 and 459-79.

Red Lake Band of Chippewa Indians, et al., v. United States of America, (CFC) No. 189-C.

Retained by the United States Department of Justice in the following contract cases:

Chevron U.S.A. Inc., Texaco Downstream Properties Inc., and Union Oil Company of California v. United States of America, (CFC) No. 20-1784 C.

OXY USA Inc. and CITGO Petroleum Corporation v. United States of America, (CFC) No. 19-694c.

Shell Oil Company, Union Oil Company of California, Atlantic Richfield Company, and Texaco, Inc. v. United States of America, (CFC) 06-141C. Deposition testimony and trial testimony were given in this case.

Expert Report and Rebuttal Report (submitted to Department of Justice, 2015).

Retained by the United States Department of Justice in the following title cases:

State of Alaska v. United States of America, (D.AK.) 3:22-CV-0103-SLG.

State of Montana v. Talen Montana, LLC f/k/a PPL Montana, LLC and Northwestern Corporation, d/b/a Northwestern Energy and United States of America, (D. MT., Helena Division) CV 16-35-H-DLC. Deposition testimony was given in this case.

Expert Report (submitted to Department of Justice, 2021)

F.E.B. Corps v. United States of America, (S.D. FL.) Case No. 12-10072-CV-Martinez; retained by the U.S. Attorney's Office, District of Florida.

“A Report on The Political Controversy Leading to the Passage of the Submerged Lands Act” (submitted to Department of Justice, 2014)

Retained by the United States Department of Justice in the following toxic torts case:

Camp Lejeune Water Litigation, United States, (E.D. N.C., Southern Division). Civ. No. 7:23-CV-897.

Retained by the State of Wisconsin:

Retained by the State and the Wisconsin Department of Justice in the case of *Lac Courte Oreilles Band et al. v. Tony Evers et al.*, (W.D. WI.) Case No. 18-CV-992-JDP. Deposition testimony was given in this case.

Expert Report (submitted 2019).

Retained by the following law firms:

Retained by the law firm of Talbot, Carmouche & Marcello, in the following cases: *The Parish of Plaquemines v. Riverwood Production Co., et al.*, (E.D. LA.) Civil Action: 2:18-cv-05217; *The Parish of Cameron v. Auster Oil and Gas Inc., et al.*, (W.D. of LA., Lake Charles Division) Civil Action: 2-18-cv-00677; *The Parish of Cameron v. Ballard Exploration Company, Inc., et al.*, (W.D. of LA., Lake Charles Division) Civil Action: 2-18-cv-00678; *The Parish of Cameron v. Brammer Engineering Inc., et al.*, (W.D. of LA., Lake Charles Division) Civil Action: 2-18-cv-00679; *The Parish of Cameron v. Burlington Resources Oil & Gas Company, LP, et al.*, (W.D. of LA., Lake Charles Division) Civil Action: 2-18-cv-00682; *The Parish of Cameron v. Alpine Exploration Companies, Inc., et al.*, (W.D. of LA., Lake Charles Division) Civil Action: 2-18-cv-00684; *The Parish of Cameron v. Bay Coquille, Inc., et al.*, (W.D. of LA., Lake Charles Division) Civil Action: 2-18-cv-00685; *The Parish of Cameron v. Atlantic Richfield Company, et al.*, (W.D. of LA., Lake Charles Division) Civil Action: 2:18-cv-00686; *The Parish of Cameron v. BP America Production Company, et al.*, (W.D. of LA., Lake Charles Division) Civil Action: 2-18-cv-00687; *The Parish of Cameron v. Apache Corporation (of Delaware), et al.*, (W.D. of LA., Lake Charles Division) Civil Action: 2-18-cv-00688; *The Parish of Cameron v. Anadarko E&P Onshore, LLC, et al.*, (W.D. of LA., Lake Charles Division) Civil Action: 2-18-cv-00689; *The Parish of Cameron v. BEPCO L.P., et al.*, (W.D. of LA., Lake Charles Division) Civil Action: 2-18-cv-00690; and *Keith Stutes, District Attorney for the 15th Judicial District of the State of Louisiana v. Gulfport Energy Corp., et al.*, (W.D. of LA., Lake Charles Division) Civil Action: 2-18-cv-00691.

