



Barnsworth Ave. and Crosswicks St., Bordentown, N. J., in 1874.



SoJourn 2023

A journal devoted to the history, culture, and geography of South Jersey



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SoJourn

Volume 7

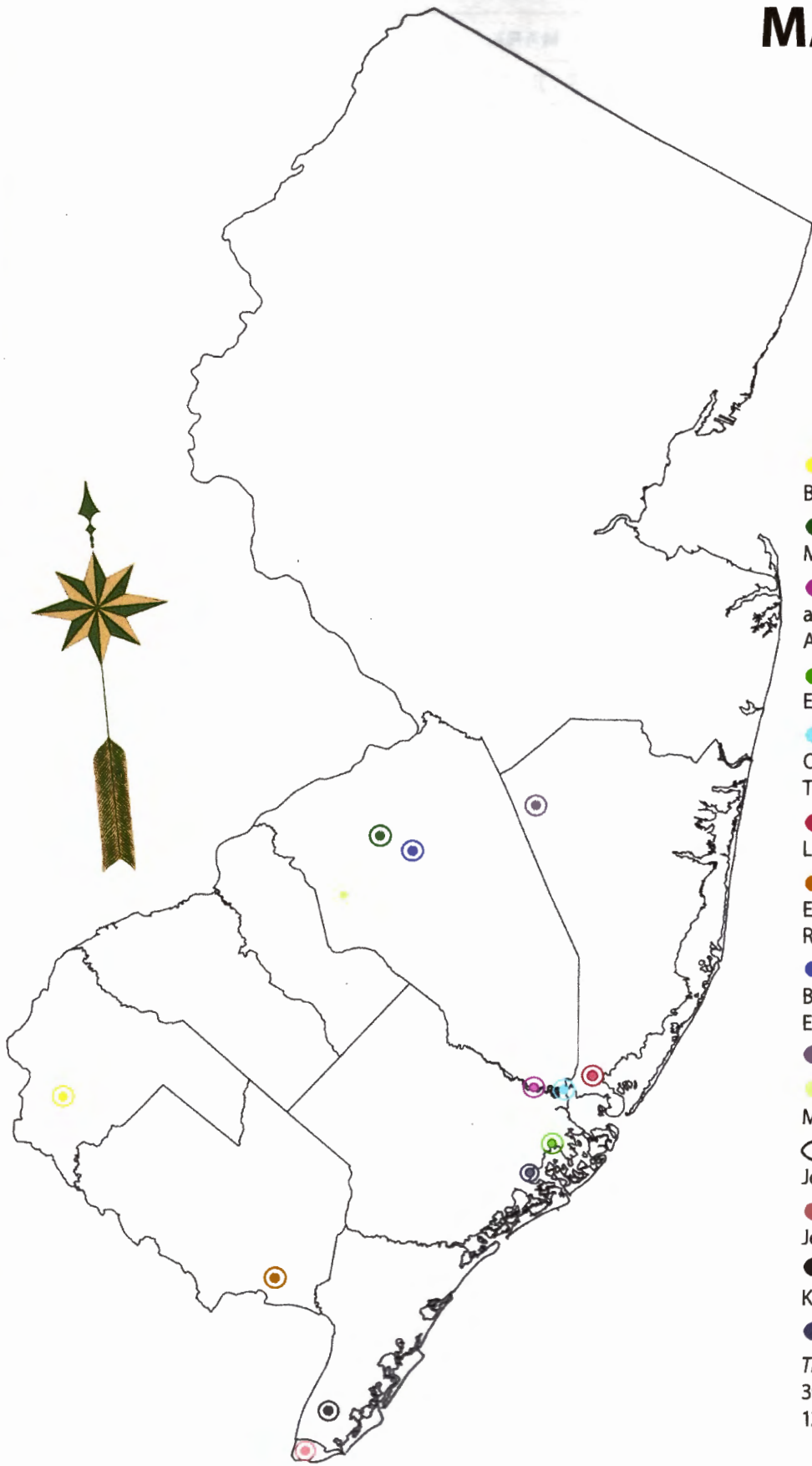
A journal devoted to the history, culture, and geography of South Jersey



Stockton University

Autumn 2023

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As seen in 2015 just before being dismantled to allow a housing development, this steel structure in Lumberton was the platform for a high-powered Nike Missile radar system. The actual antenna was mounted atop the structure, allowing it to scan out into the Atlantic, watching for incoming bombers; it would have been protected from weather by a fabric golf-ball-appearing radome. The adjacent building housed electronic equipment; other support buildings are in the distance. Photograph courtesy of Richard Lewis.

Last Line of Defense: The Lumberton Nike Missile Base

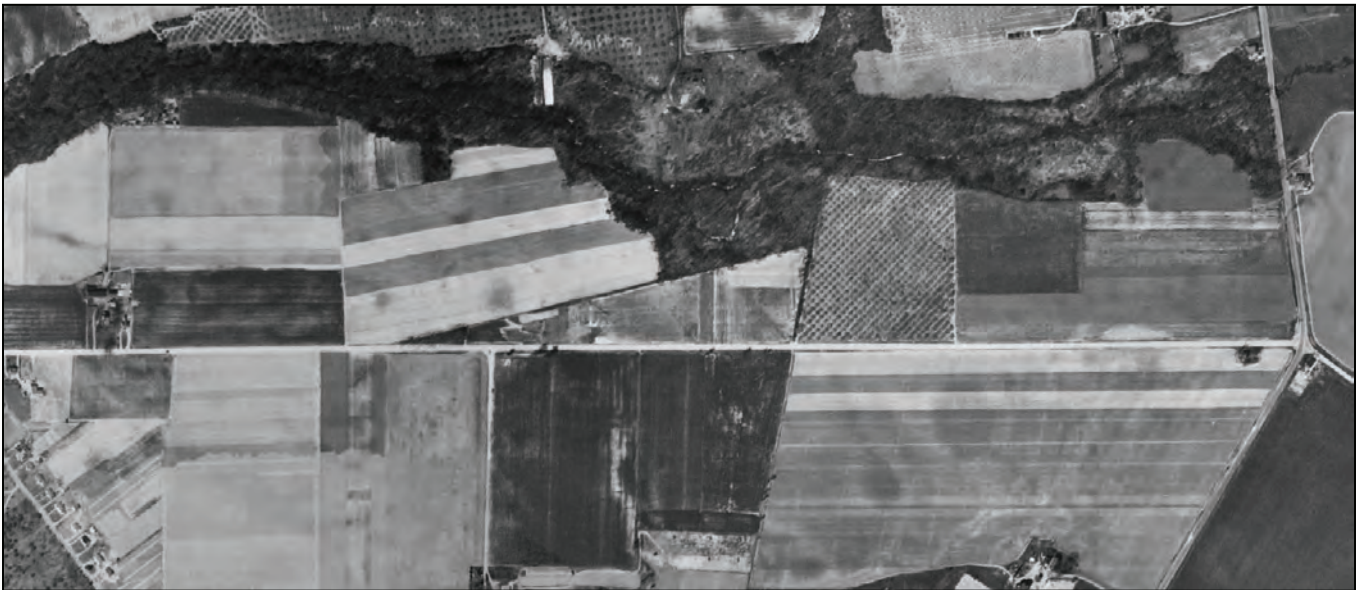
Jim Alexander

Some 40 years after the Lumberton Nike Missile Base was taken out of service, photographer Richard Lewis shot a series of stunning photographs of its radar control area, which was by then being demolished to make way for housing. The vitality of the base's operations during its years of operation between 1955 and 1974, which included radar towers, nuclear-armed anti-aircraft missiles and underground storage magazines, was never preserved with such skilled photography.¹

The jarring click of a round being chambered in an Army rifle prior to being fired in the spring of 1960 is a sound one Lumberton resident in Burlington County will never forget. It all happened

when one of Doris Barton's high school girlfriends suggested they sneak a visit to the back part of the Reid family farm that had been sold to the government.² At that time, Lumberton was almost all farmland, and there wasn't much excitement. The arrival of the United States Army a few years earlier was a matter of curiosity.

