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Draft
The Coldest Front:
Cold War Military Properties in Alaska

Prepared in Cooperation with the
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Legacy

The Legacy Resource Management Program was established by the Congress of the United States in 1991 to provide the Department of Defense with an opportunity to enhance the management of stewardship resources on over 25 million acres of land under DoD jurisdiction.

Legacy allows DoD to determine how to better integrate the conservation of irreplaceable biological, cultural and geophysical resources with the dynamic requirements of military missions. To achieve this goal, DoD gives high priority to inventorying, protecting, and restoring biological, cultural and geophysical resources in a comprehensive, cost-effective manner, in partnership with Federal, State and local agencies and private groups.

Legacy activities help to ensure that DoD personnel better understand the need for protection and conservation of natural and cultural resources and that the management of these resources will be fully integrated with, and support, DoD mission activities and the public interest. Through the combined efforts of the DoD components, Legacy seeks to achieve its legislative purposes with cooperation, industry and creativity, to make the DoD the Federal environmental leader.

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Introduction

From the late 1940s through 1989 Alaska served as America's Cold War sentinel and an important air defense shield against the threat of Soviet attack over the North Pole. A threat of global proportion, the Cold War consumed $12 trillion from the U.S. Treasury and spanned nearly the lifetime of a generation of Americans.[1] In the course of the Cold War, America amassed a vast standing army, a global intelligence network, and a military-industrial economic complex. By general convention, 1946 is the year the Cold War began. It is the year of George F. Kennan's Long Telegram[2] and British Prime Minister Winston Churchill's Iron Curtain speech. In November 1989 the Berlin Wall came down. This date commonly serves as the end of the Cold War.

The advent of atomic weapons in the 1940s changed the way American military planners thought about how future wars might be fought. Within weeks after the end of World War II, American strategic military planners had identified twenty Soviet cities as potential atomic targets.[3] By 1949, the Soviets also had the bomb. With the advances in aircraft and missile technologies, delivery of these systems to one's enemy over the pole became a major threat. This became known as the *polar concept*. British historian Sir John Keegan observed that 99% of the world's wars were waged between the tropics of Cancer and Capricorn.[4] The Cold War was the first to have major theaters of operations above the Arctic Circle, assuring Alaska's Cold War role.

The Military Situation in 1946

Immediately after World War II, Soviet leader Joseph Stalin directed his military to consolidate Soviet gains in Europe, improve air defenses, and redouble efforts to obtain nuclear capability. The need for nuclear capability presumed the need for a delivery vehicle. While Stalin (and Nikita Khruschev after him) was keen on the development of a ballistic missile, he settled for what the available technology and a strained industrial plant would allow, a long range strategic bomber force and strategic airfields in eastern Siberia. The Soviet Union also benefited from its late-war production organization, and aeronautical technology and material captured from the Germans.[5]

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[1] Betts, Richard K. *Military Readiness: concepts, Choices, Consequences*. Washington, D.C.: The Brookings Institution, 1995.

[2] Jensen, Kenneth M., *Origins of the Cold War: The Novikov, Kennan, and Roberts "Long Telegrams' of 1946*. Washington, D.C.: United States Institute of Peace Press, 1993, pp. xi-xii. George Kennan, U.S. Charg d' Affaires, sent what is known as the Long Telegram on February 22, 1946, from Moscow to Washington. It analized Soviet history, society, outlook, and intentions and subsequently influenced U.S. policy toward the Soviet Union. Information presented in the telegram provided the reasoning for what became the policy of containment.

[3] Walker, Martin. *The Cold War: A History.* New York: Henry Holt & Co., 1994, p. 26.

[4] Keegan, John *A History of Warfare.* New York: Alfred A. Knopf, 1993, pp. 68-69.

[5] Higham, Robin, and Kipp, Jacob. *Soviet Aviation and Air Power: A Historical View.* Boulder, Colorado: Westview Press, 1978, Chapters 8-12.

The Soviets developed and produced Cold War bombers in formidable numbers, the Ma-4 "Bison" (1953), the Tu-14 "Badger" (1954) and the Tu-95 "Bear"(1955) among them. They deployed the planes above the Arctic Circle and in eastern Siberia in quantities great enough to alert the U.S. Air Defense Command to Alaska's value as the front line for America's air defense.[6] In 1954, Russia's second hydrogen bomb test took place on Wrangel Island, only 500 miles from Nome, Alaska. The point was not lost on U.S. military planners.

As part of General Carl Spaatz' reorganization, the Army Air Force (AAF) established the Air Defense Command (ADC) in March 1946. ADC became part of AAF's operational command triad, complementing the offense-minded Strategic Air Command (SAC) and Tactical Air Command (TAC). ADC's mission was to organize and administer the integrated air defense system of the Continental United States. Competing for funds with the longstanding tradition of offensive doctrine and the meteoric ascendancy of General Curtis LeMay and the SAC, ADC emphasized planning for future continental air defense.[7]

In 1946, most American atomic experts thought that the earliest the Soviets could possess an atomic bomb was 1950. The U.S. military began to prepare for the new threat. The Joint Chiefs of Staff (JCS) developed the *polar concept*, envisioning future air operations across the North Atlantic and Alaska, the shortest distance between American and Russian soil.[8] The idea triggered a host of activities destined to affect air defense developments in North America.

During the course of the Cold War, Alaska has been called the "Guardian of the North," "Gibralter of the North," and "Top Cover for America." The military invested in military bases, operational readiness, nuclear testing, and applied research in innovative technology in Alaska. Expensive defense programs such as Nike and the DEW Line caused President Dwight D. Eisenhower in his farewell address to add a new phrase to the lexicon of the Cold War, "the military-industrial complex." By the 1960s, the facilities in Alaska were an integral part of North America's air defense umbrella. The North American Air Defense Command (NORAD) was responsible for a giant warning line that stretched from Hawaii, across Alaska, Canada, and Greenland to Iceland, and down the Atlantic seaboard.

Impacts on Alaska

The Cold War defense establishment was the principal contributor to Alaska's infrastructure improvements until oil development in the late 1970s. Communications in Alaska made huge leaps in reliability and accessibility as a result of the military's need to transmit vital information urgently and instantly.

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[6] Mason, R.A., and Taylor, John. "Long Range Aviation" in *Aircraft, Strategy and Operations of the Soviet Air Force.* London: Jayne's Publishing Ltd., 1986, pp. 133-134.

[7] Schaffel, Kenneth. *The Emerging Shield: The Air Force and the Evolution of the Continental Air Defense, 1945-1960*. Washington D.C.: Office of Air Force History, 1991, p. 53.

[8] Ibid, p. 58.

Military radar and navigation aids greatly improved civilian air transport, vital to nearly all of Alaska.

Military research led to advancements in arctic engineering. National interest in economic self-sufficiency catalyzed by the Cold War provided some of the impetus to explore for oil on Alaska's North Slope. The ability to exploit the oil discovered is in part from lessons learned from building and maintaining Cold War defense systems in the Arctic. The experiences with the physical properties of permafrost and the physical demands of extreme wind chill on men and machinery in the 1950s helped companies extract oil from Prudhoe Bay and build the trans-Alaska pipeline.

During the Cold War, Alaska's civilian population nearly tripled, increasing from 79,000 in 1945 to 220,000 in 1970. The military population of Alaska averaged 20% of all Alaskans in the 1950s,[9] 12% in the mid-1980s,[10] and 15% in 1990. In 1946, Alaska was a U.S. Territory inhabited by a roughly even split of Natives and Whites. By 1960, census figures indicate that the Native population had become a permanent minority. The Cold War in Alaska is also notable for the appearance and growth of a distinct African-American minority. This is especially true for Anchorage and Fairbanks, two Alaskan cities with large military bases.

The Cold War influx of people and money helped the statehood movement dilute, then overcome, traditional sourdough sentiments and absentee business interests that opposed joining the Union. Political economist George W. Rogers wrote in 1962, "without the influx of new population and prosperity brought in by Military Alaska, it is doubtful that Alaska would today be a state."[11] Cold War immigrants to Alaska may have accelerated statehood for Alaska despite the reluctance of Eisenhower and elements of Congress.

In monetary terms, Alaska's military buildup after 1946 became the largest economic activity until Prudhoe Bay oil fields started producing in 1977. After, military spending was still significant in Alaska's gross state product. The year after the end of the Cold War, the military contributed 8.2% to the total Alaskan workforce, five and one-half times that of the U.S. average. In several rural Alaskan communities, the economic effects of the Cold War were more pronounced. The 1990 U.S. Census figures for the Forward Operating Base communities of King Salmon and Galena show that the military was over half of the town's workforce.

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[9] Rogers, George W. *The Future of Alaska: Economic Consequences of Statehood*. Baltimore, Maryland: Johns Hopkins Press, 1962, p. 95.

[10] DCS/Comptroller. *Impacts of Military Spending on the Economy of Alaska.* Elmendorf AFB, Alaska: DCS/Comptroller, Headquarters, Alaskan Air Command, 1984, p. 13.

[11] Rogers, George W. *The Future of Alaska*, p. 97.

In 1946 construction of the world's longest runway at what was to become Eielson AFB, was followed by the expansion of other major defense facilities at Fort Richardson, Elmendorf AFB, Fort Greely, Kodiak Naval Air Station and Adak Naval Air Station. The 1950s witnessed the construction of the DEW Line and other radar installations, the White Alice Communications System and the Ballistic Missile Early Warning Site, and the maintenance of a large military force. The Cold War ensured four decades of prosperity for Alaska.[12] For their time, defense and research systems invested in Alaska were extremely expensive. Alaska's permanent radar network cost hundreds of millions of dollars to build, operate and supply. The military, however, considered Alaska's defense properties worth the cost.

The economic impacts after 1946 contain some notable ironies. The Cold War buildup in Alaska resulted in a 25-year housing boom that existed side-by-side with a severe housing shortage. The defense construction resulted in the explosive growth of labor unrest and organized labor in Alaska. Alaska's defense spending substantially increased labor costs in an already high-cost area. Federal pay checks attracted workers from mining, forestry and fisheries, retarding natural resource development.