Retained by the law firm of Blaney McMurtry, LLP, Toronto, Canada, in the mediation of General Electric Canada Company, Davenport and Guelph Sites.

Retained by the law firm of Blaney McMurtry, LLP, Toronto, Canada, in the mediation of General Electric Canada Company, Ward Street Site.

Retained by the law firm of Covington and Burling in the case of *Travelers Indemnity Company et al., v. Northrop Grumman Corporation*, (S.D. N.Y.) 1:12-CV-03040.

Retained by the law firm of Gordon, Thomas, Honeywell, Malanca, Peterson & Daheim in the case of *Skokomish Indian Tribe v. City of Tacoma, et al.*, (W.D. WA.) Civil Action No. C99-5606 FDB.

Expert Report (submitted 2000).

SELECT PUBLICATIONS

BOOKS

Empowering the West, Electrical Politics Before FDR (University Press of Kansas, 1998).

This book was nominated for the George P. Marsh Award presented by the American Society for Environmental History, the Sharlin Memorial Award presented by the Social Science History Association, and the Best Book Award presented by Westerners International.

CHAPTERS IN BOOKS

“From Water to Power: The Changing Charge of the Bureau of Reclamation,” *Reclamation, Managing Water in the West, The Bureau of Reclamation: History Essays from the Centennial Symposium*, Volume 2 (U.S. Department of the Interior, Bureau of Reclamation, 2008).

“Lighting Las Vegas: Electricity and the City of Glitz” in Mike Davis and Hal Rothman, eds., *The Grid Beneath the Glitter: Tales from the Real Las Vegas* (University of California Press, 2002).

ARTICLES

“Lighting the Reservation: The Impact of the Rural Electrification Administration on Native Lands,” *The Journal of the West* (2001).

“Hydro Power’s Legacy,” *Public Power* 58 (2000). This article was reprinted as “Governing Hydropower: The Story Behind the Law,” *Hydro Review* (2001).

“The Ace: Local Control,” *Public Power* 58 (2000).

“Moving Out and Settling In: Residential Mobility, Homeowning, and the Public Enframing of Citizenship, 1921-1950,” with Ronald Tobey and Charles Wetherell, *American Historical Review* 95 (1990): 1395-1422.

ENCYCLOPEDIA ENTRIES

“Federal Power Act,” Steven L. Danver, ed., *The Encyclopedia of Politics in the American West* (Washington, DC: Mesa Verde Publishing/CQ Press, 2013).

“Public Utilities (Federal Policy),” Donald Critchlow and Philip VanderMeer, eds., *Oxford University Encyclopedia of American Political, Policy and Legal History* (New York: Oxford University Press, 2012).

BOOK REVIEWS

Gene A. Budig and Don Walton, *George Norris, Going Home: Reflections of a Progressive Statesman*. (Lincoln and London: University of Nebraska Press, 2013), *Journal of the West*, 2015.

Eugene P. Moehring, *Reno, Las Vegas, and The Strip: A Tale of Three Cities*. Wilbur S. Shepperson Series in Nevada History. (Reno: University of Nevada Press, 2014), *Western Historical Quarterly* 46 (Winter) 2015.

Paul W. Hirt, *The Wired Northwest, The History of Electrical Power, 1870s-1970s* (Lawrence: University Press of Kansas, 2012), *Journal of American History*, 2013.

Char Miller, eds. *Cities and Nature in the American West* (Reno and Las Vegas: University of Nevada Press, 2010), *Journal of the West*, 2012.

Zachary A. Smith and John C. Freemuth, eds. *Environmental Politics and Policy in the West*, Revised Edition (Boulder: University Press of Colorado, 2007), *Journal of the West*, 2009.