Some 60 years later, married and now widowed, Doris Priest sat in her living room thinking back over the decades, occasionally crossing the room to check an old friend's number for follow-up, and a story emerged. As one of the small number of people who grew up in Lumberton before postwar suburban growth consumed much of the farmland, she has a keen sense of history,



This 1951 aerial map detail shows part of Lumberton and its agricultural nature. With Newbolds Corner Road (now Municipal Drive) running across the map, and Eayrestown Road on the right, the only concentration of houses is at the lower left, along Landing Street.³⁴

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having later been a township official herself and a leader of the Lumberton Historical Society.

She recalled that day when she and her friends jumped in a car and drove up an old dirt path off of what is now Municipal Drive, heading toward the back of the old apple farm by Bobby's Run. They had hardly turned the engine off, when they were startled by the loud click, followed by an Army sentry ordering them to leave immediately—no discussion about the old family farm, or that they didn't realize they were on the part that had been sold, just move on!

Most residents of Lumberton were never allowed access behind the barbed wire fencing that surrounded what had become the Lumberton Nike Missile Base, although a few recalled venturing to play in the fields surrounding the launch area.³ Doris was to have more encounters on the property several decades later.

THE LAST LINE OF DEFENSE

The story really begins in the final years of World War II. Fearing German air raids on America's homeland, our cities had been ringed with anti-aircraft batteries to fend off incoming bombers. The problem, as the military learned from its European experience, was that they would not have offered very much protection. Seized records showed that when the Germans fielded their feared "88" artillery guns against incoming waves of American B-17s, they had to fire over 2,800 shots to bring one down.⁴ Fast-moving planes at varying altitudes were just too hard to hit, even using flak.

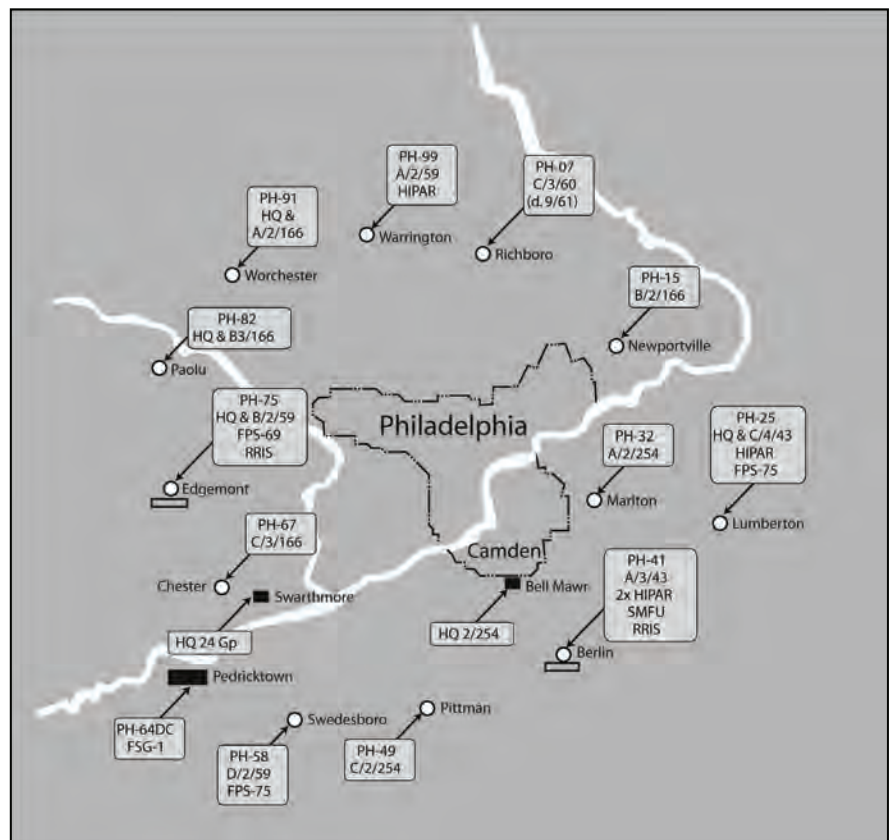
So, in 1945, the federal government commissioned New Jersey's Bell Laboratories to design a defensive missile for use against incoming enemy bombers.⁵ As Bell continued their efforts, the Russians tested a nuclear bomb in 1949, and soon Soviet TU88 bombers were flying off the American coast.⁶ School children began participating in Civil Defense drills, in which their teachers instructed the students to get under their desks or go into basements, where officials had stockpiled emergency supplies. People listening to the radio became acquainted with CONELRAD, a system

through which the government could seize control of commercial radio transmissions to confuse incoming bombers.⁷

Fears grew that Navy and Air Force interceptors would not be able to halt incoming waves of bombers headed for American cities.

By the early fifties, Bell Labs, conducting most of the developmental work at its Whippany labs in New Jersey, had designed and tested a new radar-controlled system whose missiles could soar 30 miles toward incoming Soviet bombers, carrying warheads that could down the approaching planes. It came to be known as the Nike Ajax missile system.⁸ Douglas Aircraft built the missile frames and Bell system's Western Electric assembled the control components. Missile construction took place in Burlington, North Carolina, at the Western Electric Tarheel Army Missile Plant.⁹

Acting with urgency, the Army Corps of Engineers oversaw the construction of over 250 missile bases that ringed major cities and military installations in the United States. Similar construction occurred overseas to protect European allies. The Corps' Philadelphia Office issued requests for contractor proposals to construct bases in the Philadelphia area in early 1954.¹⁰



Nike bases protecting Philadelphia area.⁵⁵

Last Line of Defense

Soon, the Philadelphia area was ringed by twelve such bases, with five located in Burlington and Camden counties. A massive concrete bunker in Salem County's Pedricktown, provided the command-and-control facility for those twelve bases ringing Philadelphia.¹¹

Each missile base consisted of two separate sections: the radar (officially called the IFC, or Integrated Fire Control) area, and the missile Launch Area,¹² and each included barracks, generator buildings, administrative and support facilities, and their own water and sewer systems.¹³ Most prominent to those looking over the barbed wire fences that surrounded them were the multiple radars, typically covered by protective "golf-ball" domes, but the missile launch area had underground storage magazines that could not be seen from the road. Typical construction of the magazines can be seen in the sketch below.¹⁴

To build one, the contractor excavated a large pit, and then assembled a reinforced concrete structure below ground level. The main level served as missile storage. In the center, a deeper pit housed a massive elevator that would carry the missiles up to ground level. A thick steel double door at ground level opened to allow the missiles to rise or descend.