The Coldest Front

The Alaska State Historic Preservation Officer received a grant from the Department of Defense's (DoD) Legacy program to draft a historic overview of the state's Cold War properties. The study is to assist DoD property managers with managing the numerous Cold War properties under their responsibility. This study shows that individual Cold War properties are interrelated parts of a larger unit. Properties still need to be considered for their impact on a local area.

This study does not contain all the parts that a historic context should have as outlined by the National Register of Historic Places. Historic context by definition is "an organizing structure for interpreting history that groups information about historic properties that share a common theme, common geographical area, and a common time period. The development of historic contexts is a foundation for decisions about the planning, identification, evaluation, registration, and treatment of historic preoperties, based upon comparative historic significance."[13] It consists of the history (relating time, place and theme), property types, and criteria for registration. A historic context provides direction for evaluation of properties. This draft study is only the history (relating time, place and theme).

[12] Kresge, David T., Morehouse, Thomas A., and Rogers, George W. *Issues in Alaska Development.* Seattle: University of Washington Press, 1977, p. 45.

[13] National Park Service. Natoinal Register Bulletin 15: How to Apply the National Register Criteria for Evaluation. U.S. Department of the Interior, National Park Service, Interagency Resources Division p.53.

The study is organized in terms of the functional and technological aspects of Alaska's Cold War, not chronologically. "Detect and Monitor" addresses the major radar systems that operated in Alaska. "Communicate" discusses the White Alice system that passed on the warning of airborne intrusion. "Intercept and Respond" covers Nike Hercules batteries and forward operating interceptor bases. "Guard and Defend" and "Research" are yet to be developed to complete the story.

America made a massive Cold War investment in Alaska of military bases and air defense systems. They were erected and operated in a land of extreme cold and vast distances. Alaska's sites are a significant part, yet are largely unexplored, in America's Cold War story. The fragile nature and current rate of destruction of Alaska's properties from this era makes expectations of their survival *beyond the 50 year* threshold doubtful.

NOTES

Detect and Monitor

For millennia, opposing armies placed pickets as forward observers to watch for enemy movements and signs of an imminent attack. The nature of providing tactical warning of an enemy advance changed dramatically in the late 1930s with the advent of radar (radio detecting and ranging). Radar made it possible to see enemy ships and aircraft long before the sharpest human eye could detect a speck on the horizon. In the early 1940s, technology wed human to radar scope. The U.S. military proceeded to use electronic pickets in the developing Cold War.

In November 1947, the JCS approved implementation of a report called the Radar Fence Plan, code named *SUPREMACY* by the new U.S. Air Force. *SUPREMACY* suggested that a comprehensive, technologically advanced radar net be established country-wide, with 37 stations in Alaska. Congress balked. The 1948 Berlin Crisis, however, caused the American public and its political leadership to reassess the proposal.

In September 1949, President Truman announced that the Soviet Union had detonated an atomic device. The revelation stunned America's public, its government, and its military establishment. In October 1949, Congress approved funding for a scaled-down radar net in Alaska. In the wake of the Soviet atomic blast, an April 1950 national security analysis document known as *NSC-68* recommended that DoD "provide an adequate defense against air attack on the United States." The air attack threat was the Tupolev-4 (Tu-4) bomber deployed to Siberia.[14]

An August 1951 defense study, *Project Charles*, prepared by MIT's Lincoln Laboratory recommended the immediate computerization of air defense systems. That same year a huge, vacuum-tubed Whirlwind II computer was tested for use as a Semi-Automatic Ground Environment System (SAGE) at Cambridge, Massachusetts. SAGE would eventually link the Alaska-Canada radar systems, interceptor bases, and Nike batteries to NORAD/CONAD in Colorado.

The United States and the Soviet Union had active short and intermediate range missile development programs for years. After 1945, each country began long range missile research. Both employed rocket scientists and equipment from the German World War II V-2 program. By the late 1950s, accelerated efforts by the U.S. and the Soviets to develop nuclear and thermonuclear (hydrogen) weapons made smaller, lighter, missile-borne payloads possible.

Until the mid-1950s, American radar defense technologies were inadequate for surface-to-surface strategic missiles. Even then, accelerated radar development programs were undertaken only after intelligence from U-2 overflights indicated

[14] White, Ken. *World in Peril: The Origin, Mission and Scientific Findings of the 46th/72nd Reconnaissance Squadron*. Elkhart, Indiana: K.W. White and Associates, 1994, p. 40.

that Soviet missile programs were progressing more rapidly than anticipated.[15]

The putative bomber gap of the early 1950s lost its significance after October 4, 1957, when the Soviet Union launched and orbited the first satellite. *Sputnik* suggested that they would soon have the ability to deliver a nuclear warhead to a target on U.S. soil with an Intercontinental Ballistic Missile (ICBM).

One month after *Sputnik,* the U.S. Federal Office of Defense Mobilization released the sensational Gaither Committee Report. Employing considerable hype, and questionable data on the Soviet ICBM program, the report emphasized the vulnerability of the U.S. to nuclear sneak attack over the polar regions.[16]

In response to this perceived vulnerability, four radar systems were constructed in Alaska during the Cold War. These were the Aircraft Control and Warning (1951-1968), the Distant Early Warning Line (1953-1969), the Ballistic Missile Early Warning Site (1961-present), and the Cobra Dane Radar Facility (1978-present).

Aircraft Control and Warning, 1951-1968

At the end of World War II, radar coverage in Alaska was concentrated on the Alaska Peninsula and Aleutian Island chain, where it had been directed toward Japan. By 1946, the Soviet Union supplanted Japan as America's principal foe. This triggered a reassessment of continental defenses in Canada and Alaska. AAF moved its headquarters in Alaska from Adak to Elmendorf AFB near Anchorage, and on January 1, 1947, the military's first unified command, the Alaska Command (ALCOM) was established. Elmendorf, Ladd, King Salmon, Nome, and St. Lawrence Island were to get radar to detect bombers from bases in the Soviet Far East.

Major General William Hoge, Deputy Commander of the U.S. Army Engineers, came to Alaska in 1946 to study the existing air defense system and suggest new radar defense requirements. The Hoge Board recommended 36 Aircraft Control and Warning (AC&W) radar sites in Alaska. An Alaska Air Command (AAC) study recommended 58 radar sites. An air defense study team headed by Lt. Col. H.J. Crumley devised a third, selected downsized scenario in 1947. This plan called for 13 strategically located Alaskan AC&W sites to supplement those established at Elmendorf, Ladd, King Salmon, Nome, and St. Lawrence Island.[17]

Focused around the main interceptor bases at Ladd and Elmendorf, building the

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[15] Schaffel, *The Emerging Shield*, p. 255.

[16] Nielson, Jonathan M. *Armed Forces on a Northern Frontier: The Military in Alaska's History*. Westport, Connecticut: Greenwood Press, 1988, Chapter 6.

[17] Cloe, John Haile. *Top Cover for America*. Missoula, Montana: Pictorial Histories for the Anchorage Chapter, Air Force Association, 1984, p. 160.

AC&W network in Alaska began as part of the U.S. Permanent Radar System in the summer of 1950. With the outbreak of the Korean War that June, additional AC&W stations were constructed. Surveillance AC&W stations were sited to cover a broad area, and placed at high elevations to assist line-of-sight radars. In all, five Alaskan sites were for coastal surveillance (the outer ring), five interior sites for ground-controlled intercept (GCI) (the inner ring), and master GCI radars at Ladd and Elmendorf.

The GCI air defense concept was based on air defense tactics tested in World War II. Using high-frequency radio beams and forward observers on the ground, interceptor pilots could be vectored to the projected flight paths of airborne intruders. Radar gave interceptor pilots and crews true advance warning. The more accurate the radar, the earlier, and therefore the more valuable, the warning.

The first Alaska AC&W station, Murphy Dome, went on line in 1951. Cape Newenham, the last of the original sites, was operating by April 1954. The construction costs were nearly $50 million. Three years later, six sites were added, finishing the system with a station at Bethel in 1958.

Aircraft Control and Warning Stations

(A) Active LRRS Radar
(D) Demolished

Year	Place Name
1951	Murphy Dome (D)
	Fire Island (D)
	King Salmon (A)
1952	Tatalina (D)
	Campion (D)
1953	Cape Lisburne (A)
	Cape Romanzof (D)
	Tin City (A)
	Northeast Cape
	Indian Mountain (D)
1954	Sparrevohn (D)
	Cape Newenham (D)
1958	Ohlson Mountain
	Fort Yukon
	Middleton Island
	Unalakleet (D)
	Kotzebue
	Bethel

Building the AC&W stations was difficult and dangerous. It required overcoming the immense logistical burden of transporting supplies and equipment to remote sites. Construction was beset by difficulties with severe weather, transportation delays, and labor unrest. These problems continued to challenge major defense construction efforts in Alaska throughout the Cold War.

Figure 1: Aircraft Control and Warning (AC&W)

In 1951, the AAC employed the Military Sea Transport Service to bring six to nine months of supplies to the AC&W sites and Galena Forward Operating Base. Although fraught with problems, in 1952 the Army, Navy and Air Force participated in the supply effort. In 1953 the program became known as Mona Lisa, and grew as new remote facilities opened. In 1966, the program was renamed Cool Barge.

Approximately half of the AC&W stations had buildings at two sites. Radomes stood at the higher elevation. They housed the radars and had overnight accommodations for personnel. At a lower site was a composite building that housed operations and personnel. Other buildings housed communications, living accommodations, and storage.