Gary D. Libecap, *Owens Valley Revisited, A Reassessment of the West's First Great Water Transfer* (Palo Alto: Stanford University Press, 2007), *Journal of the West*, 2008.

John Trombold & Peter Donahue, eds. *Reading Portland: The City in Prose* (Portland: Oregon Historical Society Press; and Seattle University of Washington Press, 2006), *Journal of the West*, 2008.

Renée Corona Kolvet and Victoria Ford, *The Civilian Conservation Corps in Nevada: From Boys to Men* (Reno and Las Vegas: University of Nevada Press, 2006), *Journal of the West*, 2007.

William D. Layman, *River of Memory: The Everlasting Columbia* (Seattle: University of Washington Press; and Vancouver: University of British Columbia Press, 2006), *Journal of the West*, 2007.

Marjorie Weinberg, *The Real Rosebud, The Trump of a Lakota Woman* (Lincoln, NE: University of Nebraska Press, 2004), *Journal of the West*, 2005.

Frank H. Goodyear III, *Red Cloud, Photographs of a Lakota Chief* (Lincoln, NE: University of Nebraska Press, 2003), *Journal of the West*, 2005.

Daniel Tyler, *Silver Fox of the Rockies: Delphus E. Carpenter and Western Water Compacts* (Norman, OK: University of Oklahoma Press, 2003), *Register of the Kentucky Historical Society*, 2003.

Tom H. Hastings, *Ecology of War & Peace: Counting the Cost of Conflict* (Lanham, MD: University Press of America, 2001), *Peace & Change*, 2002.

J. William T. Youngs, *The Fair and The Falls: Spokane's Expo '74 and the Transforming of an American Environment* (Cheney, WA: Eastern Washington University Press, 1996), *Pacific Northwest Quarterly*, 2000.

Char Miller, ed., *American Forests: Nature, Culture, and Politics* (University Press of Kansas, 1997), H-ASEH, H-Net Reviews, 2000. URL: <http://www.h-net.msu.edu/reviews/showrev.cgi?path=10514954955461>.

REPORTS

Public Power and Democracy (American Public Power Association, 2000).

SELECT PRESENTATIONS

Contaminated Industrial Site Investigation: Insights from Experts,” panelist, Environmental History Conference, American Society for Environmental History, Eugene, OR, March 2022.

“Public Historians and Research on Contaminated Sites,” panelist, Environmental History Week Virtual Conference, American Society for Environmental History, April 2021.

“Navigating the Historical Profession: Different Career Options for Historians,” panelist, Western History Association Conference in Las Vegas, NV, November 2019.

“The Legal Applications of Western Histories,” panelist, Western History Association Conference in San Diego, CA, November 2017.

“The Changing Political Landscape of Electrical Generation, Transmission, and Distribution in the American West,” panelist, The Electric West: A Roundtable Discussion held at the Western History Association Conference in Denver, CO, October 2009.

“Salmon and Hydropower: The Policy Debates over Hydroelectric Development on the Cowlitz River,” paper delivered at the Western History Association Conference in Fort Worth, TX, October 2003.

“Homer Truett Bone: Hydro and Public Power Crusader,” paper delivered at the American Society of Environmental History Conference, Providence, RI, March 2003.

“From Water to Power: The Changing Charge of the Bureau of Reclamation,” paper delivered at the Bureau of Reclamation’s Centennial Conference, Las Vegas, NV, June 2002.

Panelist, “Public vs. Private: Who Should Own Utilities,” 13th Annual Envisioning California Conference, Center for California Studies at California State University, Sacramento, Sacramento, CA, October 2001.

“Energy Resources and the Development of Modern America,” paper delivered at the Woodrow Wilson National Symposium, “America: Transformation Toward the Modern, 1856-1924,” Staunton, VA, October 2000.

