

The Distant Early Warning (DEW) Line:
Transformer of the Arctic

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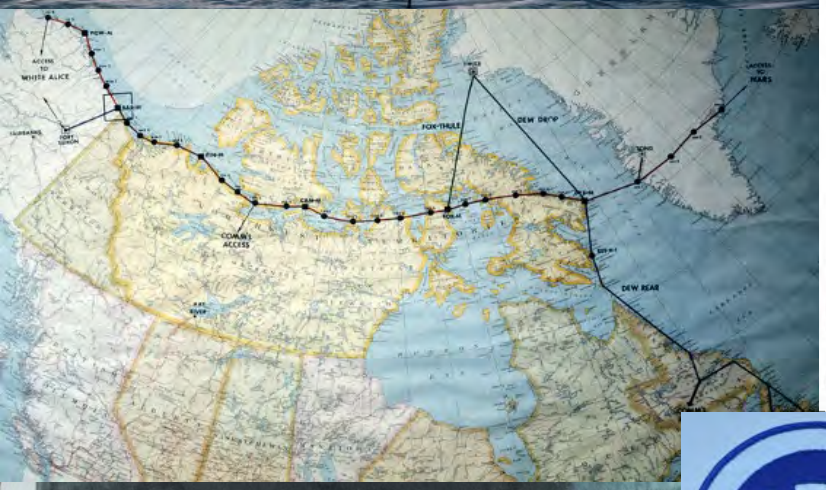
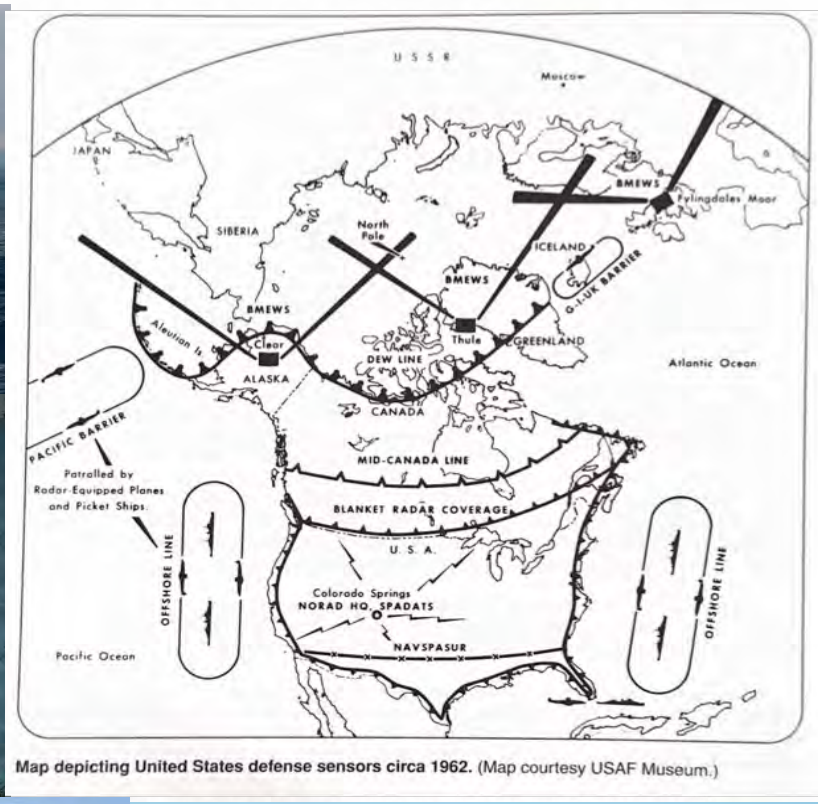
Point Lay





Map depicting United States defense sensors circa 1962. (Map courtesy USAF Museum.)



Point Barrow



Oliktok

Photos of Oliktok, Point Lay, and DEW Line map: Records of the Office of Secretary of Defense 1921-2008, National Archives. Point Barrow and DEW patch photos taken by author of displays at Point Barrow Long Range Radar Site. 1962 map from David F. Winkler, Searching the Skies: USAF Combat Command Publication, June 1997, 38.

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1. Abstract

The main Distant Early Warning (DEW) Line, built between 1953 and 1957 across the polar approaches in the Alaskan and Canadian Arctic, was America's response to deter the Soviet nuclear bomber threat to North America. Reliant on cooperation and close coordination between US and Canadian defense authorities and authorization and support from political leaders, it represented a herculean military infrastructure effort in an environment unprecedented in its construction challenges. The epic effort to construct the DEW Line preceded the equally challenging task of manning, maintaining, and operating it. While the US government sought to maintain secrecy and limit information and contact, a project of this magnitude was impossible to hide from the public. Furthermore, the Canadian and American governments needed to persuade their respective publics of the value of the DEW Line. In addition, the DEW Line construction took place in inhabited lands and some sites were located adjacent to or nearby Indigenous people and settlements. All this meant an indelible imprint on the environment and

people associated with the DEW Line. Examining Western Electric Company (WEC) (contracted to construct the DEW Line) material, government documents, primary source material, interviews from individuals who served on or lived along the DEW Line, and scholarly analysis, this history will consider the role of the DEW Line in transforming the Canadian and Alaskan Arctic with both positive and negative consequences. The DEW Line represents a fascinating story of scientific innovation, monumental logistics, unprecedented adaptation of new structures and living conditions to a challenging environment and transformation of a region whose inaccessibility had previously limited contact. While the DEW Line itself was replaced by the North Warning System (NWS) in the late 1980s, some of the infrastructure and the long-term impact on local community locations and lifestyle remain. This has implications for cultural and historic resource management and military activity in this region.

"Beyond the DEW line is the ice curtain, implacable, grim, forbidding—and beyond the ice curtain, too close for the comfort of America and the free world, is the iron curtain of Communist Russia." Fairbanks Daily News Miner, 25 July 1955

2. Alaska: the US Entrée into the Arctic

From the acquisition of Alaska in 1867, the US government recognized the value of military presence and dispatched US Army forces to monitor and explore the new territory. This, however, did not reflect a recognition of the strategic military value of forces in Alaska or deep concern about any imminent military threats to American territorial integrity. Alaskan acquisition meant little for most politicians beyond American manifest destiny and geopolitical rivalry. A few, though, such as William Seward, envisioned the future strategic and commercial value of a militarily secured Alaska. Despite a policy of generally benign neglect, the US Navy (USN) and Army served an instrumental role in establishing American footholds in key Alaskan ports and the Alaskan interior. Additionally, the Army brought the first modern and timely communications system to Alaska when they built the Washington-Alaska Military Cable and Telegraph System (WAMCATS) in the early 1900s. Besides these limited military activities, pre-World War II US interest and attention to Alaska waxed and waned largely based on gold discoveries. Alaska had provided the US with an entrée into the Arctic, but the relevance of this fact remained far from a priority for either military or political luminaries. With limited ground and naval access, Alaska served as a "frozen" buffer for threats to US borders and a prohibitively challenging location from which to operate military forces.

The advent of airpower irrevocably changed this equation. Even so, early airpower visionaries such as Billy Mitchell and Hap Arnold who foresaw the strategic value of Alaska and urged its fortification with modern military infrastructure and substantive forces, remained voices crying out in the wilderness until the rise of Japanese power. World War II and increased threats in the Pacific region began to focus political and military minds on the potential vulnerability of Alaska to become a staging point for attacks on the continental US. From the beginning of this recognition, another fact quickly rose to prominence amongst military planners. Access to Alaska relied heavily on Canada. This meant US engagement with Canadian political and military leaders was an essential component of US defense efforts. Fortunately, Canadian long-standing suspicions of US designs on Canadian territory and sovereignty could be set aside given the devastating successes of Germany in the European theater and the increasingly

worrisome threat posed by the Japanese to the US and Canadian Pacific coast. Exigencies of war and geographic realities drew the two nations into closer defense cooperation.

3. American-Canadian World War II Defense Cooperation

On 17 August 1940, on a train in Ogdensburg, New York, US President Franklin Roosevelt met with Canadian Prime Minister MacKenzie King and their Ogdensburg Agreement created the binational Permanent Joint Board on Defense (PJBD). The PJBD, consisting of equal Canadian and American members, met 33 times between 1940 and 1945 to consider mutual threats and propose cooperative solutions to enhance the defenses of Alaska, British Columbia and Northwestern North America.[1] Through the PJBD, the two nations initiated three major projects to include construction of the Alaskan Highway, completion of the Northwest Staging Route (which would play a major role in Lend Lease to the USSR) and CANOL (Canadian Oil), a project to develop and transport oil from the Canadian Arctic.[2] In addition, the PJBD ironed out coordination for common defense efforts on the West Coast and in April 1942 agreed that local commanders should be ready to send air units to Alaska if necessary.[3] The Canadians subsequently but reluctantly relinquished four of their sixteen squadrons in Western Air Command to support Alaskan operations.[4] In addition to the air assets, the Canadians also provided naval assets comprised of three merchant cruisers, the *Prince David*, *Prince Henry* and *Prince Robert* along with two corvettes and air defense batteries[5] The Canadian aircraft began reaching Alaska on the first day of the Japanese attack on Dutch Harbor, 3 June 1942. A few days later Japanese forces occupied the American islands of Attu and Kiska.

At the Jan 1943 Casablanca meeting of the Combined Chiefs of Staff, after insisting that Europe remained the priority, the British conceded to "operations to make the Aleutians as secure as they may be."[6] On 22 March, the US Joint Chiefs of Staff subsequently approved Operation Landcrab to take back Attu. The hard-fought battle for Attu from 11-29 May resulted in horrendous casualties, second only to those on Iwo Jima in terms of percentage of losses to number of troops involved.[7] As the Americans began planning to take back Kiska, General John DeWitt, Commander US Western Command, suggested to Canadian Major-General Pearkes, Commander in Chief, Canadian Pacific Command, that a Canadian Brigade take part in the

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[1] Stanley W. Dziuban, *Military Relations Between the US and Canada 1939-1945,* United States Army in World War II Special Studies, CMH Pub 11-5 (Washington D. C.: Center of Military History United States Army, 1990), 22-26, 33-34. The PJBD only had the authority to make recommendations, but these were reported directly to the President on the US side and to the War Department, presided over by the Prime Minister, on the Canadian side. The PJBD would have a major impact on defense cooperation as the war progressed. Both nations had equal representation and influence, and both abided by the recommendations of the board. One of the American members of the board explained, "The Canadians had to recognize American power; the Americans had to cater to Canadian sensitivities." *See* John Herd Thompson and Stephen J. Randall, *Canada and the United States: Ambivalent Allies,* 2nd ed. (Athens: The University of Georgia Press, 1997), 159.

[2] Ibid, 199-235.

[3] W.A.B. Douglas, *The Creation of a National Air Force: The Official History of the Royal Canadian Air Force, Vol. II*, ed. Norman Hillmer (University of Toronto Press in co-operation with the Department of National Defence and the Canadian Government Publishing Centre, Supply and Services Canada, 1986), 412.

[4] Rich Thistle, "Canadian Artist Pays Tribute to an RCAF Pilot Who Scored a Victory in the Aleutians during World War II. *Aviation History*, January 1995, 67.

[5] F. J. Hatch, "The Aleutian Campaign," First of Two Parts, *Roundel Magazine*, May 1963, 21.

[6] Galen Roger Perras *Stepping Stones to Nowhere* (Vancouver: UBC Press, 2003), 116, 119.