Changes in strategic command, reductions in the continental defense budgets, and advancements in radar technology led to closures and operational changes at AC&W sites. By the 1970s, orbiting strategic reconnaissance satellites began to circumvent the need for tactical warning radars. In 1974, the Saber Yukon report prescribed an overhaul of the AC&W system, and assignment of joint surveillance and control to the Federal Aviation Authority.[18]

King Salmon, Cape Lisburne, and Tin City AC&W stations received updated radar technology and were reassigned to NORAD's Long Range Radar System (LRRS). Known as the Seek Igloo program, this $113 million technological change to AN/FPS-117 air defense radar was complete by the mid-1980s. Indian Mountain, Sparrevohn, Cape Romanzof and Tatalina AC&W stations were demolished. They were replaced with LRRS stations that had aluminum geodesic domes. Used only in Alaska, the innovative radomes and the radar they housed were part of a USAF program called Minimally Attended Radar (MAR). The technical personnel required to operate a MAR facility was a fraction of that needed to run a pre-1970 AC&W site.[19]

The Distant Early Warning Line,[20] 1953-1969

U.S. Air Force Chief of Staff Hoyt Vandenburg publicly admitted in the early 1950s that the generally accepted efficiency of air defenses was a nominal thirty percent of total intruders.[21] Aware that the image of waves of Russian aircraft carrying atomic bombs to targets in the American heartland would be unacceptable to the public, Vandenburg proposed an air defense Manhattan Project.

In April 1952, a USAF air defense study, East River, revealed that civil defense measures alone would be nearly futile against atomic weapons delivered by a determined foe. East River concluded that Soviet weapons, and the aircraft that carried them, needed to be stopped before they reached the United States. The study claimed this could be accomplished with an electronic outer warning radar network "not less than 2,000 miles from the continental limits of the United States."[22] The study identified the arctic coasts of Alaska and Canada as part of this radar net. Thus was born MIT's Summer Study Group, a collection of forty civilian scientists and engineers, including the father of the atom bomb, Robert Oppenheimer. By September 1952 they had conceived the Distant Early Warning Line.

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[18] Denfeld, D. Colt. *The Cold War in Alaska: A Management Plan for Cultural Resources.* Anchorage, Alaska: U.S. Corps of Engineers, 1994, p. 123.

[19] Ibid, p. 40.

[20] Hanscom AFB documented the Alaska DEW Line stations and the system was determined to be eligible for inclusion in the National Register of Historic Places in 1978. It was determined that the DEW Line has national significance in the areas of military, politics and government, invention, engineering, and communications.

[21] Schaffel, *The Emerging Shield*, p. 140.

[22] Jockel, Joseph T. *No Boundaries Upstairs: Canada, the United States and the Origins of North American Air Defense, 1945-1958*. Vancouver: University of British Columbia Press, 1987.

The DEW Line was the most ambitious radar warning line in North America, but it was not the first. The Pinetree Line, principally financed and staffed by the United States, was constructed on the Canadian-American border. Consisting of thirty stations, it was up and functioning by 1954. Next came the Mid-Canada Line. Also known as the McGill Fence, it was built along the 55th parallel, paid for and operated by Canadians. The McGill fence was not a true radar line, but an unmanned microwave Doppler Fence, subject to false alarms (formations of wild geese were detected). Rudimentary as it was, it provided the technological model later used to plug the gaps in the DEW line.

Eisenhower approved construction of the DEW Line in 1954. Known at the time as Project 572, the DEW Line was built (aside from the 1953 Barter Island prototype) in its entirety in a mere 32 months, by 23,000 American and Canadian laborers and technicians directed by Western Electric Company. Prefabricated station components were fitted together in Seattle or at Elmendorf AFB. These were disassembled, flown to the Barrow Camp staging area, reassembled, and attached in series, mounted on sleds, and transported by cat trains over routes marked by air-dropped flags to the sites.

Western Electric learned from the problems that beset the Barter Island prototype. The wind-swept arctic tundra fostered inventive engineering solutions for problems with the prefabricated buildings. At a site, the modules were aligned east-west to show the minimum profile to the strong westerly arctic winds. This alignment offered the least area for snowdrift eddies to form.

Placed directly on the frozen tundra, the heat radiating from the Barter Island buildings melted the permafrost and made the module foundations uneven. Western Electric solved this problem by steam-drilling into the permafrost and inserting steel pilings into the holes. The ground refroze and modules and radomes were hoisted atop the pilings, separating them from the permafrost. This also allowed wind-lashed snow to blow under the buildings relatively unimpeded.

The danger of fire prompted the addition of a fire-barrier module to each station. Built into the train, one to every eight modules, the barrier had a metal roof and siding. It formed a firebreak that could be bulldozed out of the way if necessary.

As with the AC&W system, resupply of the DEW Line was an annual exercise in long-range logistics. Project 572 serviced the DEW Line annually beginning in 1953. It delivered over 212,000 tons of building supplies to DEW Line sites from Shepard's Bay, Canada, to Point Lay, Alaska. Later, DEW Line supply merged with the AC&W system's program.

By the time the DEW Line stations were completed, they consumed 46,000 tons of steel, 75,000,000 gallons of fuel, 22,000 tons of food and 12 acres of bed sheets.[23] They also cost the lives of 26 airmen and construction workers lost in 60 air crashes.

On July 31, 1957, the Western Electric Company turned the completed DEW Line over to the U.S. Air Force. The Air Force transferred nominal operational custody to Federal Electric, the service division of International Telephone and Telegraph (ITT). The world's longest single integrated radar system began operation, dedicated solely to defense of North America from aircraft intruding over the North Pole. The DEW Line stretched along the arctic coast from Canada's Baffin Island to Alaska's Point Lay.

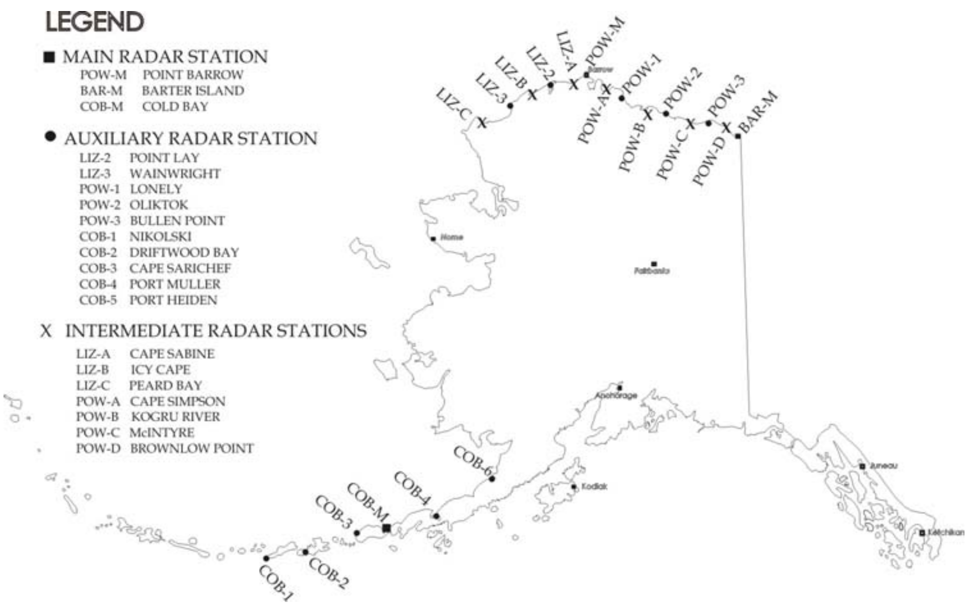

Figure 2: Distance Early Warning (DEW) Line Stations

Of the 52 DEW Line stations, sixteen were in arctic Alaska. There were main, auxiliary, and intermediate stations. Sector headquarters were at the main stations (POW-M, BAR-M). Auxiliary stations were at regular intervals in the 500 or so miles between main stations, and were designated by the next westerly main station's symbol, a dash, followed by the sequential number. Intermediate stations, or I-sites, equipped with doppler type radar fences, were between the rotating radars of main and auxiliary stations where necessary.

[23] La Fay, Howard. "DEW Line: Sentry of the Far North" in *National Geographic Magazine* (November 1958), pp. 129-146.

Arctic DEW Line

	Code	Name
Main:	BAR-M	Barter Island
	POW-M	Point Barrow
Auxiliary:	POW-1	Lonely
	POW-2	Oliktok
	POW-3	Bullen Point
	LIZ-2	Wainwright
	LIZ-3	Point Lay
Intermediate[24]:	LIZ-A	Cape Sabine
	LIZ-B	Icy Cape
	LIZ-C	Peard Bay
	POW-A	Cape Simpson
	POW-B	Kogru River
	POW-C	McIntyre
	POW-D	Brownlow Point
	?	Camden Bay
	?	Nuvagapak Island
	?	Demarcation Bay

In 1965, the Air Force awarded the Federal Electric Company the contract to operate the DEW Line. This began a trend towards employing civilian firms to operate important and sensitive military facilities.[25]

Information on potentially hostile, and even friendly, aircraft was sent laterally along the DEW Line to a Main station, then to the Air Defense Combat Centers at Campion from POW-M, or Murphy Dome from BAR-M. From the centers data was sent to the NORAD/CONAD Regional Combat Command Center (ROCC) at Elmendorf AFB and NORAD Command in Colorado.

The center of activity at Auxiliary and Main stations was the radar console. The surveillance room had the console, radar scopes, air and ground radio transmitters, fire alarm monitors, intra and interstation telephones, and teletype facilities. Two radicians staffed the console 24 hours a day. One operated the

[24] Camden Bay, Nuvagapak Island and Demarcation Bay were decommissioned in 1963 due to equipment upgrades to Main and Auxiliary stations. Thompson, Gail, and Werner, Robert. DEW Line: The Alaska Segment. Determination of Eligibility for the National Register of Historic Places documentation, on file at the Office of History and Archaeology, Anchorage, Alaska, 1986.