ACADEMIC EXPERIENCE

Courses taught include:

Twentieth Century American History (numerous courses)
American West
Twentieth Century U.S. and American West Undergraduate Writing Seminars
Quantitative Methods and Social Science History
U.S. Survey, 1607-1865 and 1865-Present
Slavery and the Old South
Vietnam War
American Indian Policy

PROFESSIONAL MEMBERSHIPS AND SUBSCRIPTIONS

American Society for Environmental History
Western History Association
Environmental History
Western Historical Quarterly
Montana, The Magazine of Western History
Pacific Historical Review

SELECT PROFESSIONAL ACTIVITY AND SERVICE

Manuscript reviewer for the University of Nebraska Press, 2007.

Guest on “Springboard” technology program, produced by KQED Television, San Francisco, August 2001. Discussed technology and the electrification of rural America.
Guest Lecturer, The George Washington University, Washington, DC 2000, 1997.

Attachment 2



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EXPERT WITNESS TESTIMONY LAST FOUR YEARS

Riverview Farms, et al., v. United States of America, (CFC) 18-cv-1099 L. Deposition testimony (June 2023).

Chevron Mining Inc. v. United States of America, (D. N.M.) No. 1:13-cv-00328. Deposition testimony (December 2019) and trial testimony (March 2022).

Gold King Mine MDL Litigation, (D. N.M.) No. 1:18-md-02824-WJ. Deposition testimony (November 2021).

State of Montana v. Talen Montana, LLC f/k/a PPL Montana, LLC and Northwestern Corporation, d/b/a Northwestern Energy and United States of America, (D. MT., Helena Division) CV 16-35-H-DLC. Deposition testimony (May 2021).

Attachment 3

Attachment 3: Air Conditioning at Various Camp Lejeune Housing Projects

Housing Project	Type of Housing	Housing Population	Year Built	AC?	AC Cite
Hadnot Point Regimental Barracks	H-style Barracks	bachelor enlisted and officers	1942	1973	CLJA_USMC_PWD_0001281400
Hadnot Point Service Company Barracks	H-style Barracks	bachelor enlisted and officers	1942	1973	USMC-00293335, CLJA_USMC_PWD_0001281400
Women's Reserve Area aka HP Regimental Area 1	H-style barracks	Women's Reserves/ Enlisted	1943	1973	USMC-00293344, CLJA_USMC_PWD_0001281409
Hadnot Point III	Hotel Style Barracks	bachelor enlisted	1978	1978	USMC-00114517, CLJA_USMC_PWD_0000458833
Hadnot Point IV	Hotel Style Barracks	bachelor enlisted	1981	1981	USMC-00112344, CLJA_USMC_PWD_0000455939
Hadnot Point V	Hotel Style Barracks	bachelor enlisted	1982	1982	USMC-00040898, CLJA_USMC_PWD_0000163453
Hadnot Point VI	Hotel Style Barracks	bachelor enlisted	1984	1984	USMC-00220502, CLJA_USMC_PWD_0000927910
Naval Hospital I	H-style Barracks	corpsmen/ enlisted	1942	1969	USMC-00194087, CLJA_USMC_PWD_0000756272
Naval Hospital II	H style barracks	bachelor officers	1942	1985	USMC-00239660, CLJA_USMC_PWD_0000955635
Naval Hospital III	Single homes	Family officers	1945	No	USMC-00045933, CLJA_USMC_PWD_0000175446
Tent Camp	H-style Barracks	bachelor enlisted	1941	No	USMC-00045317, CLJA_USMC_PWD_0000174337
Montford Point I	one story barracks	African American enlisted, 1951 some converted into bachelor officers quarters	1942	No	USMC-00355211, CLJA_USMC_PWD_0001677451
Montford Point II	Single homes	Family, Officers	1942	No	USMC-00045825, CLJA_USMC_PWD_0000175288
Onslow Beach/Signal School	One story H-style barracks	enlisted	1943	No	USMC-00290189, CLJA_USMC_PWD_0001277711
Onslow Beach II	Single homes	Senior Officer Guest House	1941	1985	USMC-00228082, CLJA_USMC_PWD_0000937776