[7] Ibid., 133.

operation. The Canadians agreed to send the Thirteenth Brigade (approximately 5,000 men) which consisted of Canadian Home Defense Forces called up through the National Resources Mobilization Act (NRMA). The Canadians trained and deployed to Kiska alongside their American counterparts. Commander of these forces, Brigadier General Harry Foster, in a 1943 interview emphasized that it was appropriate to send Home Defense Forces as the security of Western Canadian cities relied on an effective defense of the Aleutians and Alaska.[8]

The combined Canadian-American force worked well together. General DeWitt was "extremely pleased" with their capabilities and Maj Gen Pearkes was impressed with the "whole-hearted co-operation" from the Americans.[9] In Alaska, theater preparation for Operation Cottage prior to the 15 August amphibious landing involved the airmen of the US Army Air Force (USAAF), the Royal Canadian Air Force (RCAF) and the US Navy. Even before the operation was approved, these airmen bombarded Kiska from their forward locations first at Adak and later from Amchitka Island.[10] Shared hardship, comradery and dedication to the mission led to an almost seamless integration of the American and Canadian aircrew members as they flew the P-40s together. Flying Officer D.F. Griffin described the relationship with the Americans this way, " We were all serving the same cause…A Canadian from the West doesn't have to make any particular adjustment… He's among his own people. That's the way it was."[11]

4. The Rise of Soviet Cold War Threats to the Arctic

With end of the war, Canadian politicians scaled back defense spending which limited defense cooperation efforts in the Arctic. However, PM MacKenzie King's belief that "our best defense in the Arctic was the Arctic itself,"[12] proved illusory. Tested by the revelation of a Soviet spy ring in 1945, the communist coup in Czechoslovakia, and the Berlin blockade in 1948, this optimism would recede into increasing alarm as the Soviets detonated their own atomic bomb in 1949. The 1953 Soviet acquisition of a hydrogen bomb and development of effective long-range bombers to launch the weapons focused attention, particularly for the RCAF, on the increasing vulnerabilities of North America. Soviet atomic weapons and concern that the Soviets were orchestrating the Korean conflict, fed Canadian and US fears of an increasingly dangerous and potentially unpredictable enemy intent on expansion of armed communist aggression.[13] Soviet

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[8] Howard Handleman, "Kiska Story," *Alaska Life*, November 1943. Military in Alaska Collection, ca. 1917 - ACC#: 87-073 2003-042. Box 1 of 1. Rasmuson Library Alaska and Polar Regions Collections and Archives. University of Alaska Fairbanks, 47-49.

[9] R.H. Roy, "Canadians in the North Pacific, 1943: Major-General Pearkes and the Kiska Operation," *B.C. Studies*, no. 14 (Summer, 1972), 4, 5, 11.

[10] On 25 September 1942, Squadron Leader Boomer, of RCAF 111 Squadron, convinced the American leadership to include four Canadians in the next operation against Kiska. The mission included nine B-24 Liberators, 12 Bell P-39 Aircobras and 20 Curtiss P-40 Warhawks. Four of the P-40s would be flown by Canadians. Arriving at Kiska, the fighters followed up the bombing run by targeting gun positions, naval targets, radar installations and support buildings. Two Japanese A6M2-N Rufes, the floatplane version of the Zero fighter, challenged the P-40s, and both Boomer and his American counterpart Maj John Chennault destroyed one of the zeros each.[10] Boomer immediately became the first Allied pilot to shoot down an enemy aircraft in both the European and Pacific theaters. All the Canadian and American pilots on this mission received US Air Medals and Boomer received the Distinguished Flying Cross. *See* Rich Thistle, "Canadian Artist Pays Tribute to an RCAF Pilot Who Scored a Victory in the Aleutians during World War II," 66-67. W.A.B. Douglas, 417.

[11] D.F. Griffin, *First Steps to Tokyo* (Toronto: J.M. Dent & Sons, 1944), 38.

[12] James Eayrs, *In Defence of Canada* (Toronto: University of Toronto Press, 1972), 320, 344.

[13] Howard Coombs and Richard Goette, "Supporting the Pax Americana," in *The Canadian Way of War: Serving the National Interest,* ed. Colonel Bernd Horn (Toronto: Dundurn Press, 2006), 272.

ambitions in Europe raised the specter of isolating North America in a "sea of communism."[14] The Arctic, rather than a barrier to an attack, now appeared the conduit to launching nuclear Armageddon on North America.[15]

The unexpected appearance of the Soviet Tu-4 long range bomber at the 1947 Tushino airshow, had accelerated concerns regarding continental defense of the Arctic. Although the Tu-4 had only a 1,700-nautical mile range, it could pose a threat to Europe and Alaska and, on a one-way trip, to the Western US and Canada. This stimulated air defense buildup to include radar warning and interceptors.[16] However, while Soviet aircraft designer Andrei Tupolev had very impressively copied the US B-29s at its disposal, the US had already improved upon the version of the B-29 that the Soviets had copied by the time the Tu-4 entered service.[17] Thus, Soviet bomber development remained behind that of the US in quality and quantity. However, due to both the rapid appearance of the Tu-4 as well as lack of clear US intelligence on its disposition and capabilities, it was immediately perceived as a threat to North America.

Tupolev rapidly followed up the Tu-4 with his own designs for the Tu-16 Badger medium range bomber and the Tu-95 Bear intercontinental range aircraft.[18] Tupolev's design for the Tu-16 innovatively incorporated turbojet engines and swept wing features. The Tu-16 entered service in 1954. With its 4,000-mile range and ability to launch the hydrogen bomb, the Tu-16, while not of intercontinental range, still could pose a credible threat to the West.[19] Tupolev's four engine turboprop bomber proved more successful and with a range of 8,000 miles, could reach targets deep within the US. Tupolev combined both a swept wing design to improve the aerodynamics of the aircraft and turboprop engines which together gave the aircraft the requisite range. Although the speed at 497mph was slightly less than the 559mph which could be achieved with a turbojet engine, the increased range was a far more critical attribute for a strategic bomber.[20] Successful initial test flights of the prototype led to production of the Tu-95 Bear-A in 1955 followed by the improved Tu-95M in 1957.

Soviet Arctic missions practicing transpolar flights against the US were an essential part of Tu-95 training and the Soviets prioritized them to ensure both increased flight hours and more

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[14] Robert Bothwell, *Alliance and Illusion: Canada and the World*, 1945-1984 (Vancouver: UBC Press, 2007), 53.

[15] Knowing that the US would not compromise on the security of its borders, the Canadian government had to consider its options: relegate North American security to its American neighbors, incur all the costs of securing itself against both a Soviet threat and the likely overreach of American military ambitions or embark on a cooperative course of action concerning North American defense. With Soviet nuclear threat to North America and a balanced relationship with America in mind, Canadian leaders considered the cooperative course as the most sensible and relatively economical option. Potential American encroachment on Canadian sovereignty, however, demanded caution. While the Canadian government remained circumspect on the prospect of a too closely joined continental air defense, Soviet nuclear capability drew Canada into closer military cooperation with its American neighbor. See Desmond Morton, *A Military History of Canada* (Edmonton: Hurtig Publishers, 1990), *229-230.*

[16] Steven J Zaloga, *Target America: The Soviet Union and the Strategic Arms Race 1945-1964* (Novato, California: Presido, 1993), 72-73. Samuel F. Wells, *Fearing the Worst: How Korea Transformed the Cold War* (New York: Columbia University Press, 2020), 318-319.

[17] Steven J. Zaloga, *The Kremlin's Nuclear Sword* (Washington: Smithsonian Institution Press, 2002, 15.

[18] Von Hardesty, "Some Reflections on the Soviet Quest for a Strategic Bomber, 1945-1955, in *Stalin's Cold War Military Machine: A New Evaluation. Colloquium on Contemporary History, December 18, 1991 No. 6*. Naval History and Heritage Command, n.p. Accessed 10 August 2023. https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/s/stalins-cold-war-military-machine.html.Hardesty, n.p.

[19] Wells, 320.

[20] Jason Moore, *Soviet Strategic Bombers: The Hammer in the Hammer and the Sickle* (United Kingdom: Fonthill Media LLC, 2018), 48-49.

experienced crews onboard. Although USAF's Strategic Air Command (SAC) bombers frequently trained with nuclear weapons, the Soviet planes rarely did. Stalin era suspicion of sabotage or rogue actions meant that the KGB maintained control of the nuclear weapons and the bombers could only be loaded and armed with them after a lengthy and cumbersome process. Nonetheless, morale among Long Range Aviation crews was generally high as they were given more flight hours and a certain level of prestige as nuclear capable bombers served as a symbol of Soviet power.[21]

Soviet advances in nuclear capabilities were impressive and it was not all merely catching up to the Americans. Although the US led with atomic and hydrogen bomb and strategic bomber development, the Soviets anticipated US projects and emerging technologies and forged ahead in ICBM and Sea Launched Ballistic Missile (SLBM) development.[22] The Soviets bled civilian industries and even other parts of the military to support the immense effort put into the strategic weapons program from 1945 to the early 1960s. Thus, an economy much smaller than the US, plus one recovering from the ravages of a devastating war fought on its territory over the course of many years, not only joined the US as a nuclear power but prioritized the means to deliver such weapons to the American continent.[23] Fueling this arms race, politicians on both sides could justify huge defense expenditures based on the perceived threat from the ongoing developments of the other side.[24] Soviet bomber advances in fact deeply alarmed the US defense establishment and provided fodder for media reports stoking the fire of Cold War rhetoric. Fear drove action from the US despite the fact that the US had over 1,000 bombers able to deliver over 2,000 warheads in 1955 while the Soviet Bear bomber, the only one capable of striking targets throughout the US, was just being brought into the inventory.[25]

5. Building Cold War Security in the Arctic

Despite the complicated Soviet relationship with its long range bombers, it was this technology coupled with nuclear weapons that shaped the initial US Cold War response and sparked the development and deployment of air, air defense and early warning assets in Alaska and across Canada. Increasingly capable Soviet strategic bombers extended the Cold War battlefield and ensured Alaska's prominent position in the US response. Although Alaska itself represented a target, it was also a transit corridor and first line of defense protecting prominent industrial and urban targets throughout the US. In 1946, then Chair of the Senate Committee on Armed Forces, Lyndon Johnson stated, "the security of every American home begins in the snows of Alaska."[26] Even before the Soviets deployed both nuclear weapons and nuclear capable bombers, fear drove US military considerations. In 1946, despite post war demobilization, the USAF established Strategic Air Command (SAC) to ensure a capable nuclear deterrent to defend the US and maintain US nuclear dominance. Post war demobilization, lingering concerns about defending the Pacific Basin and Alaska, and lack of an organized and centralized intelligence apparatus all increased feelings of vulnerability and overestimates of Soviet capabilities, particularly amongst military leadership concerned with defense of the Pacific Basin. US fears

[21] Zaloga, *The Kremlin's Nuclear Sword*, 28-30.
[22] Zaloga, *Target America*, xiii, 239.
[23] Ibid, 239-241.
[24] Ibid, xiii.
[25] Christopher Bluth, *Soviet Strategic Arms Policy Before Salt* (New York: Cambridge University Press, 1992), 7.
[26] Galen Roger Perras *Stepping Stones to Nowhere* (Vancouver: UBC Press, 2003), 185.

were constructed upon the memories and regrets over the surprise at Pearl Harbor. Compounding these concerns, US intelligence collection, analysis and warning capabilities were extremely limited and yielded reporting that often overestimated Soviet capabilities and the realistic threat they posed. Many US strategic planners viewed Communism as a powerful and expansionist force wielding a formidable military against a West unprepared for the onslaught.