[25] A USAF officer who reported to the Commander of Detachment 1 commanded each station. Denfeld, *The Cold War in Alaska*, p. 27.

console and the other performed equipment maintenance. During each shift, console operators were to track targets as they appeared on the scopes, report targets to the controlling data center, provide aircraft with radar and weather advisories, and log equipment outages and significant actions. Other personnel were responsible for secondary areas at the DEW Line site including the garage, POL, and kitchen.

Arctic DEW Line stations reflect their isolation and inaccessibility. The number of modules at a station is dictated by the type of station. A Main station had two 25-module trains, an Auxiliary station had a single 25-module train, and an Intermediate station had five modules. All DEW Line stations had communication transmitter relay towers and gravel airstrips. The Main and Auxiliary stations had rotating radar housed in radomes that straddled the modular buildings.

The original radars were AN/FPS-19 line-of-sight search radars developed for the DEW Line by Raytheon Corporation. At a later date, ANJ/FPS-23 gap-filler radar was placed at the Main and Auxiliary stations to compensate for the AN/FPS-19's low altitude shortcomings. Intermediate stations had gap-filling electronic Doppler radar fence.

In 1985, the U.S. and Canada entered into the North American Air Defense Modernization Accord, Program 413L. Computer systems, software and communications upgrades were part of the improvement program. DEW Line stations at Barter Island, Oliktok, Point Barrow and Point Lay are USAF components of Program 413L. Abandoned DEW Line stations at Bullen Point, Wainwright and Point Lonely were updated with new unattended short-range radars and reactivated in 1994. Now known as the North Warning System of NORAD, the aircraft and missile warning system has 35 stations stretching from Point Lay in Alaska through Greenland. All radars report data to the ROCC at Elmendorf AFB, part of the Canadian-American Joint Surveillance System (JSS). Each site is staffed by seven contractor personnel, who operate long range AN/FPS-117 Air Defense Radar.[26]

Aleutian DEW Line

An extension to the DEW Line was authorized in 1957. Upon completion in 1959, it extended 630 miles along the Alaska Peninsula and the Aleutian Islands west to Umnak Island. The USAF built and activated six stations as part of Operation Stretchout. The Aleutian DEW Line stations were combined with White Alice tropospheric communication stations and equipped with FPS-19 radar.

A single Main station was built at Cold Bay, and Auxiliary stations at Port Heiden, Port Moller, Cape Sarichef, Driftwood Bay, and Nikolski. There may have

[26] Jane's Information Group. "Ground Radar/USA" in *Jane's Weapons Systems 1971-72, 1989-90*. Alexandria, Virginia: Jane's Information Group, 1971-72, 1989-90, p. 435.

been stations at Adak and Shemya as well.[27] These radars were decommissioned on June 1, 1969, although the attendant White Alice communications facilities operated until November 1978.

Aleutian DEW Line

	Code	Place
Main:	COB-M	Cold Bay
Auxiliary:	COB-1	Nikolski
	COB-2	Driftwood Bay
	COB-3	Cape Sarichef
	COB-4	Port Moller
	COB-5	Port Heiden

The Atlantic side of the DEW Line was anchored to radar picket ships and Texas Tower radar platforms, placed 100 miles offshore on the northeast continental shelf. On the Pacific side, the Aleutian DEW Line was linked to radar picket ships out of Adak and Hawaiian islands. These ships added another 2,800 miles of surveillance and doubled the length of radar coverage. EC-121 Warning Star airborne radar planes, the forerunner of today's Airborne Early Warning and Control System (AWACS) planes, out of Midway and Adak islands supplemented the ships.

Alaskan DEW Line stations had a runway; building complex for housing, mess, operations, and power generation; radome(s); and communications towers. Aleutian DEW Line stations differed in form but not function from the Arctic stations. They were accessible by ocean barge. Aleutian DEW Line stations were two-story, reinforced concrete composite buildings measuring approximately 162 feet by 179 feet.

Ballistic Missile Early Warning Site, 1961-1989

In 1953 the Air Force's Air Research and Development Command asked MIT's Lincoln Laboratory to study the ICBM defense problem. Lincoln Laboratory prepared three studies, known collectively as Wizard 3. The recommendations of Wizard 3 led to the development of a system of three Ballistic Missile Early Warning Stations.[28] Each BMEWS would have monstrous non-rotating radar antennas and communications gear to provide NORAD early warning of strategic missiles. The proposed system would be reliable in extremes of weather, incorporate electronic countermeasures, and discriminate between real and false alarms. Radar coverage above much of the Soviet land mass was achieved through the placement of BMEWS on or near the polar perimeter for 2,600 miles.

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[27] Denfeld, Colt. Review comments, Feb. 26, 1996.
[28] Schaffel, *The Emerging Shield*, p. 256.

Two months after the October 1957 launch of *Sputnik*, Secretary of Defense Neil McElroy directed the Air Force to continue research in early warning radar systems. The Air Force soon submitted General Operating Requirement (GOR) 156, calling for a practical Ballistic Missile Early Warning system (BMEWS) to provide radar coverage for North America.

The Department of Defense and Congress quickly approved GOR 156, and in May 1959 Alaska Air Command's C.F. "Nick" Necrason announced the imminent operational status of the BMEWS Site II at Clear (Figure 3). Located in a flat and open expanse 75 miles south of Fairbanks, BMEWS was designed to detect transpolar missile firings and bomber flights. The Clear complex[29] complemented sister facilities at Thule, Greenland (BMEWS Site I), and Flyingdales Moor, England (BMEWS Site III). Completed in 1961, and complemented with microwave and cable communications equipment, the $360 million BMEWS could give at least 15 minutes warning to SAC bombers located in America's heartland.

The complex at Clear is divided into three main areas: (1) Tech Site, (2) Composite Site, and (3) Camp Site. The Tech Site consists of the BMEWS radar and related buildings. The Composite site consists of support facilities such as dormitories, recreation falcilities and warehouse and is connected to the Tech Site by an enclosed utility corridor. Base operations facilities that are not directly associated with BMEWS compose the Camp Site.

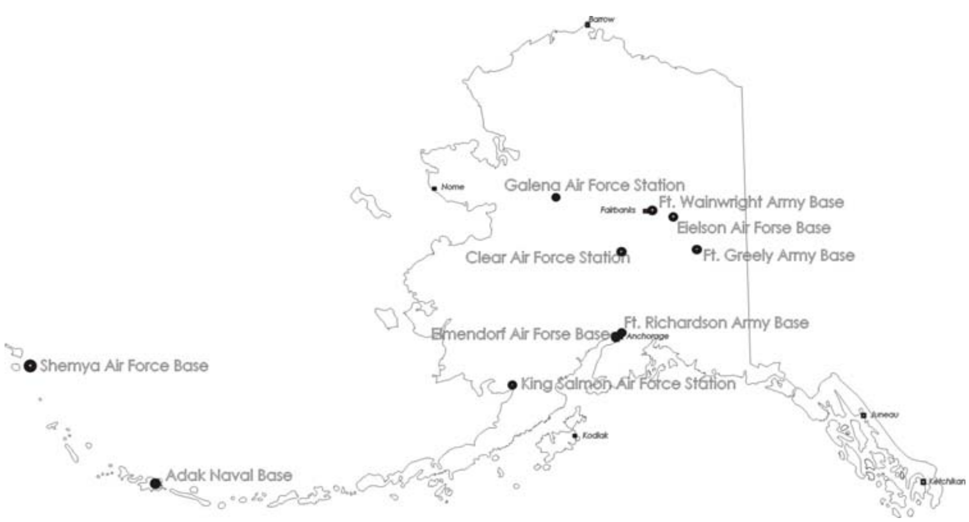

Figure 3: Alaskan Cold War Military Bases

[29] A study performed by the Argonne National Laboratory for the 21st Space Wing, Air Force Space Command found Clear Air Station (BMEWS Site II) eligible for inclusion in the National Register of Historic Places. Clear Air Station "represents the only remaining intact site of the first system constructed for early warning of Soviet ICBM attack across the polar region (1958-1961). Hoffecker, John F., Mandy Whorton, Casey R. Buechler. "Cold War Historic Properties of the 21st Space Wing, Air Force Space Command." Paper presented at the Cold War Workshop, Eglin Air Force Base, Florida, January 10-11, 1996.

A large radome that housed the 25 meter parabolic tracking radar and three 400 x 165-foot static radar assemblies dominated the site. Each billboard reflector stood on 40 concrete piers. Each pier was 20-feet tall and contained 45 cubic yards of concrete and steel. Each pier rested on a foundation of 5,400 cubic yards of concrete and reinforced steel bars. The antennas were built to withstand earthquakes and winds of 180 miles per hour.

Fifteen hundred workers worked building the complex. There were frequent, and at times violent, labor disputes. A million yards of gravel and a mile of underground passageways were excavated to protect BMEWS personnel from atomic attack and the attendant radiation. Anti-radiation measures built into the passageways included nearly 700,000 square feet of copper screening and twenty five and a half tons of solder to seal it in place. There was room for 600 people in one of BMEWS' two composite buildings.

There are two types of radar in use at Clear. The AN/FPS-92 tracking radar is marginally different from the tracking radars at Flyingdales Moor and Thule. The main reception and transmission element to this radar is the 25 meter diameter parabolic reflector that is mounted on a conical pedestal and rotated to track or search for a detected target continuously. The antenna is housed within a 43 meter diameter radome, consisting of two high-density 1 millimeter thick skins that cover a 15 centimeter thick Kraft-paper core. The radome is made up of 1,646 hexagonal and pentagonal blocks. The AN/FPS 50 is a large static radar that uses three tall parabolic reflectors fed by organ-pipe scanners. There are three of these large billboard antenna.

From the radar billboard antennas, two electronic beams fanned the atmosphere at differing angles. The radar pulse from objects passing through the beam closest to the horizon was fed to computers to determine position and velocity. Data from the second beam determined speed, trajectory, point and time of impact, and launch point.