As constructed, a separation existed between the radar and the launch areas relative to the radar tracking the launched missiles as well as incoming aircraft. The missiles rocketed into the sky so fast that some distance was needed to make sure the radar did not lose contact. The two sections at Lumberton, roughly sixteen acres each, were about 4000 feet apart, connected by the

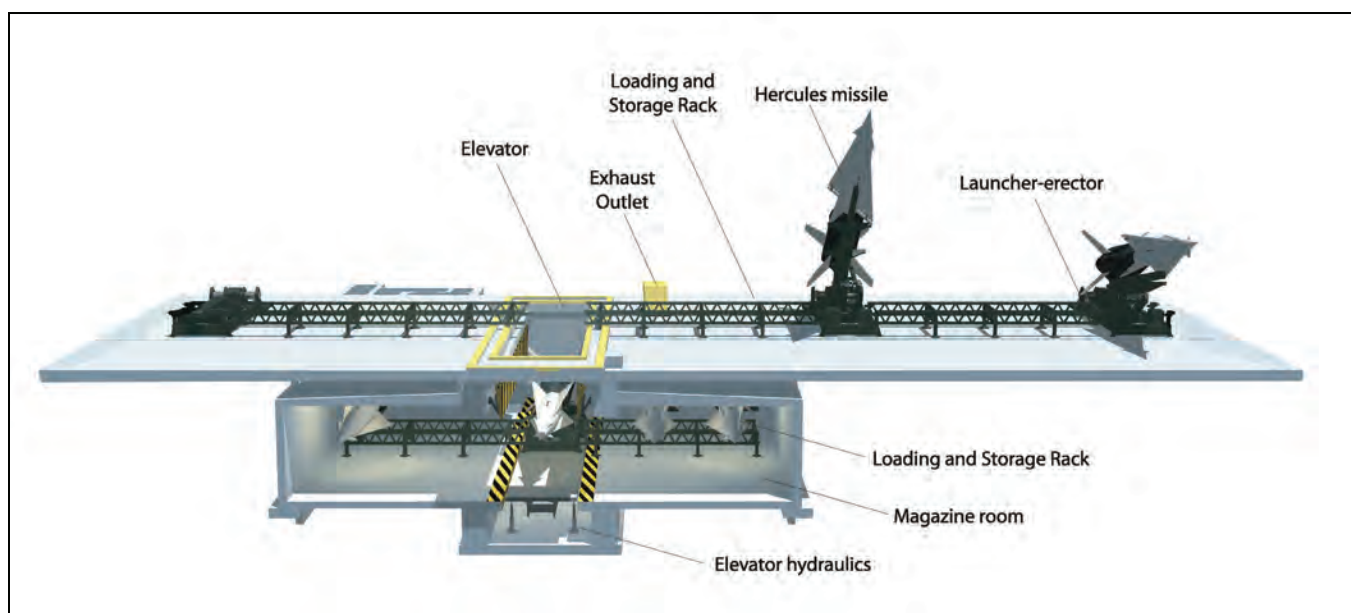
gravel covered portion of Newbolds Corner Road.¹⁵ The Army reportedly paid \$65,100 to acquire the land.¹⁶

Most Nike bases followed a similar plan,¹⁷ with some adjustments for local terrain or nearby development. While storing the missiles underground did afford some protection from attack, the primary reason stemmed from those bases sited in locations adjacent to real estate development, where costs were high, and safety regulations would have required larger, more expensive, protective buffer lands if the missiles had been stored above ground.¹⁸ The missiles had to be raised to a firing position; they were not fired from underground.

LIFE ON THE BASE

At Lumberton, eight officers and 100 enlisted soldiers occupied the site in March 1955,¹⁹ while construction remained ongoing. Initially, they lived in tents while waiting for proper facilities to be assembled. Early aerial maps disclose that construction required several phases. The base constituted one of the few facilities known as a double base, meaning that it had six underground missile storage/launch areas, rather than the usual three, and double the radar capability to control them. A captain commanded the base, with lieutenants in charge of each part. In its early years, the majority of the soldiers were as young as eighteen, having been intensively trained and constantly tested, with surprise and demanding inspections.

Local residents knew of the base, but the locked gates prevented access without specific authorization.



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As a result, while the local people could see through the fences, and even see the missiles when raised for drills, much of what was remembered was the sounds of trucks, of lights and sirens, but little understanding of the complex work inside.²⁰ On occasion, helicopters would land for transporting supplies or bringing the brass for surprise inspections.²¹

Exceptions to the tight security occurred on occasion. In May 1960, a photograph of Miss Burlington County appeared in the local papers, standing in front of raised missiles at Lumberton.²² This was in preparation for one of several tightly controlled “open houses” that took place in conjunction with Armed Forces Day programs. She was there in preparation to crown Miss 43rd Artillery. The Nike missile forces were part of that Army artillery unit.



Typical Hercules Missiles as seen at Ft. Hancock base at Sandy Hook. The missile at right is in upright firing position on its launcher, while the other missile is only partly raised. Each missile was 41 feet long with its booster, 31.5-inches in diameter, 6-foot wingspan, and weighed of over 10,000 pounds.⁵⁶

The following year, the base briefly opened to the public again for missile raising demonstrations, “cartoons for children, sentry dog demonstrations, helicopter displays,” and other presentations. Those present for the event included that year’s Miss Burlington County, a Philadelphia TV personality, and a retired US Secretary of Labor.²³

The military deemed good public relations especially helpful in the missile system’s early years around the country, where in some areas, especially urban, opposition arose. A second reason stemmed from the Air Force’s development of its BOMARC Missile system (with a prototype base installation at McGuire Air Force Base), and that service branch pressed Congress to shift funding from the Nike program to its own.²⁴

At Lumberton, there was little to occupy the soldiers’ off-time, despite the presence of a chapel, a PX, and exercise and recreation facilities. So, it was not unheard of for a few soldiers to head for the bright lights of nearby Mr. Holly on their time off, where, on occasion, some excess libation led to arrests.²⁵ With one exception that involved a private becoming involved with a local waitress and an ensuing murder/suicide attempt,²⁶ very little real friction developed with the locals.

“We really didn’t know that much about what went on inside the base,” Doris noted. The two worlds lived side by side, but apart. Internal base records did not survive,²⁷ yet some comments collected years later from soldiers stationed at Lumberton²⁸ give some clues:

“I didn’t appreciate being located in the middle of a cabbage field,” one obvious city boy recalled. Indeed, the base was surrounded by farmland.

“A lot of local girls would drive along the roads looking for the guys.” Whether this was a wishful recollection cannot be determined, but at least one soldier did marry a local girl.

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"I used to sign out a shotgun and shoot squirrels along the gully behind the barracks in the main IFC area." This would have been by Bobby's Run, a small tributary to the Rancocas Creek, where Doris had gotten the scare of her life.

"The drilling was very intense. There were constant alerts."

"A kind Sergeant's wife who provided Thanksgiving dinner at his home." Doris had recalled such kindnesses from other locals.