In 1947, the formation of Alaskan Command (ALCOM), one of the first US Commands established to combine land, air and sea forces under one commander, correlated with this increased concern over Soviet Arctic capabilities and military buildup to include conventional forces, bombers and nuclear weapons. The view of Alaska as the guardian of the north aided its first two commanders, Lt General Howard Craig and Lt Gen Nathan Twining, in reorienting and consolidating the post war military presence in Alaska and launching a major rebuilding campaign. The Cold War "polar concept" increasingly took hold, pushing Alaska to the forefront. The polar route was the shortest for Soviet bombers to transit and Alaska the closet point to mainland USSR. In addition, Alaska provided the nearest proximity to collect information, particularly on Soviet nuclear testing and location of their bomber fleet. From the US perspective, it offered an excellent testing ground for cold weather operations and large spaces with sparce human populations that could serve for training and testing grounds.[27] Major construction ensued at Elmendorf AFB in Anchorage and Eielson AFB in Fairbanks, along with forward operating locations at Galena and King Salmon. This helped create the infrastructure required to house the interceptor aircraft needed to respond to Soviet bomber incursions and support the SAC bombers that would serve as the first line of retaliation in case of attack.[28] Both bomber and interceptor aircraft served roles in Alaskan defense. The first SAC deployment began in 1947 and B-29, B-36 and finally B-47 bombers all served on alert in the Alaskan theater. Early interceptor aircraft to include the F-51H and F-82 Mustangs, the F-80 Shooting Star and the F-94 Starfire lacked the all-weather capability, range, and performance necessary for effective intercept of Soviet bombers. The F-89 Scorpion entered the Alaskan inventory in 1953 but still lacked adequate range. The F-102 Delta Dagger, sent to replace the F-89s in 1957, offered a faster, all-weather capability and performed the first successful intercept of two Soviet Tu-16 Badgers off the northwest coast of Alaska in the Bering Sea in 1961. Alaskan Air Command's motto, "Top Cover for America,"[29] highlights this role in defending Alaska and the modification to "Top Cover for North America," proposed by the Canadians in the 1980s, demonstrates the importance of binational cooperative efforts to secure the Arctic.

6. Warning Systems for the Arctic

The need to ensure North American defense against Soviet incursions required better warning systems. The Air Control and Warning system (AC&W) for Alaska which extended to sites in Canada, Greenland and Iceland, was an important addition to provide this protection through longer range warning. Since the end of World War II, US airpower visionary General

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[27] Laurel Jeannette Hummel, "Alaska's Militarized Landscape: The Unwritten Legacy of the Cold War" (ProQuest Dissertations Publishing, 2002), 20-23.

[28] Mandy Whorton, Gustavious Williams and Alan M Alpert, *History of Alaska's Forward Operating Bases (FOBs): The Soviet Bomber Threat and North American Air Defense during the Cold War,* prepared for U.S. Air Force, Pacific Air Forces, 611th Air Support Group Elmendorf AFB, Alaska (University of Chicago: Argonne National Laboratory, April 2001), 5-7.

[29] John Haile Cloe, *Top Cover for America: The Air Force in Alaska 1920-1988*, Anchorage: Air Force Association (Missoula, Montana: Pictorial Histories Publishing Company, 1984), 187.

Carl Spaatz had urged development of continental air defense, a strategic air force with effective deterrent value, and access to outer bases.[30] In line with his thinking, General Spaatz visited Alaska before assuming the new position of Air Force Chief of Staff and in 1948 ordered immediate augmentation of Alaska's air defenses.[31] This included upgrading the existing localized radar system which suffered from often faulty equipment and a lack of reliable communication. The new AC&W network was one of the first defense systems of the Cold War. The radar sites comprised an outer ring of early warning, an inner ring of ground control and a central ring of reserve sites. Ladd AFB and Elmendorf AFB served as the control centers. These radar sites contained radomes, support buildings and among other infrastructure, required a weather station and power plant.[32] It would take time, but by 1954 Alaska would have twelve radar sites and two control centers.[33] Canada hosted 33 of these sites and Greenland and Iceland together held 10 sites.[34]

Although the AC&W network provided protection to Alaskan based assets from the west, the polar route remained vulnerable. Deterrence against the Soviet bomber threat relied on early warning to ensure intercept aircraft and SAC bombers could be airborne as soon as possible. Furthermore, air defense cooperation with the Canadians had accelerated in light of concerns over Soviet threats. Military to military cooperative efforts drew the two together as they considered the most effective means of defending North America. By the early 1950s, the two countries increasingly coordinated airborne air defense assets and began construction of joint air defense radars.[35]

The air defense assets of the two nations and the tactics, techniques and procedures of conducting air defense were increasingly intertwined. To provide warning, the two nations constructed the Pinetree Line and further north, Canada funded and operated the Mid-Canada Line. But these air defense assets could not provide sufficient coverage or warning time given assessed Soviet capabilities. Additionally, USAF and RCAF leaders recognized the necessity in terms of military effectiveness of integration under centralized command and control with one overall commander.[36] These concerns led to the formation of the binational North American Air Defense Command
(NORAD),[37] and would justify the immense cost and profound engineering feat involved in constructing the DEW Line.

7. A Sword and Shield for the Arctic

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[30] Carl Spaatz, "General Spaatz on Atomic Warfare: Phase II Air War," *Life Magazine*, August 16, 1948, 92-93.
[31] C.L. Grant, *The Development of Continental Air Defense to 1 September 1954*. Maxwell Air Force Base, AL: USAF Historical Division, Research Studies Institute, Air University, n.d. [1957?], 12, 59.
[32] Hummel, 62, 63, 65.
[33] Thomas A. Sturm, *Air Defense of Alaska 1940-1957. Historical Reference Paper Number Two, (*Colorado Springs: Headquarters Continental Air Defense Command, Office of Information Services Directorate of Command History, 1957), 20.
[34] Thomas Ray, *A History of the DEW Line 1946-1964.* Air Defense Command Historical Study No. 31, June 1965, 673rd Air Base Wing History Office, JBER, Alaska, 3-4.
[35] Joseph T. Jockel, *Canada in NORAD, 1957-2007: A History* (Montreal & Kingston: McGill-Queen's University Press, 2007), 11-12.
[36] Richard Goette, *Sovereignty and Command in Canada-US Continental Air Defence, 1940-1957 (*Toronto: UBC Press, 2018), 170.
[37] NORAD is now known as the North American Aerospace Defense Command

US Army Air Force planners had introduced a plan for an early warning system in the northern Arctic back in the mid 40s but the high costs and seemingly low threat at the time, meant the plan was rejected. However, by the 1950s, Soviet weapons systems developments decreased resistance to the immense expense and effort that would be required to construct the DEW Line. Thus, in September 1949, the USAF convened a study group that produced the Project Charles report urging the acquisition of better weapons and increased warning time. In August 1952, the US convened the Summer Study Group at MIT's Lincoln Labs to study the feasibility and requirements to develop an early warning system capable of providing enhanced protection against the Soviet airborne nuclear threat.[38] The group included two Canadians, one from McGill University and one from the Defense Research Board.[39] This group resurrected the 1946 idea of early warning radars along the 70th parallel and proposed a system that would connect with the Alaskan AC&W radars to the west and the Northeast Air Command (NEAC)[40] AC&W radars from Baffin Island, Canada across Labrador to Newfoundland to the east. They proposed that this be supplemented with over the water stations flown by Airborne Early Warning and Control (AEW&C) patrols.[41] The Final Report of Summer Study Group, dated 1 Feb 1953, proposed that, "These sites of the outer DEW Line would form a continuous line along which any aircraft flying at any feasible altitude above the terrain would be in the unimpeded line of sight of at least one station…These sites could be installed by expeditions of ships working in the ice-free season. Permanent manning is estimated at 10 persons per station. Station spacing varies from 75-125 miles."[42] The manning requirements were significantly less than previous warning radars due to new technology allowing for automated warning upon target pickup. The Summer Study Group estimated costs at 250 million with 100 million annual maintenance costs.[43]

Ironically, although the USAF had commissioned the Summer Study Group, it strongly opposed its recommendations as large air defense costs in 1952 would likely syphon funding from SAC and its bombers. The mighty power of SAC easily dwarfed that of the USAF air defense community. Thus, the USAF advanced the arguments that the harsh Arctic conditions would stymie the technology and that a DEW Line harkened back to the Maginot Line concept and would rest on a false sense of security. Furthermore, a 1952 independent RAND study highlighted the need to first establish adequate AEW&C and picket ship radar coverage off both coasts as well as develop the technology for effective Arctic to US communications.[44]

Despite all these misgivings, the USAF contracted with Western Electric Company (WEC) in December 1952 to erect test locations to determine feasibility of the project and address concerns about the efficacy of the technology.[45] By 1953, the public became aware of the DEW Line debate and press reporting portrayed USAF and Department of Defense (DoD) intransigence as deleterious to the construction of an effective air defense network that would

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[38] Ray, 1.
[39] Alexander Herd. "A Practicable Project: Canada, the United States, and the Construction of the DEW Line." In *Calgary papers in Military and Strategic Studies Canadian Arctic Sovereignty and Security: Historical Perspectives.* Occasional Paper Number 4, 2011. Edited by P. Whitney Lackenbauer, 174. https://journalhosting.ucalgary.ca/index.php/cpmss/issue/view/2442
[40] NEAC was deactivated and its mission and assets subsumed into Air Defense Command in 1957.
[41] Ray, 1.
[42] Ibid, 8.
[43] Ibid.
[44] Ibid, 9-11.
[45] Ibid, 10.

protect the nation and its people. Furthermore, President Eisenhower, wanting to decrease US conventional force expenditures, thus lowering defense budgets and bolstering the US nuclear deterrent, saw the value of the DEW Line. It could provide warning time to dispatch interceptor aircraft to challenge incoming Soviet bombers, to evacuate citizens, and to launch SAC bombers, thus preserving the key element of American deterrence. The DEW Line, in fact became an essential pillar in his defensive strategy, the New Look. Eisenhower saw it as a means to preserve the sword (SAC bombers) and serve as the shield (securing North America's northern perimeter). While the DEW Line was immensely expensive and vastly increased continental defense budgets, the overall military budget did decrease.[46] A special committee known as the Bull committee after its head, Major General Harold Bull, and appointed by the Secretary of Defense, issued a report in July 1953 confirming the Summer Study Group's findings and recommending 18-25 billion dollars be allocated to air defense in the next five years.[47] A month after that report, the Soviet's successful test of a hydrogen bomb hastened the National Security Council (NSC) to approve the Summer Study Group's DEW Line proposal.

On February 24, 1954, President Eisenhower officially gave his approval to proceed with the project with the USAF in charge of implementing it. Meanwhile, in 1953-54, the Western Electric Company, under Project Counterchange, later renamed to Project Corrode and Project 572, constructed two experimental stations. They built one on Barter Island, Alaska and one at Streator, Illinois. Streator served as a site for personnel training and testing of experimental prototypes while Barter Island provided the true test in Arctic conditions. Point Barrow, which had existing military infrastructure from the Naval presence there, served as the transport hub.[48] Secrecy was so tight that Alaskan Air Command (AAC), tasked to provide logistical support in transporting equipment, was not even informed what it was they were supporting.[49]

8. Solving Challenges of the Arctic

One of the most important barriers to operation in the Arctic, as the RAND report had pointed out, was reliable, effective communication. High frequency (HF) communications were rendered unreliable due to atmospheric disturbances such as the aurora borealis. Microwave stations every 30 miles or thousands of miles of land lines clearly were financially and logistically impossible. However, recent development of the Frequency Propagation Ionospheric (FPIS) and Tropospheric Systems (FPTS) offered immunity to atmospheric disturbances and when bounced off the troposphere and ionosphere using high power transmitters allowed for transmission between stations and in the case of VHF, over 1200 miles to reach command centers to the rear.[50]

WEC tests indicated that a modular structure consisting of flat roofed modules 28x16x10 ft and configured from pre-fabricated plywood panels would be best suited to the Arctic environment. The modules could be fastened together into "trains" to create larger spaces and could be transported, once mounted on skids, and towed behind a tractor. The Main stations,

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[46] James Louis Isemann, "To Detect, To Deter, To Defend: The Distant Early Warning (DEW) Line and Early Cold War Defense Policy, 1953-1957." Doctoral Dissertation. Kansas State University, 2009, xx.
[47] Ray, 11.
[48] Ray, 12.
[49] "DEW Line Sites," Alaskan Air Command History, July-December 1953. 673rd Air Base Wing History Office, JBER, Alaska, 1. "The DEW System," ITT Arctic Services, Inc. Air Defense Command DEW System Office, Government Brochure, 1969. 673rd Air Base Wing History Office, JBER, Alaska, 1-1.
[50] Ray, 14.

largest on the DEW Line, would have two 400 foot trains connected by an overhead bridge, thus configured as an H.[51] The modules could withstand 125mph winds, up to two inches of ice coating and 30 pounds per square foot of snow accumulation.[52] The modules were mounted on pilings to provide enough elevation for snow to blow around and avoid burying the structures. With the potential for three feet of snow and ice buildup per year, some of the Greenland sites required hydraulic equipment that could jack the structure up each year to compensate. This technique went on to be used for polar research stations.[53] To avoid shifting during the summer thaw, the pilings had to be dug into the permafrost or with twelve feet of insulating gravel. Acquiring that volume of gravel in remote sites was a logistical challenge.[54] Steam drilling was used to melt the ice enough to form holes for steel rods which would then be refrozen in the permafrost.[55] Once the WEC determined the structures, they set to work locating the optimal sites on which to place them.