Data from Clear was fed to NORAD's Semi-Automatic Ground Environment/back-up interceptor control (SAGE/buic) computer system, then to the NORAD Colorado Springs complex. In conjunction with early warning satellites, BMEWS is to warn of a ballistic missile attack. The Clear BMEWS supports the USAF Spacetrack system, which feeds in positional and velocity data for the display of all earth-orbiting satellites to the Cheyenne Mountain Space Defense Operations Center (SPADOC).

The Clear BMEWS facility has undergone technological modifications since operations began in 1961. Upgrades included replacing the older rotating radar with new phased array technology, the AN/FPS Pave Paws. New computers and software, increased bandwidth, larger raid tracking capability, and new ancillary communications connecting the site to NORAD have been installed. BMEWS Site II at Clear represents the only one of its type in the United States and of the three built, has escape substantial modifications from its original design. International Telephone and Telegraph (ITT) has operated and maintained the Clear BMEWS under contract with the USAF Space Command since 1987.

Cobra Dane Radar Facility, 1978-1989

Shemya Island, near the west end of the Aleutian chain (Figure 3), was a World War II base for bombing missions against the Japanese. The remote base also served as a stop for the Alaska-Siberian lend-lease aircraft program during the war. After, Shemya was a refueling stop for Northwest Airlines and the U.S. Military Transport Service to the Korean War, and home to the 375th Weather Reconnaissance Squadron.

In the 1960s and 1970s, the Soviets used the North Pacific Ocean and the Kamchatka Peninsula for their ICBM tests. Shemya's static radars were used as a component of the USAF's Spacetrack system to track orbital satellite traffic as well as missile testing. The Air Force needed a better measure of Soviet activities than Shemya's radars could provide.

In the early 1960s, physicists developed phased array radar. Using computers and solid state circuitry, phased-array radar allowed scanning without rotating or rocking antennas. Employing many small electronic sensors operating much like the compound eye of an insect, a phased array radar fed individual electrical impulses in precise computer controlled patterns. Unlike static radar, this technology used extremely short wavelengths to detect many small objects at once, even those moving very quickly through the atmosphere or in orbit.[30]

Congress authorized construction of the phased array Cobra Dane radar at Shemya in 1971 and work began in 1973. Four years and $68 million later, Cobra Dane was operational. Its AN/FPS-85 radar and AN/FPS-46 passive optical and radiometric sensors could track up to one hundred objects simultaneously with precise three-dimensional data on as many as twenty targets. Similar phased array radar on ships (Cobra Judy) and aircraft (Cobra Ball) supplemented Cobra Dane. Cobra Dane surveys a 2,000 mile, 120 degree corridor to collect data. Information from Cobra Dane is fed to the Space Defense Operations Center (SPADOC) at NORAD's Cheyenne Mountain Complex in Colorado.[31]

The Cobra Dane facility is a single multistory steel frame building. The building's western elevation is canted 20 degrees and provides the backdrop to which a 96-foot diameter, nearly circular phased array radar assembly is attached. More than 34,700 individual radiating elements (antennas) comprise the array. Each antenna is housed within a 5 inch diameter, 12 inch long plastic cylinder, affixed to ping-pong sized steel plates that are attached to the radar face. Only 16,000 radiating elements are active, the others are dummies for spacing. The radar is electronically steered.[32]

[30] Ruhl, Robert K. "In the Day of the Dane" in *Airman Magazine* (June 1977), pp. 41-48.

[31] Jane's Information Group. "Ground Radar/USA," pp. 56, 276.

[32] Klass, Phillip J. "USAF Tracking Radar Details Disclosed" in *Aviation Week & Space Technology*, October 25, 1976, p. 41.

NOTES

Communicate

The U.S. Army built the Washington-Alaska Military Cable and Telegraph System (WAMCATS) at the turn of the century. By the 1920s, WAMCATS had outlived its five year life expectancy. Gradually, wireless radiophone replaced the wire. Although built by the military, the Congressional act that authorized the telegraph's construction directed the army to make it accessible to civilians whenever possible.

WAMCATS was renamed the Alaska Communications System (ACS) in 1936. It was expanded to handle the military's air defense communications in Alaska after the Japanese attack on Pearl Harbor. The Cold War pushed the capabilities of the ACS to its limits. The Korean War spurred modernization and expansion of the system, at a cost of $10 million.[33]

As the ACS strained to keep up with communications needs, the Alaska Air Command began to build its AC&W radar detection net. Alaska's AC&W system began operating in 1951, the DEW Line in 1955, with the BMEWS soon to follow. The remoteness of the radar stations, the accelerated urgency of their message, and the frequency and power of auroral disturbances (northern lights) demanded a better, faster and more reliable system of communications.

As early as 1948, scientists were experimenting with differing radio frequencies, and the Air Force had incorporated VHF into microwave transmission for voice communications up to 200 miles. Active AC&W radar jammed VHF signals, rendering communication and radar operations difficult and often impossible. The military's frustration with these co-technologies led to the formation of the Alaska Communication Study Group, which enlisted the help of Bell Systems.

The military wanted something that would span Alaska's vast distances and operate dependably in the storms, long winters, extreme cold and wind characteristic of arctic and subarctic latitudes. It had to function continuously through auroral disturbances. It had to carry voice, telex, and data transmissions simultaneously. Bell Systems came up with a new technology known as forward propagation tropospheric scatter, or just tropo.

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[33] Woodman, Lyman L. The U.S. Army in Alaska. USARAL Pamphlet 360-5, Anchorage, Alaska: U.S. Army Public Information Office, 1972, pp. 98-99.

White Alice Communication System,[34] 1957-1974

Between 1955 and 1957, Western Electric Company (WECO) built twenty White Alice (WACS) stations and the Army Corps of Engineers built eleven. WECO assembled the electronic equipment. The stations were sited to facilitate communications for the AC&W and DEW Line stations, and to provide teleprinter and digital communications for Alaska's military commanders. Twenty two of the stations were tropos, three combined tropographic scatter and microwave (TD-2) technologies, and six stations were microwave configuration only.

White Alice Communication System, 1957

Tropo		Micro	Tropo/Micro
Aniak	Kotzebue	Clam Gulch	Neklasson Lake
Anvil Mt.	Cape Lisburne	Naptowne	Diamond Ridge
Bear Creek	Middleton Is.	Rabbit Creek	Pedro Dome
Bethel	Cape Newenham	R1-N	
Big Mt.	North River	Soldotna	
Boswell Bay	Northeast Cape	Starisky Creek	
Fort Yukon	Pillar Mt.		
Granite Mt.	Cape Romanzof		
Indian Mt.	Sparrevohn		
Kalakaket Cr.	Tatalina		
King Salmon	Tin City		

Initially estimated to cost $38 million to build, the first White Alice stations ran up a construction bill of over $140 million.[35] By 1958, however, a state-of-the-art communications network linked the Alaska AC&W and DEW Line systems with Alaskan Interceptor squadrons at Campion, Elmendorf and Eielson AFBs, as well as NORAD Command in Colorado.

[34] The Corp of Engineers prepared documentation for a determination of eligibility for the National Register of Historic Places for the White Alice Communication System in 1988. It has been determined that the system's significance is on the national level in the areas of communications and military.

[35] Baker, Raymond T. *A Special Study of the Sale of the White Alice Communication System*. Elmendorf AFB, Alaska: 1931st Communications Wing, Office of Air Force History, 1987, p. 229.

When the Aleutian DEW Line stations were built in the late 1950s (Operation Stretchout), they integrated WACS stations.

Operation Stretchout

Port Heiden	Port Moller
Cold Bay	Cape Sarichef
Driftwood Bay	Nikolski

Figure 4: White Alice Communications System (WACS)

The final phase of WACS deployment came in the late 1960s, when Project Bluegrass extended the White Alice system to Adak and Shemya islands. Employing previously untried 120 foot parabolic tropo reflectors, the WACS at Adak and Shemya communicated with each other from a distance of 393 miles, completing the Aleutian White Alice System, and covering 1,400 miles.

The complete WACS system spanned 170,000 voice-channel miles, 50,000 teleprint channel miles, and over 3,000 linear Alaskan miles. Alaska's civilian population came to depend on WACS, as they had depended on its predecessors. WACS provided reliable long distance communications throughout the territory for the first time.[36]

At the time, tropospheric backscatter was the most sophisticated communications technology the world had known. In the early 1960s, WACS boasted 1 and 1/2 million miles of circuitry, enough to circle the earth 57 times.[37] Yet, White Alice was approaching obsolescence before it was dedicated at Elmendorf AFB on March 26, 1958. The launch of Sputnik six months earlier signaled the dawn of the space age, lighting the path for the communications satellite SATCOM in 1973. The Air Force never upgraded WACS' slow and cumbersome Klystron vacuum tube system.

In 1967, Congress passed the Alaska Communications Disposal Act, authorizing the sale of government-owned communications in Alaska. The ACS was privatized in 1971. In 1973 ALASCOM (RCA's Alaska Communications, Inc.) began negotiations with the Air Force for purchase of the White Alice system. On August 14, 1983, the U.S. military concluded eighty years of long-line communications in Alaska, when ALASCOM handed the USAF a check for the sum of $135,348.45.[38]

Today, many WACS stations have been partly or completely demolished. Others are scheduled for a similar fate. Altered, some WACS station continue to operate as ALASCOM satellite relay stations.

Tropo stations had composite buildings housing support and operation functions, billboard antenna, and microwave facilities. WACS stations close to established communities had radio relay buildings rather than composite buildings. Stations along roads were the TD-2 microwave type. Some had POL tanks, security fence, auto maintenance shops, equipment huts, water cisterns, power, heat and water buildings, warehouses, and dormitories.

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[36] Ibid.

[37] Reynolds, Georgeanne Lewis. *Historical Overview and Inventory: White Alice Communication System*. Anchorage, Alaska: U.S. Army Corps of Engineers, 1988, p. 6.

[38] Baker, *A Special Study of the Sale of the White Alice Communication System*, pp. 230-231.