HOW IT WORKED

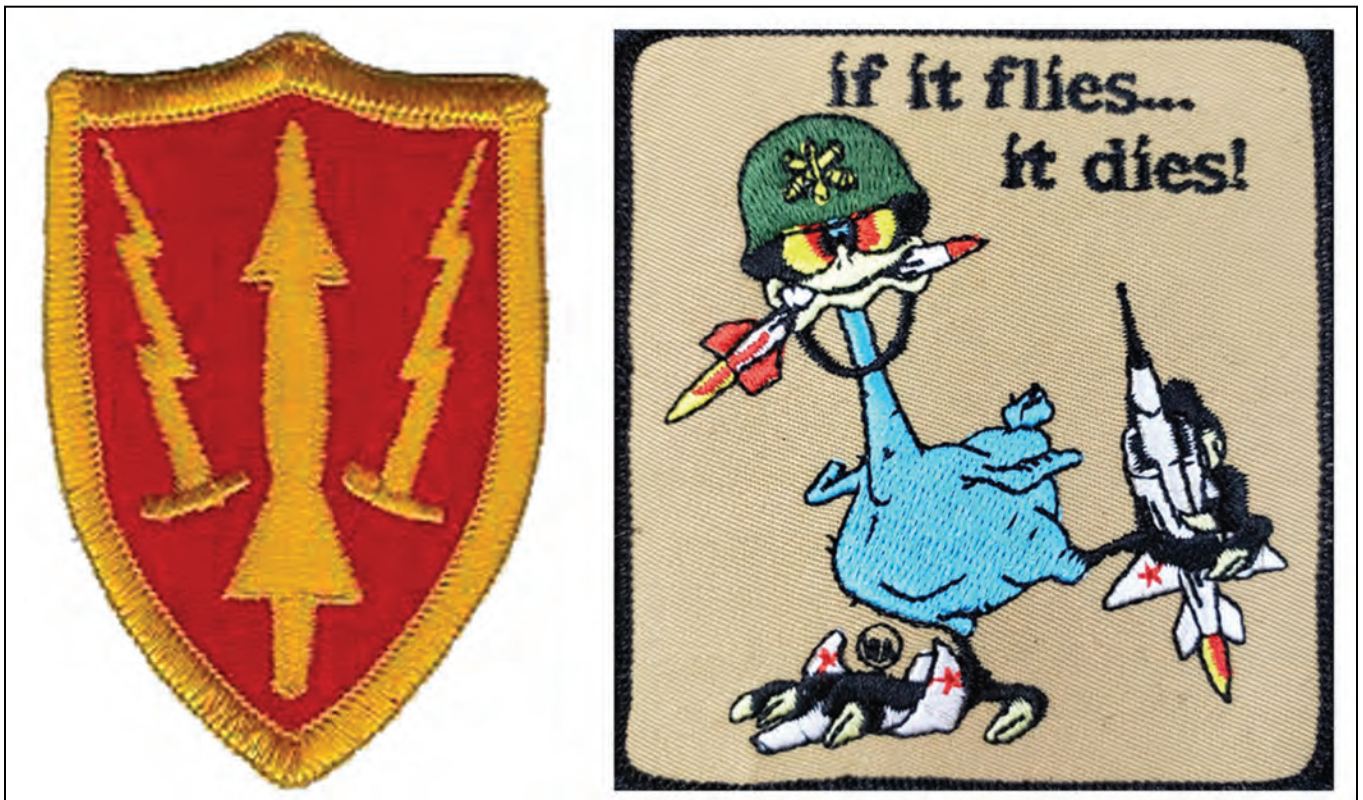
While the base initially housed six missile storage magazines underground, two years into its operation the Nike Hercules system replaced the Nike Ajax missiles.²⁹ The new missiles had several advantages over the Ajax: these 5-ton missiles could fly for 96 miles, in this case allowing intercepts out over the ocean; they could climb to 100,000 feet, with a speed of 3.65 times that of sound. Most significantly, in addition to conventional explosives, they could carry nuclear warheads with optional explosive yields of either 2, 20, or 40 kilotons.³⁰

The added nuclear capability enhanced the ability to destroy a fleet of bombers rather than just one plane, and in so doing, it immobilized any atomic bombs

within the planes. By way of comparison, the atomic bomb dropped on Hiroshima was 15 kilotons. The Army was convinced that unleashing such devastation above the homeland was a reasonable tradeoff to prevent the bombers from dropping even higher payloads directly on the cities; it was also argued that explosions high in the air would have less effect on the ground. The missiles would only be fired if naval and air force efforts had failed to stop the incoming bombers. Thus, the system was known as the last line of defense. Such were the dilemmas of the Cold War. Subsequent defensive missile systems, being more precise, did not carry nuclear warheads.

The military command structure that operated the Nike missile program evolved from the Army's Artillery organization and changed over the years. Initially, the program was part of the Army Anti-Aircraft Command (ARAACOM), which was formed in 1950. By 1957, it was the Army Air Defense Command (ARADCOM), whose patch is shown below at left.³¹ Several years later, to allow the regular Army to focus on other emerging challenges, operating responsibility shifted to various state National Guard units.

As is the case with many other military units, an unofficial mascot known as the Oozlefinch, seen at right below developed from earlier versions for the Nike soldiers.³²



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The Lumberton base was one of the first in the country to be converted from Ajax to Hercules missiles. Base commander Captain Fletcher E. Newland had been involved in test firings at another base that validated the system's effectiveness, and his soldiers were among the first trained to operate the system, which also involved a more complex and capable radar system.³³ Thus, newspaper photographs of the rollout at Lumberton, with troops lined up for inspection, appeared in October 1958. The increased capability of the Hercules led to the abandonment of two older Ajax magazines, leaving four in operation. By 1963, with the greater capability of the Nikes, the Army closed the bases at Pitman and Marlton.

While the public never learned the specifics, a review of general documentation suggests that each of the four underground magazines then held six Hercules missiles, for a likely total of 24, of which at least 20 may have been armed with nuclear warheads of varying kiloton yields, and perhaps four with conventional warheads.

Most local residents were unaware that the Hercules missiles would be lobbed from their launchers by a solid-fuel booster rocket consisting of four of the earlier-designed Ajax boosters assembled together, and that after a few seconds of flight, the expended booster would fall off. Contrary to some belief, the missiles were not "shot at the plane," but controllers guided them from the ground control area, which used one radar to track and guide the missile and another to follow the incoming planes. When the trajectories converged, the blast command was sent from the ground.

Missiles would be fired one at a time, following a choreographed, intensely rehearsed, series of manual

ground actions.³⁴ Depending on local circumstance, one missile every one or two minutes might be launched, mainly limited by the radar system's tracking ability.³⁵

Specific designs for each base included calculations for where the boosters might fall, with the plan that they would land in unpopulated areas. In the case of Lumberton, the missiles, when lifted to the surface, pointed generally eastward, the direction from which the military expected the bombers to come, but when raised almost vertical for firing, they never stood straight up, lest the boosters fall back to the launch area. Most likely the anticipated drop zone for the boosters lay just east of Route 206, an area even more thinly populated than Lumberton.³⁶

With the advent of the Hercules and their nuclear capabilities, the Army stepped up security,³⁷ in three particular ways:

- A second fence was installed around the launch area, with an inner, guarded gate, part of which is still visible in the photograph to the left.
- This area, known as the exclusion zone, featured detection equipment, and armed guards patrolled it by day. At night, specially trained dogs patrolled the zone.
- The military introduced enhanced procedures to prevent any single soldier from either tampering with equipment or attempting to fire the missiles. A two-man system required that every action at the launch area involve two soldiers watching each other, with access to nuclear enablement codes by means of locked safes with armed officers holding two keys.