Beginning in 1953, WEC studied maps, hydrographic charts and RCAF aerial photos to determine the optimal locations for DEW Line sites. This required a certain amount of spacing as well as logistical access via air, water and/or land.[56] Dependable maps were in short supply to survey the sites in Canada and so the RCAF provided "wholehearted enthusiasm and support" as they flew hundreds of sorties. Considering the harsh and remote landscape, the pilots considered any landing they walked away from as a good one. In contrast to the Arctic tundra in the West, more mountainous terrain complicated the search for sites and the construction in the Canadian East. Because the distance between sites had to be standardized, it meant some DEW Line sites ended up on mountainsides, ledges, or peaks.[57] This process was summed up by one DEW Liner stating, "no matter what the land was like, if Engineering said, "This is the spot," then Construction would find a way to build a radar post on it."[58]

Complementing WEC's efforts, the PJBD sponsored Canadian-United States Military Study Group recommended establishing a USAF-RCAF Military Characteristics Committee and in August 1954, this group took up the task of developing mutually acceptable DEW Line criteria. Upholding the necessity of the DEW Line itself, the group determined that achieving a minimum of two hours warning required Canadian sites that ranged from Herschel Island to Padloping Island. The Canadian sites would be integrated with the Alaskan land-based sites and then extended into the Pacific with Naval AEW&C aircraft and picket ships. In the east, the line would extend to Greenland and then be complemented again by naval aircraft and ships. Additional land-based DEW Line sites in the Aleutians would shorten the Navy's responsibility to a line from Midway Island to Umnak. Aligned with these conclusions, full time naval patrols did commence in 1958, maintaining four ships and four AEW&C aircraft on duty at any one time.[59]

By the end of 1954, although reluctant due to concerns that a large American presence in the Canadian Arctic would be seen as a violation of Canadian sovereignty, Canada's government authorized DEW Line sites in its Arctic. However, Canada did impose a number of requirements

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[51] Ibid, 14. "The DEW System," 1-2.
[52] Ray, 15.
[53] Peter Grier, "A Line in the Ice," Air Force Magazine, 87, no. 2 (Feb 2004), np.
[54] "The DEW Line Story," Brochure. Western Electric Company, 1958, 20.
[55] "The DEW System," 1-4.
[56] "The DEW Line Story, 14.
[57] "The DEW System," 1-5.
[58] Richard Morenus, *Dew Line* (New York: Rand McNally & Company, 1957), 83.
[59] Ray, 16, 17, 19.

to ensure Canadian rule of law, Canadian title to land, and respect for Canadian Indigenous communities and wildlife. Any cultural artifacts or scientific discoveries would be the property of Canada and the US would ensure that Canadian companies received priority on contracts. In addition, Canada reserved the right to take over any sites and man them with Canadians[60] Meanwhile the Military Characteristics Committee formed a Locations Study Group which by November 1954 settled on the land route from Cape Lisburne, Alaska to Cape Dyer, Baffin Island. Subsequently, the Joint Chiefs of Staff approved the route in January 1955. In December 1954, Western Electric received a letter contract as the prime contractor for the entire line of DEW Line stations extending 3,000 miles and the completely finalized contract in July 1955. WEC was to design, engineer, procure, construct, install and test all equipment and facilities by 1957. Air Material Command served as the USAF's administrative agency. A Distant Early Warning Project Office (DEWPO) set up offices in New York City in early 1955.[61]

9. DEW Line Design

WEC's contract called for fifty-seven sites along the 69th parallel at about 50 mile intervals with the capability to detect aircraft from 50 feet over water to 65,000 feet and up to 160 miles distant. FPS-23 and FPS-19 radars provided this high to low coverage and were designed to operate in winds up to 150 mph and in temperatures from 100 degrees to -65 degrees F. A plastic radome protected the radar's 50 foot air antenna assembly. The newly developed Radar Target Alarm (Radalarm) system automatically provided visual and audible warning eliminating the need for constant human eyes on the scope. To eliminate false alarms from migrating birds, the radars did not provide warning for targets under speeds of 125mph.[62]

The DEW Line consisted of Main, Auxiliary and Intermediate stations. The Main stations were approximately 500 miles apart and included Barrow (designated POW) and Barter Island (BAR) in Alaska and Cape Parry (PIN), Cambridge Bay (CAM), Hall Beach (FOX) and Cape Dyer (DYE) in Canada. These Main stations served as the central locations for operations, administration, maintenance and communication and other stations transmitted appliable data and requests to them. These Main stations possessed multiple communications systems to include conventional VHF and UHF transmitters and receivers to speak to aircraft operating in the area. Lateral communications with other DEW Line sites utilized AN/FRC-45 UHF tropospheric scatter equipment, and most critically, IS-101 VHF ionospheric scatter equipment relayed critical information to rearward communication centers. This traffic traveled to centers in the Mid Canada Line and in Alaska and would be immediately relayed to AAC, NORAD, ADC (Air Defense Command) and the RCAF. Main centers had responsibility for comparing any targets with known flight plans, coordinating all received data, and transmitting it to the appropriate centers. These centers needed 45-50 civilians called radicians (an amalgamation of radio, radar, and electro-mechanical technicians) and a small cadre of officers. At the Canadian Main stations, one of the six assigned officers was an RCAF officer. The 23 Auxiliary stations were approximately 100 miles apart and could only communicate with aircraft and other DEW

[60] James Eyres, *Canada in World Affairs: October 1955 to June 1957* (Toronto: Oxford University Press, 1959), 148-150. Alexander Herd, "A Practicable Project: Canada, the United States, and the Construction of the DEW Line," In *Calgary papers in Military and Strategic Studies Canadian Arctic Sovereignty and Security: Historical Perspectives.* Occasional Paper Number 4, 2011. Edited by P. Whitney Lackenbauer, 180-182. https://journalhosting.ucalgary.ca/index.php/cpmss/issue/view/2442

[61] Ray, 20-21.

[62] Ibid, 21, 24.

stations. These stations required 16-18 civilians with responsibility to notify the Main stations of any airborne targets. Midway between Main and Auxiliary stations, the Intermediate stations only required 4-5 personnel and were equipped with an FPS-23 transmitter and lateral voice communication via FM mobile radio. In total, DEW Line manpower included 800 civilians and 36 officers spread over 57 stations.[63]

10. DEW Line Construction: The Arctic Continues to Challenge

With the contract in hand, WEC had less than two years to complete the project by the deadline of 31 July 1957. The total cost of construction was approximately $350,000,000. A Canadian government stipulation for DEW construction was access for Canadian firms and they did receive $200,000,000 of the total for their contributions to construction.[64] Procurement, logistics and personnel recruitment for the entire DEW Line posed a huge and complicated challenge. From a "box of tacks to a twenty-ton bulldozer," all items had to be sourced, procured, catalogued and transported to remote and distant locations.[65] Operating a DEW Line site would require just about everything needed to keep a small town functioning. Personnel recruitment cast a wide net with everything from cooks, carpenters, plumbers, scientists, and doctors needed but with the caveat that they had to be willing to work in the northern Arctic. As author Richard Morenus stated in his 1957 book on the DEW Line, short of a "refrigerating plant and a strong fan that could blow a subzero one-hundred-mile blast," there was no way to prepare someone for DEW Line duty.[66]

Just working outside and operating in the Arctic posed unique problems. Personnel had to use huge mitts when working in the exterior otherwise touching metal in the extreme temperature would destroy their hands. But gloves decreased dexterity and complicated simple tasks. One DEW Line worker explained it was "like eating grapes with boxing gloves."[67] The RCAF and USAF did their best to provide Arctic training to their personnel involved in DEW Line support. The Canadians actually created a cookbook called "*Handy Hints to the Stranded.*" In addition to explaining how to recognize and prepare edible animals and plants, it contained such delicacies as "boiled mice and woolly lousewort stew." It also provided helpful advice on how not to become a meal for larger predators and such tips as avoiding eating snow directly until it has melted. This book became quite popular among the airmen flying along the DEW Line.[68]

The DEW Line itself covered such a vast expanse that Western Electric divided DEW Line construction into three sectors and subcontracted to different firms to complete each sector.[69] For the Alaskan sites, Point Barrow served as the logistics hub where the building modules could be assembled, coupled together, mounted on sleds, and towed via a caterpillar tractor to the various sites. "Cat" train drivers became familiar with the hazards of "white out" conditions due to the flat shadowless expanse of tundra plains. Cat drivers described it as "Eerie,

[63] Ibid, 24-28.
[64] Ibid, 32.
[65] Morenus, 38.
[66] Ibid, 39-40.
[67] Ibid, 96.
[68] Ibid, 108-109.
[69] Ray, 29.

spooky and dangerous" and with no way to determine lateral or vertical direction in space, one just had to wait until it passed. In general, it was difficult to find your way. In one case, a Cat left Point Barrow and got lost. Three days later another went out to search and the two searched for each other for 3 more days until their paths finally crossed.[70] One exasperated observer noted that "building the pyramids single handed would be a cinch alongside this one."[71] Curious polar bears could be a problem. DEW Line workers described a polar bear walking along behind them eating the marker flags they had carefully placed. In another case, a work crew had to quickly abandon their paint and flee once a family of polar bears emerged from the fog surrounding them. The curious and hungry bears then proceeded to sample the paint and earned the nickname of Rudolph from the work crew.[72]

11. Runway construction: Lifeline to the DEW Line

Aircraft runways, a key feature in DEW Line construction, posed numerous problems. Airfields were largely built from nothing, starting with patch large enough for a C-46 or C-47 Aircraft with a D-4 tractor onboard to land. Subsequently, construction workers would build a 6,000 foot long runway so that larger transport such as the C-124 could land.[73] One crew recounted three weeks of backbreaking work to get a runway cleared enough to bring in cargo and a chance winter storm covered it all up again.[74] Bulldozers proved a critical asset, but in some cases they had to be airdropped into particularly remote locations. A WEC video from 1955 on DEW Line construction included footage of one of these bulldozers being airdropped and subsequently lost when it landed and broke through the ice. Initially, this was a common problem.[75] The equipment drop technique improved once they started properly accounting for the cold's effect on the elasticity of parachute lines. Over time, the techniques for packing and dropping not only tractors but other materials vastly improved. After setting down a packing case containing an electric generator on the top of a mountain ridge, a helicopter pilot observed "It's getting so they have these things weighted and balanced to such a fine point you can set a thousand pound crate down on a case of eggs and never crack a shell."[76] In addition to equipment, often supplemental materials had to be brought in. The gravel needed to build all the runways would be enough to make a highway, twelve inches thick, from San Francisco to New York.[77]

12. Supplying the DEW Line

Building the runways was only the first step of an epic construction effort. Canadian Department of Northern Affairs and National Resources official Charles Marshall in a 1957 article described the DEW Line construction endeavor as requiring "the biggest task force of

[70] Morenus, 41, 46, 65.
[71] Ibid, 72.
[72] "The DEW Line Story," 14.
[73] Ray, 30.
[74] Morenus, 75-76.
[75] *Radar: The Dew Line Story*. Produced for Western Electric Company (1958), DVD. UAF Rasmuson Video and DVD Collection. Gareth Howerd, *DEW Line Doctor (*London: The Adventurers Club, 1960), 23.
[76] Morenus, 95,98.
[77] Ibid, 138.