Intercept and Respond

The Cold War marked the true advent of the modern jet and rocket ages. Manned and unmanned aircraft with extraordinary offensive capabilities--flying faster, higher, and farther--became the weapons. America, relatively late in the jet and rocket propulsion games, needed to quickly develop new weapons and strategies or risk falling victim to the Soviet threat.

In the mind of the American air defense strategist, air defense consisted of detection, identification, interception and destruction.[39] Radar and communications figured prominently in the first three. Destruction required interceptor aircraft, artillery, and missiles designed for the purpose.

As early as 1946, the American-Canadian Permanent Board on Joint Defense began planning for strategic polar defense. The U.S. entered into negotiations with fellow NATO members; Denmark for military use of Greenland, and Iceland for similar arrangements. The polar concept persuaded Air Force Commanding General Carl Spaatz to tell his commanders in fall 1946 that "Development of the Arctic front is our primary operational objective."[40]

On September 3, 1949, a WB-29 aircraft fitted for long range reconnaissance flying from Japan to Eielson AFB in Alaska at 18,000 feet discovered atmospheric traces of the first Soviet atomic test.[41] The Russian A-bomb was a reality, and a new sense of urgency invaded the American air defense establishment. Nine months later, Soviet sponsored North Korean troops streamed south over the 38th parallel into South Korea. In 1952, accelerated construction programs and military force level commitments in Alaska brought in $170 million in defense spending.[42] The race to achieve an air defense shield was underway.

Initially, the purpose of air defense was not to shoot down Soviet bombers, but to allow SAC sufficient time to respond.[43] In the wake of the 1947 reorganization under the JCS, the Air Force would become the preeminent branch of service. SAC was in possession of the nuclear arsenal.

As the philosophy of deterrence was established early in American defense circles, so was its corollary, the concept of forward deployment. Forward deployment called for strategic forces to be in quick response distance to the enemy. The problem with forward deployment, RAND analysts discovered, is that the enemy was close to you. By the mid-1950s Air Force strategists determined that the flaws inherent in forward deployment outweighed the deterrent effect.

[39] Schaffel, *The Emerging Shield*, p. 72.
[40] Ibid, p. 58.
[41] White, *World in Peril*, p. 40.
[42] Nielson, *Armed Forces on a Northern Frontier*, p. 190.
[43] Schaffel, *The Emerging Shield*, p. 251.

Further, Eisenhower made a preventive war a non-issue. The result was the Fullhouse concept.[44] Combined with the strategic edge of the long-distance B-52, the role of SAC bases in places like Alaska changed from pre-strike to dispersal, refueling, and post-strike support by 1963.

Nike Hercules, 1959-1979

The limits of conventional anti-aircraft artillery (AAA) in the early jet and rocket ages stimulated research and development toward viable guided missile systems as early as 1945. The Army selected Western Electric Company and Douglas Aircraft as prime contractors. The missile system they developed was known as Nike, for the Greek winged goddess of victory. Accelerated by the Berlin Crisis, the 1949 Soviet A-blast, the outbreak of the Korean War, and the dark assessment of Soviet intentions promulgated in NSC-68, American surface-to-air missile research program produced a viable Nike I (designated SAM-7-A) missile system by early 1951. Nike I (renamed Nike Ajax) was first fielded in 1954 at Fort Meade, Maryland. Within two years it outnumbered conventional 90 and 120mm AAA batteries, and replaced them in the U.S. by 1958.[45]

As Nike Ajax installations were deployed, a new generation of Nike (SAM-N-25 "B") with greater range (87 miles), ceiling (150,000 feet), and speed (Mach 3.67) was field ready. Called Nike Hercules, this missile was nuclear capable. By 1964, the 133 Nike Hercules batteries nationwide replaced its smaller, conventional predecessor.

The Department of the Army announced in 1958 that Nike Hercules would be placed in Alaska. The first Nike installation was Site Bay near Anchorage, activated March 20, 1959. Sites Point and Summit near Anchorage, and Sites Tare, Peter, Mike and Jig near Fairbanks achieved initial operational status in May. Fairbanks' Site Love began operations in 1960. Nine Nike batteries at eight sites formed the air artillery arm of ALCOM.

Nike Missile Batteries in Alaska (Figure 5)

	Battery/Name	Operation Dates
Fairbanks/Eielson:	A Tare	1959 - 1971
	B Peter	1959 - 1971
	C Mike	1959 - 1970
	D Jig	1959 - 1970
	E Love	1959 - 1971

[44] Kaplan, Fred. *The Wizards of Armageddon*. New York: Simon and Schuster, 1983, pp. 85-108.

[45] Denfeld, D. Colt. *Nike Missile Defenses in Alaska: 1958-1970*. Anchorage, Alaska: U.S. Army Corps of Engineers, 1988, p. 2.

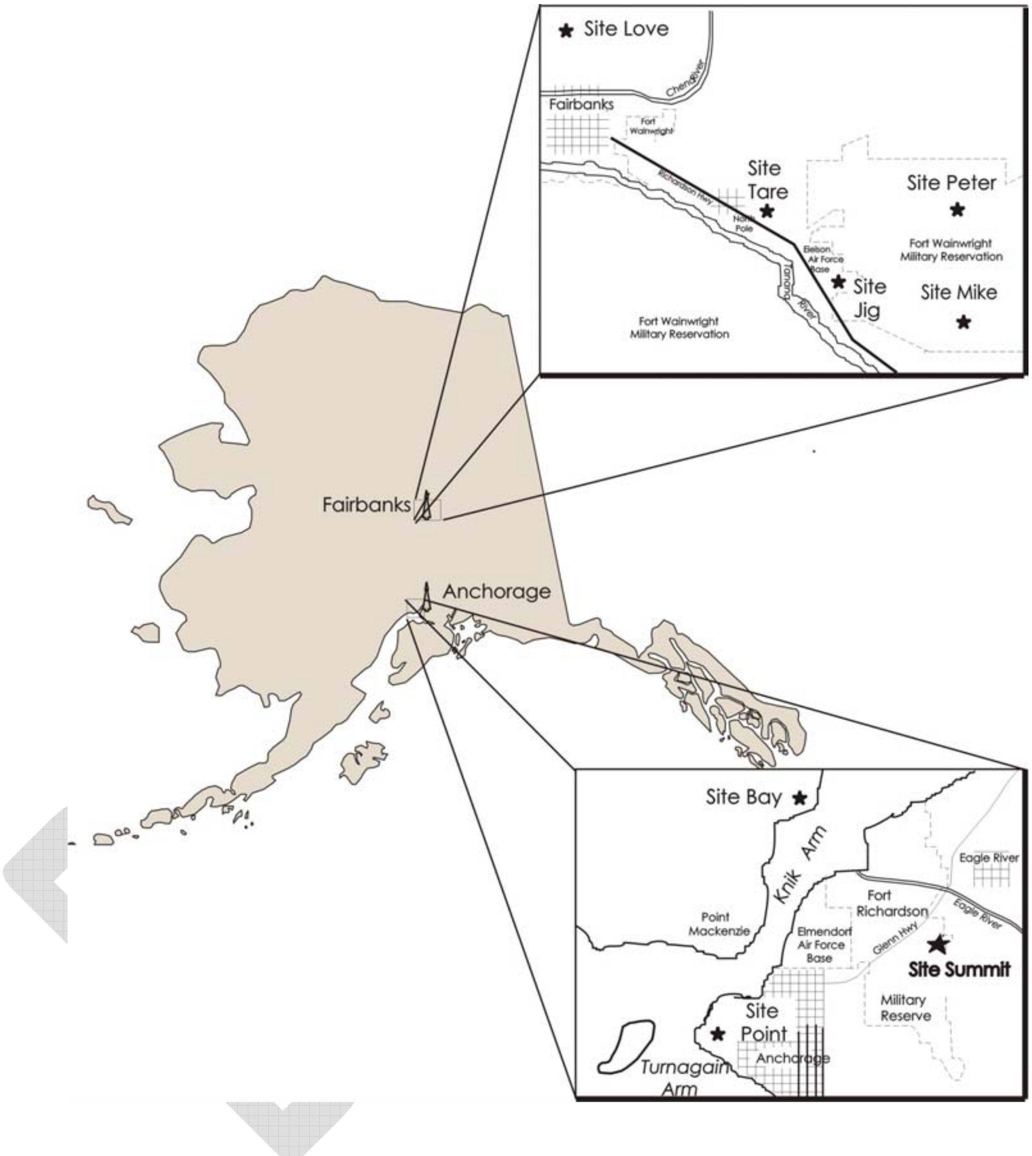

Figure 5: Alaska Nike Sites

Anchorage:	A Point (2 batteries)	1959 - 1979
	B Summit	1959 - 1979
	C Bay	1959 - 1979

Command of Nike Hercules in Alaska came under USARAL Air Defense Group, directing two Army missile battalions stationed at Fort Wainwright and Fort Richardson. Fort Wainwright supplied logistical support for the 2nd Missile Battalion, 562nd Artillery. Fort Richardson supported the 4th (redesignated the 1st in 1972) Missile Battalion, 43rd Artillery.

Nike batteries in Alaska performed under extreme climatic conditions. Frequent atmospheric disturbances, ice, wind, and bone-numbing cold were normal operating conditions. Specially designed clamshell covers of stressed metal skin permitted periodic radar de-icing and maintenance. Thermal elements under the concrete launch aprons controlled the buildup of ice and snow. Utilidors protected the lines of communication and utilities. To avoid permafrost, launch structures were built above-ground.

The sophisticated technology of guided missiles required integrated actions of 125 soldier/technicians to make a Nike site perform. Alaska's Nike batteries were on round-the-clock alert, requiring shifts of fifty or more to be housed on-site at a time. Guardhouses were staffed and sentry dogs patrolled the fencelines of the outer perimeter 24 hours-a-day.