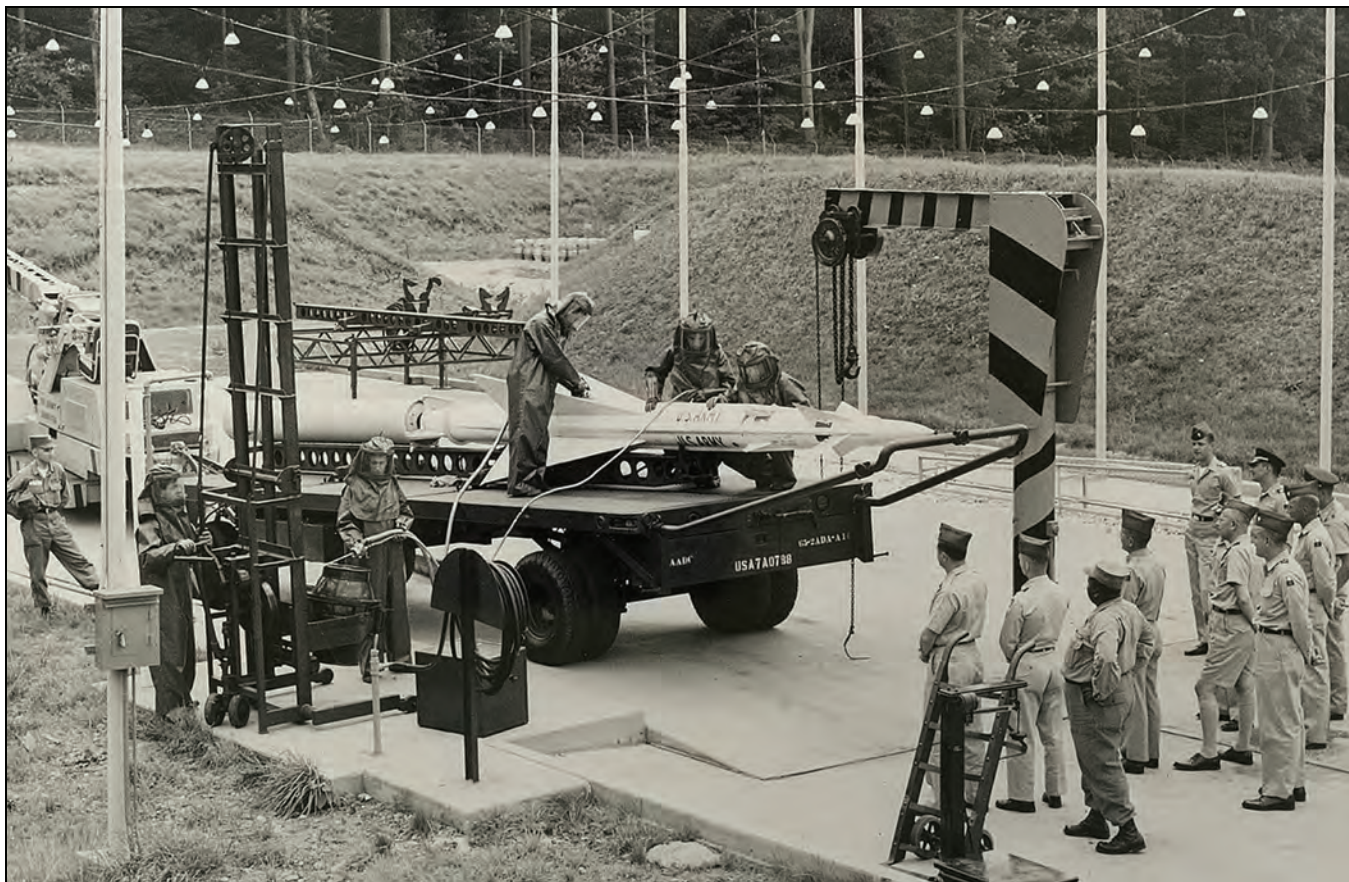
In 1963, as part of a national program to relieve the regular Army for other duties, the New Jersey National Guard gained control and assumed responsibility for the base. While details are scarce, the general pattern that ensued involved a smaller core of troops housed on the base, with guardsmen rotating in periodically. Off-duty troops typically remained on-call and had to return to the base within a set time period. The Guard carefully coordinated heightened readiness levels among the area bases, so that full protection remained always available, with greater capability available to come online as needed.³⁸

Safety was always a concern on these bases, as the troops faced constant danger. In the Ajax years, fuel for the main engine on the missiles consisted of a very dangerous special jet fuel and toxic igniting agents combination. Troops fueling the missiles did so in restricted



Original inner gate at Lumberton Launch area, November 5, 2021. Photograph by author.

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The Ajax versions of the Nike missiles used volatile liquid propellants which were hazardous to the troops. Refueling is occurring in this scene at another New Jersey base; the troops had to wear rubber garb, and earthen mounds surrounded the area to deflect explosions, as was the case at Lumberton. The Hercules missiles that replaced them used solid fuel for both booster and cruise propulsion, making them safer to handle as well as more powerful.⁵⁷

areas protected by earthen berms and wearing protective suits. In July 1960, Sergeant First Class William Hunter was hospitalized at Fort Dix after he was affected by “red nitric acid fumes” that spilled out during a refueling operation. The same month, another soldier, 19-year-old Specialist 4 Thomas Kluck, was killed when his arm got caught as the elevator lifted a missile from a magazine up to the surface.³⁹

Another soldier was accidentally shot.⁴⁰ To be sure, other hazards existed that required repeated training: high powered radar beams, electric wiring, shifting of heavy equipment, and the presence of numerous chemicals used in cleaning and maintaining the equipment. A common practice of the day, even in the civilian sector, would today be regarded as a hazmat situation, when the personnel dumped volatile or dangerous fluids down sump drains, and allowed them to eventually seep into the soil.⁴¹

Post-closure soil investigations failed to reveal any nuclear contamination at the base.⁴²

BASE CLOSING

As a result of President Nixon and Soviet Premier Leonid Brezhnev signing the 1972 SALT 1 treaty, the military determined it would close the Nike bases. As a practical matter, the ability of Soviet missiles to be launched offshore exceeded the ability of the Nikes to cope. By 1974, the bases closed, and the 150 men then stationed at Lumberton underwent reassignment.⁴³



Launch area barracks and administrative buildings 1974, just before base closing.⁵⁸

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Lumberton Township submitted a bid to acquire the property. Thus, the township acquired the launch area for \$60,000, and received the radar property at no additional cost as it was planned to be used for educational purposes.⁴⁴

In vacating the property, the army removed all missiles, radar, and military equipment, leaving the buildings and empty radar towers intact. Power to the buildings was left connected, and the elevators in the empty underground magazines remained operational.⁴⁵

THE RADAR SITE

The Army sold off a small part of the radar area, located at the intersection of Eayrestown Road and Municipal Drive, when advanced radar techniques no longer required the two towers located on it.⁴⁶ Today, those platforms remain there, and a landscape company occupies the property.

Starting in 1977, a nonprofit school for educationally challenged children occupied the main portion of the radar area, north of Newbolds Corner Road, for several decades. It was affiliated initially with the Learning

Disabilities Society of New Jersey, and later, Ranch Hope, a Christian organization for troubled youth based in Alloway, New Jersey, operated the facility as the Ranch Hope Midway School, utilizing four of the old buildings. For several years in the early 1990s, its principal once served as a radar operator on the same property in 1956 and 1957.⁴⁷

After several decades of operation, the school closed. With the property abandoned and dilapidated, several proposals to use the property for public institutions met with strong local opposition. In 2015, local photographer Richard Lewis took a number of striking photographs of the area during demolition of the buildings and radar platforms. Interior photographs of the former military buildings showed an advanced state of disrepair.⁴⁸

By 2017, a housing development had replaced the facility.