ships since the invasion of Europe and the largest air operation since the Berlin Airlift." Completed with only two short summer seasons of sealift, he further described it as "one of the most dramatic engineering achievements of our time and a milestone in the development of the Arctic."[78] Everything had to be airlifted, supplied by ship during the short summer window of favorable conditions, brought in by barge, or overland by Cat trains in the winter.[79] A May 7, 1955 press release described the scope of these early airlift operations in support of DEW Line construction. Called Operation Big Haul for the US and Project Ice Cube for Canada, these efforts by 18th Air Force utilizing C-124 Globemaster aircraft comprised more than 330 landings on short ice and snow covered air strips with temperatures as low as 57 below. They delivered over 6,600 tons of tractors, buildings, and other heavy equipment to the DEW Line. The largest tonnage belonged to the prefabricated buildings, constructed and sent from Seattle and then hauled from the various runways to the actual sites. This was the first time the C-124s, the largest USAF transport at the time, were used repeatedly on such marginal runways and north of the Arctic Circle. Prior to using the C-124s, ski equipped C-47s transported ice survey teams to determine runway locations. These survey teams would include scientists from Air University and Army's Snow, Ice, Permafrost Establishment. USAF General Wayland, Commander of Tactical Air Command (TAC), described the DEW Line airlift "as the biggest Arctic project ever undertaken by the Air Force."[80]

The RCAF supported the effort with food, lodging, hangars, offices, maintenance, weather, communications, and search and rescue from Canadian bases in Edmonton, Alberta, Churchill, Manitoba and Frobisher Bay, NW Territories. USAF officials praised the Canadian hospitality stating, "everyone was splendid in their treatment of our people, our planes, and our problems."[81] Once up on the DEW Line, conditions were austere. Aircraft repairs generally had to be accomplished outside and many of the planes were not properly winterized. Reporter Richard Morenus, in his book *Dew Line*, described use of Indigenous Knowledge as Inuit[82] working at the DEW Line site constructed a snow shelter around the plane to facilitate replacing an aircraft engine.[83] As challenging as it was to operate in the winter, ice runways that were functional in the winter could witness variable conditions in the summer that could render landings difficult to impossible.[84]

A doctor who served on the DEW Line described the pilots of these aircraft as, "the lifeline of the entire DEW Line."[85] He pointed out the extremely precarious position of many of these airfields on ice, cliff tops or among mountains. One site he often flew into rested on top of

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[78] Whitney Lackenbauer, "The Military as Nation Builder: The Case of the Canadian North," 2013 Ross Ellis Memorial Lecture in Military and Strategic Studies, *Journal of Military and Strategic Studies* 15, no.1 (2013), 13.
[79] Ibid, 14.
[80] HQ Eighteenth Air Force, "Feature Release For Use as Convenient," nd. 673rd Air Base Wing History Office, JBER, Alaska, 1-4. "USAF Globemasters Airlift DEW Line Construction Equipment to Alaska," Department of Defense Office of Public Information Washington, DC. News Release, No. 424-55. 7 May 1955. 673rd Air Base Wing History Office, JBER, Alaska.
[81] HQ Eighteen Air Force, 3-4.
[82] This paper uses the term Inuit to refer to the culturally and historically similar peoples of the Arctic and Sub Arctic of North America. This includes the Inupiat people of Alaska.
[83] Morenus, 94.
[84] "Interview with Gen. Earle E Partridge, Commander in Chief, North American Air Defense Command." *US News and World Report*, 6 Sept 1957, 82.
[85] Howerd, 86.

a 2,000 foot cliff surrounded by mountains and with the wreckage of a plane at the foot of the cliff to serve warning to the pilots. He described another site as almost as bad with a macabre adornment of three wrecked planes. He pointed out that traveling between sites could be risky if you were attempting to skirt the frequent and capricious Arctic storms and a forced landing in an empty valley could mean you might never be found. He recounted returning from a trip he had made to multiple sites to conduct inoculations and finding out shortly after that the pilot that had flown him on that trip had gone down with two other people on board. Although it was only nineteen miles from base, it took forty-three hours to reach the plane due to bad weather and a combination of snowmobiles and dog sleds to reach the crash site. Tragically, the pilot and one of the passengers died before the rescue team arrived.[86] Over the period of DEW Line construction from 1955-57, 25 people lost their lives in aircraft accidents.[87]

Aircraft served an important role in transport to and between stations and an indispensable part in logistics supply to the sites. In 1955, aircraft delivered approximately 50,000 tons of material for DEW Line construction and supply. In addition to getting supplies to the DEW Line sites during the many months they were inaccessible to resupply by ship, aircraft of the USAF, USN, RCAF and Alaskan bush pilots along with the US and Canadian Coast Guard, served an important role in the Spring of 1955. They mapped out the safest routes for the seaborne resupply force to follow the summer of 1955. The ships had about a two month window from July to September while the Arctic coast was accessible by sea to deliver all necessary supplies.[88]

The short shipborne supply season required detailed planning and careful timing. Ships sailed eastward and westward from the Pacific and the Atlantic.[89] Ship convoys gathered in Seattle and Halifax to begin their journey north together.[90] A *Fairbanks Daily News Miner* July 25, 1955 article heralded this "most spectacular mission" of 117 ships on the largest ever peacetime Arctic naval operation. The article described the use of eight icebreakers equipped with helicopters to assist in safely navigating Arctic waters and the novelty of this travel to areas the USN had not yet been. In preparation for the challenging conditions, the Navy equipped some ships with extra strong propellers and additional heating systems.[91]About sixty vessels, comprising almost every type of noncombat ship the Navy possessed, left Seattle in early July and transited the 2,800 mile journey to the western portion of the DEW Line.[92]

Along with the Navy personnel, onboard the vessels were several thousand Army troops trained at Ft Eustis for specialized loading and unloading once they arrived at the DEW Line sites. One soldier compared traveling through the Arctic fog to, "walking through the inside of a frozen cream puff." He went on to describe winds that instead of blowing past or around acted like a "solid…you couldn't go through." Ice pressure, he equated to being inside a ball with a powerful fist squeezing it.[93] The expedition also required the services of underwater demolition

[86] Ibid, 85, 145, 190
[87] Ray, 32.
[88] Ray, 29, 31.
[89]Morenus, 115, 118.
[90] Ray, 28.
[91] Elton C. Fay, "Navy Will Send 117 Ships to Supply Arctic Radar Bases." Fairbanks Daily News Miner, July 25, 1955.
[92] Morenus, 127-128. "The DEW System,"1-4.
[93] Morenus, 128, 133.

experts who traveled ahead of the ships and utilized explosives to remove obstacles that could impede the ships' approach to the Arctic shore.[94] Overall, this 1955 sealift to the DEW Line supplied 129,000 tons of cargo to the sites despite the worst recorded ice conditions between Point Barrow and Hershel Island.[95] An Inuit observer noted the sheer volume of supplies made it seem "like the ship was making babies."[96] Besides supplying the DEW Line, the massive sealift operation proved beneficial in other ways. These vessels were able to chart the Arctic coastline and waterways, establish new sea routes, supply remote Arctic settlements as well as weather stations and other radar sites, and garner practical knowledge on ice operations along with hydrographic and oceanographic data.[97]

Complementing the sealift, rail and trucks transported supplies to Waterways, Alberta which were then loaded on barges and traveled to the northwest to supply six Canadian sites. Supplies also traveled by rail to Churchill, Manitoba and then onward by airlift. In 1955, barges delivered 8,000 tons and Cat trains 4,000 tons.[98] In Alaska, heavy duty tractor trailer units hauled 1,100 tons of petroleum products and thousands of pounds of cement and steel from Fairbanks to the Arctic coast. Materials and equipment deliveries comprised staggeringly large amounts. Everything from a needle to a 1,000 pound crane made its way to the DEW Line sites.[99] For example, WEC facilitated transport of 19,000,000 gallons of POL via ships and 490,000 gallons via barge on the McKenzie River during the summer of 1955. It was necessary in 1955 to deliver enough POL for construction and to last for almost a year until the ships could return in 1956.[100] 1956 saw a similar amount of material moved but the cargo contained more of the technical gear, electronics, and remaining construction supplies. This time, for the "dash to the Arctic" the Navy selected smaller, more maneuverable ships that could better avoid damage from treacherous shoals and drifting icebergs.[101] Happily, ice conditions improved over those in 1955 and again the supply effort stockpiled a year's worth of provisions, materials, and POL at each site.[102]

The summer 1957 effort was the last under WEC's responsibility as they officially turned over the project to the USAF at the end of July 1957. By then, 460,000 tons of material had transited the Arctic by various means for delivery to the 57 completed DEW Line sites.[103] This resupply effort did continue, and the Alaska portion would eventually be known as Operation Mona Lisa. This involved providing 12-month resupply to 70 remote AC&W, DEW, White Alice and special project sites in Alaska. A 1962 press release highlighted the massive nine-million-dollar annual resupply of "everything from bulldozers to razor blades." The volume of the deliveries remained significant. For example, in 1961, Op Mona Lisa provided 81,000 tons of cargo during the May- September timeframe.[104]

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[94] Ibid, 141. Fay, np.
[95] "The DEW Line Story," 20. Ray, 30.
[96] Melanie Gagnon and Iqaluit Elders, *Inuit Recollections on the Military Presence in Iqaluit.* Memory and History in Nunavut. Vol. 2. Iqaluit, Nunavut: Language and Culture Program of Nunavut Arctic College, 2002, 87.
[97] Lackenbauer,14. Morenus, 122.
[98] Ray, 28,31.
[99]Morenus, 32, 107.
[100] Ray, 32.
[101] "DEW Line Sites," Alaskan Air Command History, January-June 1956. 673rd Air Base Wing History Office, JBER, Alaska, 50.
[102] "The DEW Line Story," 20.
[103] Ibid, 6, 20.
[104] "Operation Mona Lisa," Press Release Headquarters Alaskan Air Command Office of Information (ca. 1962). Military in Alaska Collection, ca. 1917 - ACC#: 87-073 2003-042. Box 1 of 1. Rasmuson Library Alaska and Polar Regions Collections and Archives. University of Alaska Fairbanks.

13. Addition of Greenland and Aleutian Sites

While WEC proceeded with constructing the 57 DEW Line sites across Northern Alaska and Canada, the US government approved an extension of air defense coverage across the Aleutians. A 28 January 1957 press release announced that the US Army Corps of Engineers would be responsible for the design and construction of six new DEW Line sites. Instead of the modular structure employed by WEC, civilian contractors would build the Aleutian sites out of reinforced concrete.[105] Construction began by 1957 on these Aleutian "stretchout" stations. Nikolski was the farthest west followed by Driftwood Bay, 106 miles from Nikolski, Sarichef, 93 miles from Driftwood, Cold Bay 92 miles farther east, Port Moller 105 miles from Cold Bay and Port Heiden, an additional 100 miles further. Cold Bay served as the Main Station and King Salmon as the support base. Alaskan Air Command (AAC) took control of these sites and after testing they became operational on 1 April 1959.[106]

In March 1958, the US signed an agreement with Greenland authorizing the construction of four DEW Line sites across southern Greenland with a target completion date of 1960. The Greenland sites: Holsteinsborg, Ice-Cap Site No.1, Ice-Cap Site No. 2, and Kulusuk Island, were auxiliary sites that reported to the main station, Cape Dyer, on Baffin Island. Sondrestrom Air Base served as the support base for the Greenland sites.[107] The main buildings for DYE II and III on the ice cap were referred to by DEW Line personnel as "submarines floating in snow."[108] Air ducts and vertical ducts connected the buildings to the surface. This construction technique did not prove either popular with the inhabitants of the buildings or long lasting. The surrounding ice melted due to the heat from the buildings and the drinking water, melted from surrounding snow, tasted like diesel fuel. Furthermore, they would sink farther under the surface as more snow accumulated on the surface. The antennas had to be outside and capable of withstanding 100 mph winds and temperatures of up to -40 F. To avoid getting buried, the surface structures sat on 350 ton jacks used to float the building and raise it as needed. The foundation for these structures were 30 feet below the surface when built but 75 feet below ten years later. Sewage waste, once collected, was dispatched to a pit and any other waste was simply buried. The sites provided a self-contained environment for workers; most rarely traveled more than 100 yards in their whole tour. They were completely dependent on airlift and thus items were limited to no more than 5 tons and no larger than 9x9x41 to fit in the back of a C-130D.