If a DEW Line or AC&W station registered an unidentified aircraft, information on the number, speed, direction and altitude would be relayed by White Alice facilities to the NORAD centers. The Nike site's acquisition radars would sweep the skies for the aircraft. Once an enemy was identified and confirmed, target tracking radar locked on, feeding data to the missiles readied at the launch structure. Nike Hercules would launch on the command of the Battery Control Officer. In flight, radars and computer would work in tandem to keep the missile on target to the impact point where the warhead would detonate.

Alaskan Nike sites Peter and Summit were unique among Nike installations in the United States. They were the only Nike Hercules missile batteries on American soil to hold on-site firings. Targets included computer generated points in space, and miniature airplane drones. Early firings exposed weaknesses in the tactical radar systems, and by 1962 sites had high power acquisition (HIPAR) radars. Live firings from Site Summit stopped in 1964, though Site Peter continued them at least through 1968.[46]

Nike Hercules sites are critical elements in the larger overall air defense network. They were to provide a demanding American public a technologically advanced defense against Soviet bombers striking the American heartland. Nike Hercules missile batteries operated from 1959 to 1979. In the 1960s, live practice

[46] Ibid.

firings from two Alaska batteries (the only Nike sites in North America to have live firings) indicated readiness to combat enemy aircraft attacking America. Nike combined Cold War cutting edge technologies of computerization, rocketry, and nuclear warheads into a lethal weapon system.

Nike Hercules sites have structures in two separate areas, defined by function and located according to local terrain. The launch area generally included two missile launch and storage structures, a launch control and general operations building, missile maintenance shop, motor repair shop, fuse and detonator magazine, warhead magazine and dog kennels. This area was protected by a double fence, alarm intrusion system, and sentry station.

The battery control area had the operations building, which held the target tracking and missile tracking radars, barracks and living facilities; a high power acquisition radar (HIPAR) building with radar; and repair shop. The battery control area was sited at a higher elevation than the launch control for the proper line-of-sight. It was sited within 5,000 feet of the launch area to offer the same point of reference for target and missile tracking radars. Anchorage's Site Summit is the only Alaskan Nike site that has escaped demolition or extensive alterations.

The frenetic pace of technological change rendered the Nike Hercules missile system obsolete within a decade of its deployment in Alaska. By the end of the 1960s, the nation's cities and strategic bases were so vulnerable to Russian ICBMs that vulnerability to manned bombers had little relevance.[47] As the missile threat eclipsed the threat of manned bombers, Nike Hercules was eclipsed by ABM systems like the SAM-D, later known as Patriot, although actual ABM deployment was limited to a negligible number by the 1972 Salt II treaty. Nike Hercules ended twenty years of service in Alaska when the remaining three Nike batteries closed on May 10, 1979. They were among the last Nike Hercules batteries to be deactivated in the U.S.

Forward Operating Bases, 1948-1989

Forward Operating Bases (FOBs) extended the reach of the U.S. Air Defense Command's ability to intercept airborne intruders. The bases in Alaska, located close to the Soviet Union, intercepted more aircraft than others. King Salmon (Figure 3), known as Naknek Field until 1954, became a FOB in 1948 when the Air Force sent F-80 Shooting Stars, then America's first front-line jet fighter, there. In March 1951, the Air Force sent four F-94 Starfires to Galena for intercept duty.

By 1954, advancements in all-weather interceptor technology led to the replacement of the F-94s, transitional fighters with no de-icing capabilities, with the bigger, heavier twin-engine Northrop F-89 Scorpion. At Galena, this event

[47] Schaffel, *The Emerging Shield*, p. 268.

coincided with an ambitious program to pave and lengthen the runway and improve its lighting system.

In the late 1950s, the Air Force assigned Mach-plus high-ceiling fighters, the delta-winged F-102s and 106s, to the Alaska FOBs. The F-102 Convair Delta Dagger and F-106 Delta Dart could overtake a Soviet intruder. The all-missile armament of these planes included up to six state-of-the-art Falcon missiles. Both planes were could carry the USAF's first tactical nuclear air-to-air missile, the AIM-26 Genie.

After 1957, the focal point for the intercept duties assigned FOBs was the Combat Alert Cell. The CAC was the hub of activity at a base. Also known as the ready hanger, the CAC answered the need to get airborne quickly, prepared to meet the Soviet threat. Its design is unique to Cold War military construction. The typical CAC is a combination aircraft hanger, maintenance facility, and refueling depot with a self-contained living area for the pilots on the second floor.

When radar detected an unidentified aircraft in Alaskan airspace, the intruder's location and direction would be radioed to an Air Defense Direction Center such as Campion or King Salmon. The station would transmit the information to the nearest FOB. Minutes later, planes were in the air to challenge the intruders.

By the 1960s fear of Soviet bombers was eclipsed by fear of Soviet missiles. ICBM detection now had priority, resulting in the opening of the BMEWS at Clear in 1961. During the 1960s, however, there was increased frequency of interceptions for Alaska's FOBs. The first visual intercept of Soviet aircraft (two TU-16 Badgers) took place in 1961 above the Bering Sea. The two American interceptors were F-102s of the 317th Fighter Interceptor Squadron from Galena FOB.

Crews from Galena made fifteen more intercepts before 1968; from King Salmon, eight. Galena had 197 intercepts of Soviet aircraft between 1961 and 1991, the most for any U.S. base during the Cold War. Fighters from King Salmon tallied 69 intercepts. The frequency of intercepts increased dramatically in the 1970s, a result of the deployment of the F-4E Phantom II. Considered the best fighter-bomber ever built, the Phantom had great range and durability and on-board radar.

With the assignment of two E-3 Sentry Aircraft Warning and Control System (AWACS) planes to Elmendorf in 1986, intercepts reached an all-time high. In 1987, Alaska's intercept tally was 33.[48] As the result of reduced air threat to North America and the overall reductions in the Department of Defense

[48] Allen, TSgt William J. *Hunting the Soviet Bear: a study of Soviet Aircraft Intercepts near Alaska 1961-1991.* Elmendorf AFB, Alaska: Eleventh Air Force Office of History, Headquarters Eleventh Air Force, 1992, p. 73.

budgets, the Air Force placed Galena and King Salmon FOBs in caretaker status after 1989.

Eielson Air Force Base

Named after Alaskan aviation pioneer Carl Ben Eielson in 1948, Eielson AFB (Figure 3) began as a storage annex to Ladd Field near Fairbanks. Opened in late 1943 as Mile 26, for its milepost on the Richardson Highway, the Army stored excess lend-lease planes there. In 1946, the Air Force selected Mile 26 for a permanent base. In anticipation of the needs of SAC bombers and WB-29 reconnaissance aircraft, the Air Force lengthened the runway to 10,000 feet and built a railroad spur from Ladd AFB.

During the Cold War, Eielson AFB served as a base of operations for intelligence gathering and electronic eavesdropping activities.[49] Its other prominent mission was as a launch platform and arctic training station for the huge SAC bombers. The Joint Emergency War Plan of 1947 directed that SAC bombers be stationed in Alaska. SAC chose Mile 26, and in 1948 the runway was lengthened a second time, to 14,520 feet, making it the longest runway in North America at the time.

The extension was necessary to accommodate America's new heavy bomber, the B-36 Peacemaker. The Peacemaker had a wingspan of 230 feet, 90 feet longer than its B-29 Superfortress predecessor. At 205 tons (loaded) it was nearly four times heavier than the B-29 and could carry 43 tons of conventional or nuclear bombs. In order to get its preponderant frame, ordnance and crew of fifteen off the ground to a target 4,300 miles away and back, the B-36 had four General Electric turbojet engines and six air-cooled radial engines. In 1948 Eielson AFB was one of only four air installations on American soil with a runway long enough to launch the Peacemaker.[50]

At least six SAC exercises of bomber, fighter, tanker and reconnaissance aircraft and crews occurred in 1955. They included Operation Snowbird in January, Operation Sea Blast from May through September, and Operation Steam Shovel on October. In 1957 Eielson participated in operation Reflex Action, in which SAC rotated bombers to Eielson and other forward bases for short but maximum alerts of ten to fourteen days. During these tours, one third of the bombers were always on full alert for 72-hour periods, fully loaded with nuclear ordinance.

On January 1, 1961, the Air Force transferred Ladd AFB to the Army and it was renamed Fort Wainwright. Eielson assumed command of cold weather testing

[49] From its inception, Eielson AFB had a major polar geophysical mapping, intelligence and reconnaissance role. A WB-29 based at Eielson discovered the first evidence of Soviet atomic testing in 1949. Eielson took part in the Ferret flights over Russia from the 1950s into the 1970s, and Rivet, Cobra Ball and U-2 flights beginning in the 1960s. Further research on these activities is needed.

[50] Denfeld, *The Cold War in Alaska*, p. 16.

of aircraft and equipment. The Air Force Arctic Survival School, Cool School, moved to Eielson from Ladd in October 1960.

Eielson's role as a SAC forward deployment base ended in 1963 when the last B-47 Stratojets were reassigned. Refueling tankers replaced the bombers. Eielson became a dispersal and post-strike SAC facility, whose primary aircraft were the KC-135 aerial refueling tankers of the 4157th Strategic Wing. Tactical bombing training at Blair Lakes continued.

By the end of the Cold War, Eielson AFB had a diversified mission. In addition to reconnaissance and cold weather testing, the mission included tactical air support and training, aerial refueling, and fighter interceptor duties.

Conclusion

The seven years since the end of the Cold War have been ones of major change for the military in Alaska. King Salmon and Galena air fields are being placed in caretaker status. Shemya, renamed Eareakson AFB in 1991, has been downsized. The Army identified Fort Greely and the Navy identified Adak Air Facility for closure by 1998. As a result, major military activities include environmental clean-up and demolition of closed AC&W, White Alice, and DEW Line stations. Much of this work is being performed without an understanding of the broader historic context of the Cold War in Alaska.