Midway Park I	single homes	Family	1941	No	USMC-00000030, CLJA_USMC_PWD_0000000030
Midway Park II	Apartments	Family Enlisted	1944	No	USMC-00038639, CLJA_USMC_PWD_0000160243
Courthouse Bay I	H style barracks	bachelor enlisted/officers	1941	1973	USMC-00293346, CLJA_USMC_PWD_0001281411
Courthouse Bay II	H style barracks	Bachelor officers	1943	No	USMC-00044734, CLJA_USMC_PWD_0000173518
Courthouse Bay III	Single homes	Family Officers	1943	No	USMC-00045825, CLJA_USMC_PWD_0000175288
Courthouse Bay V	Hotel Style Barracks	bachelor enlisted	1978	1978	USMC-00114517, CLJA_USMC_PWD_0000458833
Courthouse Bay VI	Hotel Style Barracks	bachelor enlisted	1982	1982	USMC-00040898, CLJA_USMC_PWD_0000163453
Paradise Point I	Single homes	Family Officers	1943	No	USMC-00045825, CLJA_USMC_PWD_0000175288
Paradise Point II	Single homes	Family Officers	1946	No	USMC-00045933, CLJA_USMC_PWD_0000175446
Paradise Point III	Single homes	Family Officers	1946	No	USMC-00044825, CLJA_USMC_PWD_0000173680
Paradise Point IV	Single homes	Family Officers	1961	1961	USMC-00290339, CLJA_USMC_PWD_0001277861, 00897_PLG_0000049334 at *343 (1961 opening)
Tarawa Terrace I	Single homes	Family Officers	1952	1974	USMC-00293562, CLJA_USMC_PWD_0001281651
Tarawa Terrace II	Single homes	Family Officers	1953	1974	USMC-00293562, CLJA_USMC_PWD_0001281651
MCAS New River II	Hotel style Apartments	Bachelor Officers Quarters	1955	No	USMC-00354560, CLJA_USMC_PWD_0001676755
MCAS New River III	Hotel style Apartments	Bachelor Officers Quarters	1967	1967	NARA_APERTURE_CARD_00000108, CLJA_NARA_APERTURE_CARD_0000000196
MCAS New River IV	Hotel style Apartments	Bachelor Officers Quarters	1975	1975	USMC-00142953, CLJA_USMC_PWD_0000534747
Holcomb Boulevard	Hotel style Apartments	Bachelor Enlisted Quarters	1972	1972	USMC-00354164, CLJA_USMC_PWD_0001676300
Berkeley Manor	Single homes	Family Officers and Enlisted	1961	1961	USMC-00290348, CLJA_USMC_PWD_0001277870, 00897_PLG_0000048396 (1961 opening)
Watkins Village	Single homes	Family Officers and Enlisted	1977	1977	USMC-00045537, CLJA_USMC_PWD_0000174685
French Creek I	Hotel style Apartments	Bachelor Enlisted	1968	1968	USMC-00370303 (CLJA_USMC_PWD_0001747597),

		Quarters/ Force Troops Complex			USMC-00370306 (CLJA_USMC_PWD_0001747600)
French Creek II	Hotel style Apartments	Bachelor Enlisted Quarters/ Force Troops Complex	1977	1977	USMC-00114217, CLJA_USMC_PWD_0000458354
French Creek III	Hotel style Apartments	Bachelor Enlisted Quarters/ Force Troops Complex	1979	1979	USMC-00113995, CLJA_USMC_PWD_0000458045
French Creek IV	Hotel style Apartments	Bachelor Enlisted Quarters/ Force Troops Complex	1980	1980	USMC-00433760 (CLJA_USMC_PWD_0001911424), USMC-00433780, CLJA_USMC_PWD_0001911444
French Creek V	Hotel style Apartments	Bachelor Enlisted Quarters/ Force Troops Complex	1987	1987	USMC-00180010, CLJA_USMC_PWD_0000712590