Construction of the ice cap sites required a massive airlift. The 61 TCS (Troop Carrier Squadron) took off and landed 2,500 times in 1959 and would fly their supply missions starting at 0400 for 18 hours a day. Ten to 12 aircraft could be airborne at any time. The high altitude of the sites along with the increased friction of ski equipped aircraft necessitated the use of assisted takeoff bottles. This airborne supply mission to Greenland was called On Top and later changed

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[105] Message on "A News Release on Aleutian Segment," containing 28 January 1957 news release announcing DEW Line extension to the Aleutians with instructions to release to local newspapers. January 25, 1957.
[106] Ray, 53-54.
[107] Ray, 33, 53-54.
[108] John Cloe. *C-130D Support of the Greenland Ice Cap Dye Sites* (Elmendorf AFB, AK: 1931st Communications Group, 1978), 23.

to Cool Dew.[109] Air supply for the Greenland sites utilized Sondrestrom Airbase. Once or twice a week cargo aircraft would arrive at the airbase with fresh produce, mail, magazines and movies and helicopters and light ski-equipped aircraft would fly into the Greenland DEW Line sites.[110]

14. Protecting the Flanks

Even with the extended DEW Line, air defense strategists remined concerned about vulnerable flanks. For this reason, air defense coverage extended from the ends of the DEW Line utilizing naval, air force and Texas tower mounted air defense detection capabilities. To extend this coverage from Point Barrow DEW Site southward and Baffin Island eastward and southward, Naval Destroyer Escorts (DER), previously used for antisubmarine warfare, were fitted to carry air and surface search and height finding radars. These DERs would lie off the coastline to pass unidentified aircraft detection to Aircraft Control and Warning Stations and could assist interceptor aircraft. Additionally, the Navy converted World War II Liberty ships redesignated as YAGR.[111] These slow and bulky cargo carriers were retrofitted with radar. The huge size meant that the 120 men and 15 officers on board could enjoy basketball courts, movies, hobby shops, and other amenities while on boars.[112]

The Navy also converted Lockheed Constellations to serve as airborne radar platforms. The Navy called them WV2 and the Air Force called them the EC-121C and EC-121D. Able to fly 3,500 miles, these aircraft contributed another layer to air defenses.[113] With the addition of submarines and Texas Towers[114]the air defense net reached 300-500 miles at sea from the bottom of the ocean to the air and across a 10,000 mile circle. Along with the DEW Line, these platforms could provide 24 hour a day coverage.[115] The air defense network also included both the McGill or mid Canada Line and Pinetree Line.[116]

Besides all these high-tech platforms, old fashioned eyeballs on the ground made up the Ground Observer Corps. Although started in World War II, it was resurrected in 1954 as the Continental Air Defense Unit. It developed into 400,000 volunteers at 15,000 observation posts, 600 of which were active on a 24 hour basis. While the individual members had to foot the bill to set up the post, the government would pay for phone installation and cost of phone calls. The Air Force provided vetting through military manned filter centers. These Ground Observer Corps sites could also assist in reporting natural disasters, weather, or any dangerous local condition. Most of the centers would publish monthly bulletin of activities and hints on designs of enemy

[109] Ibid, 23, 25, 27, 28, 31, 39.
[110] Roy Fletcher. "Military Radar Defense Lines of Northern North America: An Historical Geography." *Polar Record* 26, 159 (1990), 272.
[111] A YAGR designation refers to an ocean radar station ship.
[112] Morenus, 159,161-2.
[113] Ibid, 163.
[114] Texas Towers refers to a permanent radar station constructed on a platform out at sea.
[115] Ralph Allen. "Will DEW Line Cost Canada its Northland. *MacLean's Magazine*. May 26, 1956, 164.
[116] Morenus, 167-8.

aircraft to memorize. Both the Secretary of Defense and the President signed a letter of congratulations to these centers thanking them for their service.[117]

15. The DEW Line, Headlines, and VIP Visits

Despite the extreme secrecy surrounding the project, the public enjoyed remarkably candid and generally timely reporting on it. Early on in the project, in Oct 1953, the Associated Press released an article entitled "New Radar Network to Blanket Arctic Circle." It announced that an experimental radar system with an initial unit at Barter Island was close to operational status. The article explained it would provide six hours of warning for aircraft approaching over the North Pole. In addition, the article revealed it would operate automatically and would not be adversely affected by Arctic atmospheric disturbances.[118] A Feb 1955 press release revealed WEC as the prime contractor, mentioned the pilot project at Barter Island, explained that the line would provide additional warning of attack, included technology developed for the mid-Canada Line, and announced a joint project office in New York City.[119]

In January 1954, military and civilians from the USAF, Air Force Research and Development Center (ARDC), the Canadian Defense Review Board (DRB), WEC, Bell Telephone Labs, the RCAF, and Headquarters ACC, inspected Project 572 along with a station at North Auxiliary East in Canada. AAC Commander Lt Gen L.C. Craig served as the senior USAF official for the visit. At the same time, AAC worked with WEC to establish procedures for transmitting early warning data from Project 572 to the 11th Air Division at Ladd AFB. By doing so, the data could be integrated into the overall Alaskan air defense picture. AAC expressed concerns at the time that unless the entirely of the DEW Line was completed, individual stations such as that at Barter would not improve air defenses in Alaska. Furthermore, AAC emphasized the importance of ensuring adequate manning which AAC would be unable to provide.[120]

In September 1955, senior military and security personnel from the US and Canada conducted an inspection of Barter Point to evaluate the state of construction there. The group included the chairs of the PJBD, senior defense officials from the US and Canada, and a representative of the WEC. An article entitled "Arctic Land Attack is Possible" in the *Anchorage Daily Times* Sept 23, 1955 issue reassured the public that the project was well in hand and moving successfully towards completion. In the article, General Partridge, in charge of Continental Air Defense Command at the time, commented that the "quarters were the best he had seen" and Major General Briggs, Assistant Deputy Chief of Staff, Operations, Headquarters USAF observed, "the radar outposts will have quite an impact on Alaska and Canada…They will bring people into areas where they have never been before." The senior officials fielded

[117] Morenus, 168-173. David F. Winkler, *Searching the Skies: the Legacy of the United States Cold War Defense Radar Program.* United States Air Combat Command. Champaign Illinois: United States Army Construction Engineering Research Laboratories, June 1997, 21.
[118] "DEW Line Sites," Alaskan Air Command History, July-December 1953. 673rd Air Base Wing History Office, JBER, Alaska, 2.
[119] "Background Information on DEWLINE." Office of Information Services, Headquarters Alaskan Air Command, Elmendorf AFB, Alaska 22 September 1955. 673rd Air Base Wing History Office, JBER, Alaska, 1-2.
[120] Ibid, 4.

questions about the possibility of land attack by emphasizing its low probability and the far greater importance of preparation to deter air attack.[121]

16. 1956 News Tour of DEW Line

Finally in Spring 1956, the press got its chance to see the DEW Line firsthand. Under strict security, 19 American and 13 Canadian news outlets participated, accompanied by escorts from the DEW Project Office, the DoD, 18th Air Force, Air Defense Command, the RCAF, the Canadian Department of Northern Affairs and WEC. AAC provided transport and all copy and photos had to be cleared by the US government prior to publication.[122] United Press Reporter Charles Corddry, in his article entitled "Burgler Alarm," described the scope of the visit. "Newsmen visited each type of station—a gap filler on Baffin Island accessible only by air, an auxiliary in the Gulf of Boothia area northwest of Hudson Bay, and a main site on Victoria Island. They saw, too, the great supply and construction center at Point Barrow where the DEW line prefabs are assembled and moved by sled train to Alaskan sites."[123] Corddry expressed his appreciation of the immense difficulties of supplying construction and operational supplies to build the DEW Line. At the same time, he remained skeptical as to the viability of the system in defeating incoming bombers. He pointed out that neither the American nor the Canadian militaries were "under an illusion that the DEW Line is an impregnable defense." He mused whether the public would view these stations as a Maginot Line and draw the erroneous conclusion that they are protected. As the 1,500 mile Great Wall of China was not always successful in keeping out northern barbarians, so the DEW Line could not guarantee the bombers wouldn't get through. Nonetheless, Corddry, impressed by the logistical success, noted the "incredible difficulties" of suppling everything down to nails and hammers. He expressed the irony that, "Without the airplane—the hundreds of commercial and US Eighteenth Air Force transports—this defense against the airplane could not have been built."

Corddry's article included much of the data provided to the group through their official briefings. USAF official commented that while the enemy could jam the DEW Line radars, that very jamming would serve as the warning of their arrival. They did explain that the radars were limited to line of site so could not detect far away targets. USAF officials cited the goal of the 50+ DEW Line sites would be to provide 3-6 hours warning thereby enabling retaliatory action by SAC's bombers and civilian evacuation by civil defense agencies. According to the USAF, this could "save millions of lives." As briefed to the reporters, data from the DEW Line could be transmitted within minutes to Alaskan Command and Northeast Air Command, US and Canadian Air Defense Commands and installations, and SAC. Also, once aircraft crossed the DEW Line, USAF officials stated it would take about an hour and a half to reach the mid Canada line and again be detected. Aircraft could fly a zig zag pattern, but aircraft range would be limiting factor. According to the USAF, the DEW Line was "a warning line, not a combat line," but it represented a series of outposts that potentially could be expanded in the future."[124]

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[121] ALASKAN AIR COMMAND PRESS RELEASE 55-82. 673rd Air Base Wing History Office, JBER, Alaska. "Arctic Land Attack is Possible." *Anchorage Daily Times.* Sept 23, 1955. 673rd Air Base Wing History Office, JBER, Alaska.

[122] Message to Commander AAC, "Dew Line Press Tour," 30 March 1956. 673rd Air Base Wing History Office, JBER, Alaska.

[123] Charles W.Corddry, "Burglar Alarm," *Air & Space Forces Magazine*, June 1, 1956. Accessed July 10, 2023. https://www.airandspaceforces.com/article/0656burglar/.

[124] Ibid.