Military offices in Alaska have studied the Nike Hercules facilities, the White Alice communications system, the DEW Line, Eielson AFB, and the railmobile command post. There are also studies that provide an overview of the different DoD entities in Alaska. Most of these studies were done to comply with the National Historic Preservation Act of 1966 (as amended). While useful, they lack a overview of the Cold War in Alaska which would help evaluate the properties. Several of the older studies need to be revisited because of new information that has become available. A recent study by the Corps of Engineers, *The Cold War in Alaska*, provides a chronology of events and starts to establish property types.

Unlike the other studies, *The Coldest Front* considers the Cold War systems in Alaska in terms of function and technology. It shows that the different systems depended on each other and all were integral to the whole. This perspective needs to be considered when properties are reviewed for their historic significance.

Three of the themes identified--detect and monitor, communicate, and intercept and respond--are addressed in this study. Two themes have yet to be addressed. Guard and defend would include a discussion of Army and Navy bases in Alaska. Research would address Project Chariot, the Amchitka nuclear test site, Fort Greely's cold weather testing station, and the Naval Arctic Research Laboratory.

NOTES

Suggestions for Future Research

The classified nature of much information and technical data on Cold War sites and systems in Alaska made full discussions of the selected Cold War facilities not possible. Some information was requested under the Freedom of Information Act, but DoD denied the request citing DoD Report 5400.7R, section 4.

A number of systems and sites were not addressed in this survey, either for lack of information on their activities, for lack of physical evidence, or because of time constraints. These include:

Detect and Monitor

Ground Observer Corps (GOC) were civilian volunteers who watched Alaska's skies with binoculars and radio equipment; no properties associated with this activity are known.

Minimally Attended Radar/LRRS, and the North Warning System replaced the DEW Line and AC&W systems. They are currently operational and classified.

Relocatable-Over-The-Horizon-Radar (ROTHR), placed on Amchitka Island in 1988, was closed and partially dismantled in 1993. More research is required.

Over-The-Horizon-Backscatter-Radar (OTHB) construction began in 1988 near Gakona, but was discontinued several years later. The site is now used by the High Altitude Auroral Research Program. More research is required.

Intercept and Respond

Anti-Aircraft Artillery (AAA) served from 1952 until the deployment of Nike missile batteries in 1958. There were four AAA sites in Anchorage and six AAA sites around Fairbanks; all are privately owned. The Alaska District, Army Corps of Engineers plans to further research the system.

Davis AFB (Adak), Cold Bay Airfield, Marks AFB (Nome), Wildwood AFS were active Cold War facilities. Only Davis AFB has physical integrity, and it is already part of the Adak Island National Historic Landmark for World War II. Davis AFB had a minor Cold War role from 1945 until 1950.

Adak Naval Air Facility served as the main base for the Alaska Sea Frontier (ALSEAFRON) from 1950 to 1993. Activities included radar picket and anti-submarine patrols. Nuclear tipped torpedoes were stored there (Arkin, Fieldhouse 1985) for anti-submarine use. Also, the U.S. Naval Security Group operated a huge antenna field for an electronic intelligence listening post.

Ladd AFB was a Cold War intercept and reconnaissance base from 1945 until it was turned over to the U.S. Army in 1960. Ladd AFB was home to Operation Nanook (polar photomapping) and Ferret electronic intelligence programs. Renamed *Fort Wainwright*, the post is a center for cold weather training and headquarters for the 6th Light Infantry Division.

Elmendorf AFB has been the Alaska Air Command headquarters since 1946 and the Alaska Command (ALCOM) headquarters since 1947. It was an important air-intercept base, NORAD Regional Combat Center, and administrative center for all military activities in Alaska.

Shemya AFB served as a refueling stop on the Great Circle Route until the USAF reactivated it in 1958. Designated an Air Force Base in 1968, Shemya functioned as an intelligence gathering platform for the Cobra Dane Radar and RC-135 flights.

Fort Richardson is still the main army post for southern Alaska. During the Nike Hercules era, it was headquarters and support installation for the Nike battalions near Anchorage.

Fort Greely opened as the Arctic Training Center (ATC) in 1948. Greely hosted the Arctic Indoctrination School. In 1953 it underwent major expansion. Fort Greely is also the site of the SM-1A nuclear power plant built in 1961, the first of its kind in the field and the only nuclear power plant in Alaska.

Other Cold War sites include former naval bases (Kodiak); maneuver and training areas (Black Rapids Camp, Clearwater Lake Camp); recreation camps; research sites (Naval Arctic Research Laboratory), Amchitka nuclear test site, Cape Thompson (Project Chariot); transportation sites (the Haines-Eielson and Whittier-Elmendorf pipelines).

Timeline

1946	Feb 22	George F. Kennan sends his long telegram
	Mar 5	Winston Churchill gives his Iron Curtain speech
	Mar	Army Air Force establishes Air Defense Command as part of operational command with Strategic Air Command and Tactical Air Command
	Oct 1	Alaskan Air Command relocates from Davis Air Force Base, Adak, to Elmendorf Air Force Base, Anchorage
		Joint Chiefs of Staff develops the polar concept
		Hoge Board recommends 36 AC&W sites in Alaska
1947	Jan 1	Joint Chiefs of Staff establishes Alaskan Command (ALCOM), the first unified command
		Air Force develops Supremacy Plan for a system of radar sites across the U.S. and Alaska
		The Emergency War Plan directs that SAC bombers be stationed in Alaska
		First large scale cold weather training, Exercise Yukon, takes place at Big Delta
1948		Berlin crisis
		Mile 26 field near Fairbanks is lengthened and becomes Eielson Field, one of only four in the U.S. capable of launching B-36 Peacemaker planes
		Naknek Field (renamed King Salmon in 1954) becomes a forward operating base
	May	New Army Arctic Indoctrination School starts at Station 17, ATC (Big Delta Army Air Field)
1949		Soviet Union tests atomic bomb
	Sep 2	Eielson based plane detects first Soviet nuclear test
1950	Apr	National security analysis study NSC-68 recommends military provide an adequate defense against air attack on

		the U.S.
	Jun 25	Korean War starts
1951		AC&W stations start operating
	Mar	Galena becomes a forward operating base
		Air Force study East River concludes that civil defense measures alone would be nearly futile against atomic weapons
		MIT's Lincoln Laboratories' Summer Study Group proposes DEW Line and its Project Charles recommends computerization of air defense systems
1952		Anchorage and Fairbanks receive antiaircraft artillery gun batteries
1953		MIT's Lincoln Laboratories prepares Wizard 3 studies that lead to development of BMEWS
	Mar 15	Soviet MIG-15 fighters fire on U.S. WB-50 weather plane near the Kamchatka Peninsula
1955		White Alice communications stations start operating
	Jul 31	DEW Line starts operating
1957	Oct 4	Soviet Union launches *Sputnik* satellite
		Canada and the U.S. create the North American Aerospace Defense Command (NORAD) housed inside a mountain at Colorado Springs
1958	Jan 31	U.S. launches *Explorer I* satellite
	Aug	Air Force begins construction of BMEWS station at Clear, becomes operational in 1961
		Atomic Energy Commission selects Cape Thompson as a Plowshare Program site and proposes Project Chariot to use nuclear power to create a deep water harbor; abandons project in 1962
	Mar 5	Radar tracks first known Soviet long-range bombers flying a reconnaissance mission over Alaska

1959		Nike Hercules batteries at Anchorage and Fairbanks replace AAA batteries
	Apr	Aleutian DEW Line stations start operating
1960		Annual practice at Nike Site Summit includes test firings
1961		Communists construct the Berlin Wall
		Planes from Galena FOB make first visual intercept of Soviet aircraft above Bering Sea
1962		Cuban missile crisis
1965		Air Force contracts with Federal Electric Company to operate DEW Line
	Nov 29	Atomic Energy Commission conducts 80 kiloton underground nuclear test, Long Shot, the first of three on Amchitka Island
1973		Satellite communications begin, making White Alice stations obsolete
		The Department of Defense begins building Cobra Dane radar station at Shemya Island, starts operating in 1977
1983		NORAD Region Operations Control Center at Elmendorf Air Force Base is operational
		President Reagan proposes Star Wars strategic defense initiative
1984		Minimally Attended Radars become operational
1985		U.S. and Canada sign North American Air Defense Modernization Accord
1987		Air Force Space Command contracts with International Telephone and Telegraph (ITT) to operate Clear BMEWS
1989	Nov	Fall of the Berlin Wall signals the end of the Cold War

NOTES

Glossary of Acronyms

AAA	Anti-Aircraft Artillery
AAC	Alaskan Air Command
ABM	Anti-Ballistic Missile
AC&W	Aircraft Control and Warning
ACS	Alaska Communications System
ADC	Alaska Defense Command
AFB	Air Force Base
ALCOM	Alaskan Command
AWACS	Airborne Warning and Control System
BMEWS	Ballistic Early Warning System
CAA	Civil Aeronautics Administration
CONAD	Continental Air Defense Command
DEW	Distant Early Warning
DEWIZ	DEW Line Identification Zone
DoD	Department of Defense
FEC	Federal Electric Company
GCI	Ground Control Intercept
GOC	Ground Observer Corps
GOR	General Operating Requirement
ICBM	Intercontinental Ballistic Missile
IOC	Initial Operating Capability/Capacity
IRBM	Intermediate Range Ballistic Missile
JSS	Joint Surveillance System
MAD	Mutual Assured Destruction
MAR	Minimally Attended Radar
MIDAS	Missile Defense Alarm System
NORAD	North American Air Defense Command
NSC	National Security Council
POL	Petroleum, Oil and Lubricants
ROCC	Regional Operations Command Center
SAC	Strategic Air Command
SOSUS	Sound Surveillance System
SPADOC	Space Defense Operations Center
SRF	Strategic Rocket Forces (Soviet)
SAGE	Semi-Automatic Ground Environment
TACAN	Tactical Air Navigation
UHF	Ultra High Frequency
USAF	United States Air Force
USARL	United States Army in Alaska
USCG	United States Coast Guard
USN	United States Navy

NOTES

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