THE LAUNCH AREA

In 1975, the Township took the initial step to vacate its overcrowded Town Hall on Main Street and



Room at closed Midway School in former radar section building.⁵⁹ Photograph courtesy of Richard Lewis.

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Demolition of radar site 2015. Photograph courtesy of Richard Lewis.

move the municipal offices and police department to the Launch site's former barracks and administrative building fronting Newbolds Corner Road. The Public Works Department occupied the expansive rear area where the missile magazines and related buildings stood, providing the department with expanded room.

Of the underground missile magazine storage areas, the township used one to store excess municipal items; a second held school system storage; and the police department employed the third for housing found and confiscated items. The ground area around the magazines, primarily used to house public works trucks and equipment, also provided ample space to store miscellaneous things associated with normal public works property maintenance.⁴⁹

By 2000, Lumberton's population had swelled with suburban growth, and the old base buildings proved inadequate and difficult to maintain. Lumberton constructed a new town hall across Newbolds Corner Road, renaming the roadway Municipal Drive. Township officials relocated the municipal offices and the police department to that location. The former municipal offices underwent demolition for construction of a modern Fire and Emergency services building in 2018.⁵⁰

Doris witnessed all that, but years later, as Lumberton Township leaders endeavored to make good

use of the site, she had two encounters with the old Launch area. In the fall of 1985, as Hurricane Gloria worked its way up the east coast, she recalls being hustled underground into one of the missile magazines as local officials sought to protect local lives against the ravages of the massive hurricane. "It was damp and scary down there."⁵¹

Five years later, now serving as the town's recycling director, she devised the idea of using the area as a center for surrounding towns to bring their plastics for processing. One local account opined that the trucks might dump their loose plastic collections down into one of the abandoned magazines, where it would be baled, and then carried up on the missile elevator to be hauled off for processing.⁵²

While such a concept would have been an innovative step, local considerations involving other jurisdictions prevented it from happening, although even today recycling bins stand nearby for resident use.

Walking through the expansive ground area, large concrete slabs with blast deflectors and metal bases for the missile moving rails remain, as do sturdy air handlers, fire hose stands, and heavy steel doors leading underground to the magazines. (See pages 25–26.)

On a visit in 2021, going down the stairs into one missile bay, you entered a different world. The

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Radar support structures remained in place until final demolition for housing. Some later passers-by mistakenly thought they were missile launchers. Photograph courtesy of Richard Lewis.

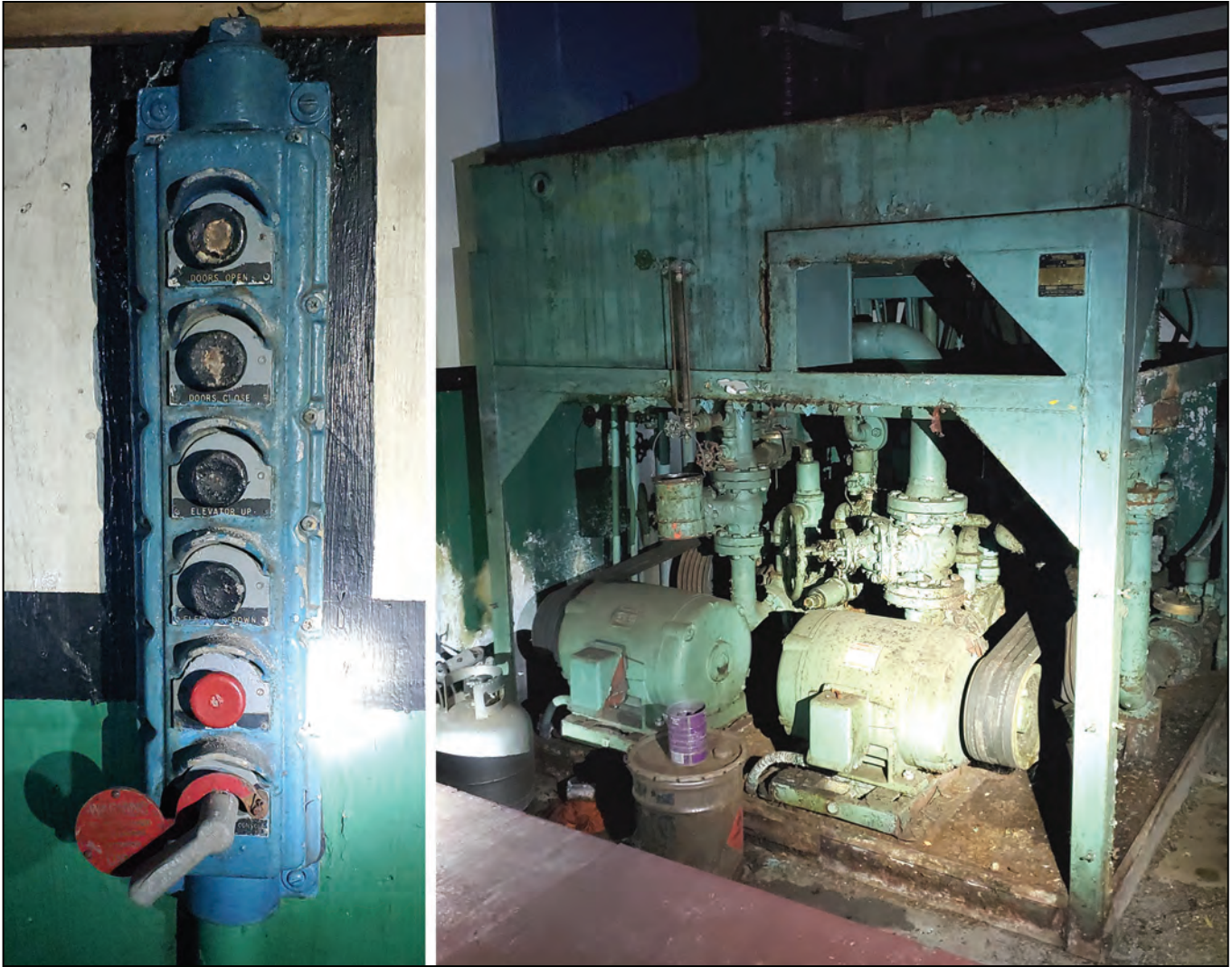


Magazine Alpha, the first of the underground missile magazines, in which defense weapons of unimaginable power had once been tended by young Americans during the Cold War. Most evident on the site are the large doors that would have dropped aside to allow the elevators to carry the missiles up for launching. Photograph by author, October 5, 2021.

Last Line of Defense



(Top four images) Montage of photographs of the launch area. (Bottom) The Launch elevator from down below.



(Left) Door and elevator control buttons. (Right) hydraulic system for elevator. All photographs by the author.

magazine's ceiling is at least six feet below ground level, with a good ten feet of headroom, and horizontally roughly 50 x 60 feet.⁵³ Except for the sunlight extending down the stairwell and a thin crack in the overhead doors where the weatherstripping has aged, it is completely dark, and completely silent. Power no longer flows to the lights. Yet, as seen with the aid of flashlights, what has endured is impressive. The missiles are gone, but the signs and painted walls have held up over the decades. The massive elevator rests in its pit, and the large hydraulic system that propelled it stands nearby, as do the electrical control boxes. The buttons to open and close the large door and operate the elevator are in good condition. A few odd items long ago stored and forgotten are strewn about, but the area is mainly clear.