While also impressed with the enormity of the DEW Line project, *MacLean's Magazine* editor, Canadian Ralph Allen, had several misgivings over the project. His views reflected Canadian angst over potential US infringement of Canada's sovereignty in the Far North. He did praise the DEW Line as "one of the greatest feats of engineering and logistics in all of history, a monument to the ingenuity and hardihood of the North American human being."[125] However, he felt that even though the US was paying for the project, Canada was paying with loss of independence, had "traded off our whole northern frontier," and "thrust" away sovereignty. Stoking Canadian fears he warned that, "a tenth of Canada may well become the world's most northerly banana republic."[126] Allen was particularly skeptical of claims that the DEW Line would allow for evacuation of civilians. He pointed out that no major city could be evacuated in three hours. He also had some petty complaints such as being issued American Arctic gear so personnel at the DEW Line didn't know that official Canadian governmental representation was in the group. He was also unhappy about US and USAF control over the reporters during the visit and that while US restrictions applied, no one was subject to Canadian customs. He did nonetheless admit that the Americans were courteous and did not go out of their way to upset the Canadians. For example, they did not fly the US flag higher than the Canadian flag.[127]

17. Completion of the Line

On 13 August 1957, Maj Gen Stanley Wray, on behalf of the USAF, accepted the DEW Line project from WEC. WEC completed the project in the requisite and impressively short 32 months. Once the USAF took control of the DEW Line, they assigned the actual operations to Federal Electric Company to run. In the press release on the turnover, Maj Gen Wray called the DEW Line a "bulwark not unlike China's Great Wall, but with electronic gimmicks."[128] To set off the official dedication test alarm for the DEW Line, Maj Gen Wray flew his staff plane, the "Dewziak," through the line.[129] In preparation for the turnover, WEC had to conduct extensive testing. This involved hundreds of flyovers at different speeds and altitudes.[130] During this testing phase, Alaskan Command's Combat Operation Center received data from the Alaskan DEW Line sites for processing. Alaskan Air Command provided a C-124 for low altitude testing and SAC sent B-47's for high altitude testing.[131] Another example of testing occurred between March and June of 1957 when B-52s and B-47s tested the FOX sector with 140 sorties at low, medium and high altitudes.[132]

Such testing continued once WEC turned over the project. Project Red Sea took place from 1 May thought 2 Sept 1958 and involved 13 DEW Line sites and 12 SAC aircraft in 73 separate fights with varying altitudes. Seventy two of the 73 flights were detected and appropriately reported. While the test was successful overall, it did highlight some training

[125] Allen, 17.
[126] Ibid, 17,68,69.
[127] Ibid, 68,70.
[128] "The United Press Noon Run for KBYR and Elmendorf AFB Aug 13." Press Release on August 13, 1957. 673rd Air Base Wing History Office, JBER, Alaska.
[129] Ibid.
[130] Ray, 33.
[131] "The Distant Early Warning Lines," Alaskan Air Command History, January-June 1954, 673rd Air Base Wing History Office, JBER, Alaska, 3.
[132] "DEW Line Sites," Alaskan Air Command History, January-June 1956, np.

deficiencies and problems with the FPS-radar providing too many false alarms.[133] One SAC navigator recalled his B-47 missions from Pease AFB in New Hampshire, flying up past Greenland and north of Canada and then south across the DEW Line. The B-47s would try to avoid the interceptors sent up to find them and had a good-natured bet with the interceptor pilots as to whether the B-47s would get through without the interceptors being able to successfully "target" them.[134]

18. Life on the DEW Line

For those actually working on the DEW Line, the lure of excellent pay helped draw civilians to volunteer despite the isolated and distant location. For the military stationed there, it was not voluntary and generally not welcome news to get the assignment. DEW Line construction did, however, include making the stations as comfortable as possible for those who worked there. The modular structures included sleeping quarters, dining facilities and recreational areas. These would often be configured to include bars. The prolific POL deliveries ensured enough fuel to make inside temperatures comfortable. Regular deliveries of first-run movies, excellent chefs recruited from high end restaurants, and plenty of good food, such as steak and baked oysters, were some of the perks of the DEW Line.[135] All this was aimed at making life at the DEW Line replicate as closely as was possible the lifestyle they had left behind.

The day-to-day work of watching and waiting for any threats to materialize could be monotonous, assuaged only by occasional chats with US or Canadian aircraft in the area or an even more welcome stewardess on a transiting PAN AM flight.[136] The lack of reception limited commercial radio broadcasts and sometimes Soviet propaganda radio broadcasts by "Moscow Molly" provided the only option. DEW Liners could listen to her entreaties for them to return south, particularly the new arrivals. Entertainment options at Barter Island included the Bar-Tiki which started by selling excess beer rations and soon developed an account with a Fairbanks liquor store with deliveries on Wein Alaska's regular flights to the site. These flights earned the nickname, the "Booze Bomber." Pilots flying between BAR-3 and BAR-Main would sometimes ignore border requirements and transfer "duty free" Canadian Crown Royal and US Everclear between the sites.[137]

Some DEW Liners really embraced life in the Arctic. As described in Peter Grier's 2004 article in *Air Force Magazine*, Fred Teeter served on the DEW Line in late 1976 after graduating from college and being offered a position. He described long hours, 12 hours a day, seven days a week for 3 months. However, he took time to explore and photograph the Arctic landscape and later characterized his experience as providing a "wonderful freedom" and he enjoyed having time to himself to think. Another DEW Liner, Rick Ranson, began writing during his off hours. One of his stories described a seal, snuck inside for a shower. Another story relates his experience guarding camp from an aggressive and hungry polar bear. He tried bear crackers (a

[133] Ray, 43-44.
[134] Interview with author October 16, 2023.
[135] Grier, np.
[136] Howerd, 187.
[137] Francis Jewel Dickson. *The DEW Line Years: Voices from the Coldest Cold War* (Nova Scotia: Pottersfield Press, 2007), 88, 134, 136-137.

cross between a firecracker and a percussion grenade), to no avail, and thus was forced to shoot the bear. He aimed for the heart, shot, the bear charged, and when the bear died, it was only 10 paces from Ranson and Ranson had been running away.[138] Other DEW Liners had far more benign animal encounters. Richard Morenus' *DEW Line* book describes a DEW Liner walking back from the airfield with a walnut sized black dot floating in the air and following behind him. The man thought he must be imaging or hallucinating, but it turned out that a friendly Arctic fox that the men had been feeding had been following him. All that was visible in the Arctic fog was the black nose.[139] Tales of supernatural encounters were not uncommon among DEW Line personnel. In an article entitled, "The Haunted Dew Line," Tim Buchanan explains an experience while serving at the DEW Line Site at Oliktok. He woke up to see an Arctic fox staring at him and then replacing the fox, an elderly Alaska Native gentleman. When he later told the story to his fellow DEW Liners, they said that they too had seen apparitions and thought the site was near a burial ground.[140] There is an Inupiat cemetery at Oliktok.

Living in an Arctic environment, communicating over long distances, and complications of travel and logistics meant unique experiences for many serving on the DEW Line. One DEW Liner related a story about his experience at PIN-3, Lady Franklin Point. This was the midpoint on the DEW Line and an important site for transmitting communications back to NORAD. NORAD began complaining that there were problems with the signal; it would lack consistency and would drop without warning. Puzzled by this, the PIN-3 personnel eventually realized that their new toilet, when operated, generated a surge of electricity that adversely affected the signals. The random nature of toilet flushing accounted for the unexpected drops in communications. At another site, a dangerous storm in January 1973 lasted twelve days and brought wind gusts up to 172 mph. The severity of the storm rendered the station inoperable, and it required 6 weeks and 150 extra personnel to be rectified. A USAF officer who arrived in the storm's aftermath, naively exclaimed, "I can't believe you all stayed. I would have ordered everyone to abandon the site." The station chief reminded him where they were and asked, "Where would you have gone?"[141] Something as simple as testing a fuel bladder could easily go awry in Arctic conditions. Before the construction of huge fuel tanks, the bladders provided storage for the precious fuel that ran the DEW Line. As per normal procedure in other locations, a technician filled one with air to check for leaks. Before anyone could stop it, the inflated bladder was off at 30 knots in a southeasterly direction already reaching 200 feet in elevation and rising.[142] Procurement decisions for DEW Line sites when made by those outside the Arctic, could lead to the arrival of puzzling items. For example, a completely unneeded 29 passenger bus showed up in an equipment delivery to Barter Island. The furthest walking distance for the site was the 1.5 miles from the upper camp to the airport. Furthermore, the entire population, if you utilized the aisle, could fit inside the bus. DEW Liners entertained themselves by putting exotic location on the roll displayed in the window above the windshield.[143]

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[138] Grier, np.
[139] Morenus, 81.
[140] Tim Buchanan. "The Haunted Dew Line Site." *Fairbanks Daily News Miner.* October 29, 1995, H-10.
[141] Dickson, 47-48, 53-54.
[142] Ibid, 122.
[143] Ibid, 151.

Britain Gareth Howerd spent one year in the early fifties in the Eastern Canadian Arctic as a DEW Line doctor with responsibility for a 600,000 square mile area and published a memoir of his experience. Dr Howerd arrived as a proper English gentleman but soon adopted appropriate Arctic attire and embraced his new Arctic duties. Although his contract was only for three months, he found the work compelling and the lure of the Arctic appealing enough to extend for almost a year. Howerd was based out of Baffin base but traveled throughout the eastern sector serving the medical needs of DEW Liners as well as local Inuit communities without access to a doctor. Howerd noted that the Eastern Arctic had been one of the most inaccessible parts of the world but World War II and now the Cold War had irrevocably changed that. Frobisher Bay, which took Martin Frobisher 63 days to reach, was now accessible as an international air station. He found the Arctic fascinating but equally understood the potential dangers. On one flight he observed, "the land below us looked innocent and merciful. It just did not seem the same land as that though which we had fought all day. But that was the Arctic—its smile was that of the tiger. Behind lay its fangs."[144]

The isolation and seeming desolation of the Arctic could adversely affect those from outside the area. Howerd described the difficulties some of the DEW Liners faced dealing with mental health issues and his role in trying to mitigate such problems or in extreme cases, evacuate them back home.[145] To those not acclimatized to life in the North, the experience could prove exhilarating, as it was for Howerd, or completely debilitating. This required close observation and quick action. Mental strain could cause hallucinations or dangerous behavior. In one case, an individual walked out into a 45mph blizzard in his underwear.[146] Richard Morenus observed in his book *Dew Line* that those sent to the North could find the transition overwhelming. He noted that the Inuit could watch the "volatile white man's nerve fray at the edges merely because of the lack of entertainment."[147]

Howerd also explains what medical care he provided to local Inuit communities. He would often need to treat cases of pneumonia, flu, colds and tuberculosis. He noted that whalers a century before had brought the latter to the area. He would also often provide maternity care and received USAF assistance in evacuating serious cases to hospitals in Montreal. Due to his work, the local Inuit would often call him Lutka, their version of Luke, the one who heals. Howerd quickly realized that he needed the support of respected local Inuit leaders to convince sometimes reluctant patients to travel south for treatment. Howerd would regularly seek out Ouha, an elderly woman in the local community, to aid him. Ouha thus served as an important partner in his medical work. Howerd noted that Ouha was a skilled accordion player which was likely something passed on by whalers. Unfortunately, whalers and non-Native hunters had also passed on diseases and decreased fish and animal stocks. The introduction of firearms had also negatively affected wildlife availability. Howerd said these previous injustices were compelling reasons for aiding the Inuit in health care and sustenance.[148]

Although he believed it was important to help, he also saw that there was much to learn from Inuit communities. Howerd was particularly impressed with the Inuit method to resolve serious disagreements. He never saw a fist fight, rather the Inuit would send the two disputants to different locations until the argument could be resolved or forgotten. Howerd commented that it

[144] Howerd, 47, 149, 156.
[145] Ibid, 182-183.
[146] Dickson, 154.
[147] Morenus, 151.
[148] Howerd, 47, 77, 122, 131, 158.

was an idea, "which could be copied among people who claim to be more civilized than those of the north."[149] From his experience providing medical care Howerd found the parents very devoted to their children and described Inuit homes as filled with "laughter and happiness." Additionally, he praised the children as intelligent and receptive, skilled in carving and with a "highly developed sense of color" when creating art.[150]

19. Interaction and Impact on Indigenous Communities

For the most part, the relationship between those working on the DEW Line and the local Inuit communities appeared cordial. Like Howerd's observation, many DEW Liners noted the kindness and friendliness of the Inuit people they met. Impressed with their ability to "live by their own ingenuity," DEW Liners described Inuit they worked with as "quick to learn and adapt."[151] In her PhD Dissertation entitled *DEW Line Passage: Tracing the Legacies of Arctic Militarization,* Stacey Fritz discussed the different Inuit view of DEW Line workers compared with other groups that had come to the Arctic. In one interview with an Alaska Native in Barrow, Fritz noted that the interviewee reflected on his more positive perspective of DEW Line workers compared to the later oil workers that arrived. He disparaged the "rednecks" brought by the oil companies and compared them to the DEW Line workers and military in particular, who were sent and did not come to profit off the land and remove resources.[152] In addition, Fritz found through her many interviews an, "almost universal consensus…that the people of the western Arctic coast loved their local [DEW Line]towers, put them to great use for generations, and were sad and angry to see them go."[153] In a flat environment, these towers provided amazing vistas for those who climbed them for fun and they were a welcome aid as landmarks, for gun siting and navigation. Fritz comments that the DEW Line relationship was in some ways "a more neutral relationship" than during whaling, trading, and missionary work. Dew Line personnel were not sent to the Arctic to acquire goods, resources or conversions from Inuit communities and were generally discouraged from interacting with or influencing them unless individuals chose to work on the sites or provide Indigenous Knowledge.[154]