The massive, reinforced concrete ceiling remains intact. Emergency access ladders, reaching up to hardened steel doors, remain. A side hall leading to a

blast-proof door, behind which the soldiers would stay during the missile blasts, contains some standing water, so, we don't venture inside.

Back on the surface, several buildings remain, including one where heavy generators once operated, and another where an overhead hoist allowed missile parts to be assembled. Elsewhere, newer public works buildings provide room to store and maintain equipment ranging from heavy snowplows to lawn mowers.

Thus, the service at the former Lumberton Nike Missile base continues in a new way. The vastness of the open launch area, formerly dedicated to the underground magazines, suggests some possible future use. It is still partially bounded by open fields, like it was in those simpler times when young children could play nearby, while not realizing the threats of a hostile world.

The service of those young soldiers who protected Lumberton and the Philadelphia area with tools of

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Doris Priest returns to the base, September 22, 2023. Photograph by the author.

incredible destruction in their care, however, cannot be forgotten. During the two decades of the Nike Missile program, not one was ever fired in anger, but they stood ready.

Now, nearly two years after Doris's initial recollections, we visited the Launch Area, and she stood above Magazine Alpha. There was so much that she had not been able to see years ago because of the fences and guards.

But memories flooded back: seeing the raised missiles in the distance behind the fences, the trucks on the road carrying soldiers and supplies, the night down below where residents sheltered from the storm, the kind local people who offered holiday meals to the soldiers far from home. And in the background, blue recycling bins now used by Lumberton residents.

Most telling, with a brief shudder, she relived that moment decades earlier, when her youthful innocence had been jarred by the click of a round being chambered in an Army rifle.

ABOUT THE AUTHOR

Jim Alexander holds degrees from Middlebury College and the University of Pennsylvania. While initially focusing on state and local government management, he has always enjoyed writing on anything he encountered. Much of his work has focused on history, including the Tocks Island Dam project. He has a special interest in railroad history, including New Jersey's pioneering inventor John Stevens, and more recently the Mt. Holly, Lumberton and Medford Railroad.

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Former Launch Area – now Public Works Yard and Fire Department.⁶⁰

KEY:

PW Gate	Gate to current Public Works Yard / Launch area
Assy	Building in which missiles were assembled
Gen	Building (now expanded) that housed generators
G	Former Guardhouse, entry to Exclusion Zone
A, B, C, D	Former Hercules Missile Magazines
X	Abandoned Ajax Missile Magazines
F	Location of Ajax Fueling area, berm removed
DK	Former location of dog kennel

New Firehouse: Former location of barracks and administrative buildings, water well, sewer facilities. (Later occupied by Police and Town offices, currently Fire and EMS headquarters).

ENDNOTES

- 1 Copyrighted photo by Richard Lewis, used with permission. His additional photos may be viewed on his website at <https://richardlewisphotography.com/galleries/cold-war-nike-missile-sites/nike-missile-battery-ph2325/>.
- 2 Series of discussions and full interview with Doris Priest (née Barton) between October 21, 2021, and February 25, 2022, and on September 22, 2023.
- 3 Discussions with the late Joan Benedict, who grew up while residing near the base. October 21, 2021, and December 11, 2021. Group discussion at meeting of Lumberton Historical Society with local residents to discuss memories of the base, October 21, 2021; participants included Doris Priest (former township official), Elaine Jardine (whose father was local Civil Defense Director), John Jardine (Association President), Ruth Lewis (retired Lumberton Tax Collector and LHS historian) and others. Review of available materials at Lumberton Historical Society, October 16, 2021.
- 4 Edward Westerman, *Flak: German Anti-Aircraft Defenses, 1914–1945* (Lawrence, KS: University Press of Kansas, 2001). Cited at en.wikipedia.org/wiki/Surface-to-air_missile.
- 5 Mark L. Morgan and Mark A. Berhow, *Rings of Supersonic Steel*, third edition (Bodega Bay, CA: Hole in the Head Press, 2010). Also see John C. Lonquest and David F. Winkler, *To Defend and Deter, The Legacy of the United States Cold War Missile Program* (Bodega Bay, CA: Hole in the Head Press, 2014), originally published by the U. S. Army Construction Engineering Research Laboratories, Champaign, IL.
- 6 <http://www.themilitarystandard.com/missile/nike/overview.php>. Site has extensive information on various aspects of Nike systems.
- 7 “Conelrad Exercise Is on the Air Here,” *New York Times*, November 17, 1954, 64. Retrieved from <https://timesmachine.nytimes.com/timesmachine/1954/11/17/issue.html>.
- 8 Morgan and Berhow, *Rings of Supersonic Steel*, 23 and following.

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- 9 *Historic Properties Report, Tarheel Army Missile Plant, North Carolina*, prepared by Building Technology Incorporated, Silver Spring, Maryland for the Historic American Building Survey/Historic American Engineering Record, National Park Service, U.S. Department of the Interior. July 1984. Accessed at https://en.wikipedia.org/wiki/Western_Electric_Company-Tarheel_Army_Missile_Plant. Also see John C. Lonnquest and David F. Winkler, op. cit., 91.
- 10 Gene Beyer, "Guided Missile Plans to Cover Area Defenses," *Chester Times* (Chester, PA), March 27 1954, 1.
- 11 Tom Tigar, phone interview December 1, 2021. Stationed at Pedriktown in late 1950s, his responsibility entailed contacting the Philadelphia area bases daily to ascertain status. He knew the Lumberton base commander at the time, Captain Fletcher Everett Newland.
- 12 <http://ed-thelen.org/ifc.html> and http://ed-thelen.org/launcher_area.html. The website ed-thelen.org contains a massive volume of official and anecdotal information on Nike bases and provides a broad understanding of how most sites worked.
- 13 B. N. McMaster, et al., *Historic Overview of the Nike Missile System* (Aberdeen Proving Ground: U. S. Army Toxic and Hazardous Materials Agency Assessments Division, December 1984). Accessed at https://scvhistory.com/scvhistory/nike_overview.pdf.
- 14 Morgan and Berhow, *Rings of Supersonic Steel*, 15. Used by permission of publisher and Ormsby and Thickstun Interpretive Design.
- 15 Interview with Stephen J. Moorer, former Lumberton Township Public Works Director. November 12, 2021.
- 16 Paul Loane, "S. Jersey 'Defenses' Are Down," *Courier-Post*, February 17, 1974, 1, 5.
- 17 <http://www.themilitarystandard.com/missile/nike/sitedesc.php>.
- 18 <http://ed-thelen.org/missiles.html#wh-h-nuc>.
- 19 "Press Tours Nike Site at Lumberton," *Courier-Post*, May 15, 1956, 4.
- 20 See note 3.
- 21 Email from Donald E. Bender to author, February 14, 2022. More details on the Lumberton base may be found in his "Lumberton's Cold War Legacy: Nike Missile Battery PH-23-25," as printed in the Fall 1999 *Burlington County Historical Society Newsletter*. Bender has visited the Lumberton site several times, provided helpful insight to the author, and has written about the missile system generally. Portions of his former website are reproduced on ed-thelen.com, in particular see <http://ed-thelen.org/Bender/BenderIntro150.pdf>. Current website is <https://coldwarpreservation.com/>.
- 22 "Beauty and the 'Beasts,'" *Courier-Post*, May 10, 1960, 5. An earlier open house is documented at "Press Tours Nike Base at Lumberton," *Courier-Post*, May 15, 1956, 4.
- 23 "Open House Listed for Missile Site," *Courier-Post*, May 19, 1961, 9.
- 24 Lonnquest and Winkler, *To Defend and Deter*, 58 and following.
- 25 See "Mt. Holly Court Fines Nike Base GI's," *Courier-Post*, May 17, 1961, 32; and "Indictments Handed Up in Burlington Co.," *Courier-Post*, November 2, 1961, 5.
- 26 "GI Slashed Waitress in Mt. Holly," *Courier-Post*, May 27, 1959, 1.
- 27 Per Steven J. Moorer, construction plans had been on hand when the township took over the base but were later discarded by somebody to make room for other items.
- 28 Ed-thelen: <http://ed-thelen.org/pp1-n.html>.
- 29 "Lumberton Unit Gets Hercules Missiles," *Courier-Post*, August 13, 1958, 6.
- 30 <http://www.themilitarystandard.com/missile/nike/overview.php>.
- 31 Courtesy of *Together We Served* at <https://www.togetherweserved.com/>.
- 32 Courtesy of the Air Defense Artillery Association. Further information about the mascot is available on the Nike Historical Society's website at <https://nikemissile.org/Theoozlefinch.shtml>.
- 33 "Nike-Hercules Ready," *Courier-News* (Bridgewater, NJ). October 10, 1958, 23.
- 34 Individual missiles were manually pushed along on rails to a designated launching position. Telephone interview with Richard Buell, a former National Guardsman assigned to the base part time, February 2, 2022. Order of launch depended on which missiles were above ground, and which had which traditional or nuclear explosives.
- 35 <http://www.themilitarystandard.com/missile/nike/missilefire.php>.
- 36 Drop zones were never made public, but general documentation indicates they were in the direction of initial firing, calculated according to anticipated weather and standard factors, and typically expected to fall within a circle whose closest edge was one mile from launch. See <http://ed-thelen.org/overvu.html> and <http://ed-thelen.org/missiles.html>.
- 37 "Nike Security," https://nikemissile.org/Security/security_was_extremely_tight_on.shtml and "Sentry Dogs," https://nikemissile.org/sentry_dogs.shtml.
- 38 "Last Line of Defense, Nike Missile Sites in Illinois," <https://www.allworldwars.com/Last-Line-of-Defense-Nike-Missile-Sites-in-Illinois.html>, provides examples of National Guard site takeover. The Guard assumed control of the Lumberton base in October 1963 per Morgan and Berhow, *Rings of Supersonic Steel*, 166. Email, December 14, 2021, with NJ National Guard Museum did not disclose any available staffing records.
- 39 "Oil City Soldier Crushed to Death on Nike Elevator," *Kittanning Simpson Leader Times*, July 26, 1960, 2.
- 40 "GI Shot in Chest," *Courier-Post*, March 30, 1957, 1.
- 41 B. N. McMaster et al., *Historic Overview of the Nike Missile System*, in extended reviews of many sites, describes various methods of mostly surface disposal.

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- 42 B. N. McMaster et al., *Historic Overview of the Nike Missile System*, Section 7.7. On sites, no maintenance of nuclear warheads (which were sealed and shielded) was performed. Testing materials were required to be returned in lead containers for disposal. Also see United States Court of Appeals for Veterans Claims, No. 18-6827, Thomas C. Graham, Appellant, v. Robert L. Wilkie, Secretary of Veterans affairs, Appellee at <https://efiling.uscourts.cavc.gov/cmecf/servlet/TransportRoom?servlet=ShowDoc/01206800690#:~:text=In%20the%20early%201960s%2C%20the,greater%20than%205%20millisievert%20per>. That case focused on unique exposure to ionizing radiation, some related to work on radar equipment, and to Graham's claim of having carried certain materials in his pocket, none of which appears to address generalized exposure. Other site reviews, such as at the Kingston, WA, Nike Site 92 by health authorities in 2005 did not disclose residual threats. <https://www.atcdr.cdc.gov/hac/pha/kingstonnikesite021705-wa/kingstonnikesite021705-wa.pdf>.
- 43 Loane, "S. Jersey 'Defenses' Are Down."
- 44 James Lawson, "Lumberton to pay \$60,000 for Nike base," *Courier-Post*, December 17, 1975, 28.
- 45 Steven Moorer interview.
- 46 "Surplus 'Gift' from Uncle Sam," *Courier-Post*, October 2, 1962, 1; and "Government Sale" notice, *Courier-Post*, May 27, 1963, 40.
- 47 *New Jersey Ass'n for Children with Learning Disabilities v. Burlington County Ass'n for Children with Learning Disabilities*, Superior Court of New Jersey, Chancery Division. Decided October 25, 1978, 163 N.J. Super. 199. And Lacy McCrary, "Missile sites now playing fields," *The Philadelphia Inquirer*, August 18, 1991, Section B, 1, 4.
- 48 Richard Lewis Photography, series of photographs taken in 2015 as the radar section was being demolished, photographs are marked with his name and used with permission. See <https://richardlewisphotography.com/galleries/cold-war-nike-missile-sites/nike-missile-battery-ph2325/>.
- 49 Discussions with Steven Moorer (previous Public Works Director and Tom Shover (Public Works General Foreman) at launch area, November 18, 2021.
- 50 George Woolston, "Lumberton Fire Co. to auction off old Main Street firehouse," *Burlington County Times*, January 13, 2020.
- 51 Doris Priest interview.
- 52 Marego Athans, "Led by Lumberton, five towns to begin recycling of plastic," *The Philadelphia Inquirer*, November 25, 1990, 14-BR; also see Frank Brown, "Launching the war on plastics; plan would use old missile silos," *The Philadelphia Inquirer*, August 26, 1990, 3-BR.
- 53 Magazine dimensions vary depending on whether original construction for Ajax, or later modifications for Hercules. Visit conditions did not permit exact measurement. See Morgan and Berhow, *Rings of Supersonic Steel*, 26, for typical dimensions.
- 54 Historic Aerials by Netronline at historicaerials.com/. Used with permission.
- 55 Mark. L. Morgan and Mark A. Berhow, *Rings of Supersonic Steel*, 165. Used with permission. A general description of bases in New Jersey, with an emphasis on the northern part of the state and including numerous photographs, may be found at Mary T. Rasa, *U. S. Army Nike: In Defense of the Nation*, accessed at https://www.academia.edu/28537915/New_Jerseys_Nike_Missiles.
- 56 <https://www.nps.gov/gate/planyourvisit/sandyhookniketours.htm>. Public domain photo authorized by National Park Service.
- 57 Photo courtesy of Joseph Bilby, Historian, Collections Management, New Jersey National Guard Museum.
- 58 Photograph from uncited newspaper, at <https://www.flickr.com/photos/42444189@N04/albums/72157624526917061>, as part of extensive photographic collection of the base taken by "John" (JSF0864) in August 2010, showing deteriorated condition of many buildings and facilities. Used with permission.
- 59 Used with permission of photographer Richard Lewis. See Note 48 for additional information.
- 60 Google Earth, December 12, 2021, showing launch area, with notations by author. Used pursuant to Google Earth Guidelines at <https://about.google/brand-resource-center/products-and-services/geo-guidelines/>.