While those arriving to construct, operate and support the DEW Line could provide things such as certain health care and supplies that were difficult to impossible for the local Inuit to acquire, they quickly realized the importance of Indigenous Knowledge. Local Inuit knowledge of the terrain proved helpful in locating sites. Capt Elliot Roosevelt, lead for the DEW Line Survey at Frobisher, consulted with local Inuit on where to site an airbase. Anugaaq Arnaqquq, an Inuit elder from Iqaluit commented, "I can tell you that setting up a camp is not easy. These Americans wanted to set up a camp in the north. There was nothing. There were no trees. It was dark. There were blizzards. There was nothing in place at all. I am in awe of how [Nakasuk (a local Inuit)] helped these qallunaat[155] set up camp here."[156] The Inuit knew how to survive, dress, track, and travel in the Arctic. Inuit clothing was perfectly adapted to the Arctic

[149] Ibid, 136.
[150] Ibid, 111, 135.
[151] Morenus, 147-148. "The DEW Line Story," 12.
[152] Stacey Fritz. "Dew Line Passage: Tracing the Legacies of Arctic Militarization" (PhD Diss., University of Alaska Fairbanks, 2010), page number, Scholarworks@UA (http://hdl.handle.net/11122/9051), 168-169.
[153] Ibid, 231.
[154] Ibid, 168.
[155] Inuit term for a foreigner that is not from the Arctic, generally a white person.
[156] Gagnon et al, 311.

and would use items such as wolverine fur for hoods as it didn't frost, and snow glasses constructed out of bone. From the Inuit, DEW Liners learned to wear wool or fur next to the body, something waterproof for the outside and to avoid sweating when working outside.[157] DEW Liners immediately turned to Inuit knowledge when they needed to locate and rescue personnel. When interviewed, Gordon Killbear from Point Lay described an incident at Barter Island in which the weatherman had gotten lost and his radio wasn't working. One of the Inupiat Perry Akootchook, went out with a group to find him and due to his excellent sense of direction and knowledge of the island was able to quickly locate the lost man, much to the amazement of those with him.[158] Indigenous Knowledge was not just practical, it could be life saving for the many arriving DEW Liners.

While the DEW Line did import thousands of workers to the Arctic, construction and operation in fact, depended on direct assistance from the Inuit population which comprised at least 25% of the construction labor force. Thus, the DEW Line provided a significant number of new wage labor positions. Along with these positions came job and skills training. This was both an opportunity for those individuals that chose to interact directly with the DEW Line and a disadvantage to maintaining traditional ways of life. Wage labor was tied to consistent dependability as a worker, and this often conflicted with the ability to hunt. DEW Line managers needed their workers to show up every day but if the workers couldn't be free to leave when the hunting was optimal, it was impossible to provide a subsistence level of food for their families. On the other hand, the military provided a market for surplus handcrafted goods as well as a source of a greater variety of food, building materials, fuel and firearms.[159] Unfortunately, the DEW Line became a source of alcohol, despite both US and Canadian government efforts to limit it distribution. Limitations on alcohol could, in fact, become a source of friction as Inuit workers were justifiably offended when they were denied the same access to alcohol that the white workers were allowed.

Beyond the impact on those directly employed, the DEW Line had a major impact on life in the Arctic. The DEW Line promoted northern science and technology. Better communication systems also benefitted local communities. The DEW Line became representative of governmental authority in areas that previously had negligible contact with the central government. The DEW Line imported American and Canadian culture through movies, food, and entertainment. DEW Line infrastructure irrevocably changed access to the Arctic. Airstrips played a major role in the continued viability of some communities, in relationships and marriages with locals, in provision of emergency medical attention, and in creating a market for local arts and crafts.[160] Discarded wood, pallets and other construction material made it possible for many in the community to expand or build new homes. DEW Line locations could affect community populations. A dramatic example of this is the community of Barrow which hosted both the DEW Line and the Naval Arctic Research Laboratory (NARL). Barrow increased in population from 330 in 1930 to 1,274 by 1957.[161]

Interviews with Inuit in Canada and Alaska provide some insight on Indigenous perspectives of the DEW Line. The Legacy Project involved interviews in Alaska while the book, *Inuit Recollections on the Military Presence in Iqaluit* focused on memories of those

[157] Morenus, 43-44.
[158] Gordon Killbear. Interview by Jenny Brower and Martha Neakok. Legacy Project. Point Lay, April 25, 2005.
[159] Fritz, 8, 117-118.
[160] Fritz, 6-8.
[161] Ibid, 117, 239.

affected by the military presence and DEW Line site in Iqaluit, Canada. These two sets of interviews highlight both positive and negative experiences and consequences of the DEW Line. Additionally, these interviews help correct the narrative of many American accounts that fail to account for agency on the part of the Inuit. While many of these accounts describe Inuit as being "moved" or "selected" in reference to their relationship with the DEW Line, the Inuit describe their active control in making choices to move, return or work for the Americans.[162]

Legacy project interviews reveal individual Inuit experiences working on the DEW Line in Alaska. In the interviews, several individuals explained their decision to work on the DEW Line based on the money and opportunity it provided. Previously, only government or village corporation jobs were available as wage earners. DEW Line jobs paid well and allowed community members to purchase items useful for more efficient hunting as well as materials to build homes. They could also use the pay to help family members and buy household items.[163]

Inuit elders interviewed in Iqaluit provided similar observations. Many of them described the Americans as helpful in providing jobs with decent pay, skills training, and opportunities to learn English.[164] Furthermore, many of them noted the American's generosity in providing food, tobacco, clothing, wood, crates, fuel and medical treatment. One elder explained his positive view of the Americans saying they, "were here for a good cause. They tried to help people…The Americans were here to protect people."[165] Interestingly, the elders had a more positive view of Americans than Canadians. They characterized the Canadians as less generous and helpful. Furthermore, they explained that wages from the Americans allowed them to pay off the revolving debt they had incurred at the hands of the Hudson's Bay Company (HBC) trading posts. Furthermore, they felt the more significant turning point in their lives was the increasing lack of control once the Canadian government extended its authority in the region. The Canadian government, concerned about its sovereignty in the Arctic, increasingly sent Northern Service Officers north and tried to convince Inuit to leave their camps and permanently settle in villages the government established. One elder, in fact, described the Americans as seemingly "happy most of the time," and Canadians as "depressed and lazy."[166] To be fair, the Canadians sent north were tasked to interfere with and change the lifestyle of the Inuit while the Americans were there for a particular military mission and in a temporary status. Not wanting any permanent American influence and imprint on the Canadian Arctic, the Canadian government sought to limit interaction of Americans serving on the DEW Line with the Inuit. The DEW Line, however, was well funded and supplied; the Americans working there could afford to be generous with their provisions and needed the expertise and extra hands that Inuit workers could provide.

Further aiding in a the more positive view of the American DEW Liners, the Inuit in both Alaska and Canada had already encountered qallunnaat diseases and the Americans in this case, did not introduce new epidemics and illnesses. The archives in Iqaluit indicated that epidemics and starvation were prevalent long before the American arrived. In fact, American military

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[162] Gagnon et al, 311.

[163] Ben Frantz. Interview by Jenny Brower. Legacy Project. Barrow, nd.
Jimmy Aiken. Interview by Jenny Brower. Legacy Project. Atqasuk, February 17, 2005.
Thomas Itta. Interview by Martha Neakok and Jenny Brower. Atqasuk, February 17, 2005.
Bodfish, Barry. Interview by Karlene Leeper and Jenny Brown. Legacy Project. Wainwright, April 8 2005.
Benjamin Neakok. Interview by Martha Neakok. Legacy Project. Point Lay, April 25, 2005.
Gordon Killbear. Interview by Jenny Brower and Martha Neakok. Legacy Project. Point Lay, April 25, 2005.

[164] Gagnon et al, 277, 303, 325.

[165] Ibid, 303.

[166] Ibid, 301, 325, 333, 335.

doctors provided much better medical care in Iqaluit than had existed before their arrival. Missionaries, Royal Canadian Mounted Police (RCMP) and HBC officials who had been there for some time lacked the medical training, supplies, and airlift capability the Americans possessed.[167] Similarly, DEW Line sites in Alaska and throughout the Canadian Arctic provided medical access, particularly the ability to evacuate serious cases. The Legacy interviews revealed two cases when an accidental gunshot victim and a dangerously ill infant were both transported via DEW Line aircraft to Barrow for treatment. Use of the telephones at the DEW Line sites provided communication access for such emergencies that otherwise wasn't available.[168]

In addition to medical care and wages, the DEW Line sites provided opportunities for social events and entertainment. One Inuit interviewee who worked at a DEW Line site stated that he enjoyed having access to the good food, music rooms to listen to albums, first run movies, bars, and a shop to buy goods.[169] Many local Inuit attended weekly movies as well as holiday parties for Christmas and Thanksgiving. Apples and oranges were common gifts to both children and elders in the local communities. These social activities allowed both the local Inuit and DEW Line workers from the south to share their cultures with one another. This was not merely introducing Inuit to culture from the south. Inuit also shared their local food and culture. One interviewee emphasized that during social events, he would be sure to bring local food, "whether they like it or not."[170]

The relationship between the local community and the DEW Line sites could depend on the personality and prejudices of the assigned station chief. Generally, this worked smoothly. For example, one of the interviewees in the Legacy Project noted a very positive relationship with the station chief. He described this particular station chief from Texas as easy to get along with and fair and equitable in his treatment of Inuit workers. Others noted that they got along well with their coworkers and had excellent access to the same DEW Line amenities as everyone else.[171] Other station chiefs were not as magnanimous or fair in their treatment of local Inuit. In his book, *The Inupiat and Arctic Alaska: An Ethnography of Development*, Norman Chance relays a story from a Kaktovik elder about a surly DEW Line Chief who treated the Inuit with distain. In one of the Legacy project interviews, Daniel and Lillian Akootchook confirmed this same story. Both accounts describe the station chief finding himself lost and disoriented after going out in a big storm to bring back the cook who was at another location on the site. DEW Line staff asked for assistance from Inuit in the local village and the Inuit soon found him with, "funny, summer shoes on," wet to the bone and incoherent. The Akootchooks said before this incident the station chief was stingy and hostile but afterwards his attitude changed completely. He invited his rescuers into the DEW Line dining area for big steaks. Furthermore, he admitted the Inuit were far more knowledgeable about the weather. The elder that found him, Vincent Nageak, pointed out that prior to his rescue, the Inuit had rescued three other people who had become disoriented in the weather. The station chief from that point on kept telling Nageak that

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[167] Gagnon et al, 327, 331.

[168] Benjamin Neakok. Interview by Martha Neakok. Legacy Project. Point Lay, April 25, 2005.
Helen Tukle. Interview by Karlene Leeper, Jennie Brower and Martha Hopson. Legacy Project. Nuiqsat, August 12, 2004.

[169] Gordon Killbear. Interview by Jenny Brower and Martha Neakok. Legacy Project. Point Lay, April 25, 2005.

[170] Benjamin Neakok. Interview by Martha Neakok. Legacy Project. Point Lay, April 25, 2005.

[171] Benjamin Neakok. Interview by Martha Neakok. Legacy Project. Point Lay, April 25, 2005.
Gordon Killbear. Interview by Jenny Brower and Martha Neakok. Legacy Project. Point Lay, April 25, 2005.

he should continue to share his expertise on the weather even when he came across difficult individuals like himself.[172]

Unfortunately, despite the many positive human connections due to the DEW Line's presence, there were lasting negative environmental and cultural consequences. Contaminants, debris and chemicals were left behind, often buried or dumped in the ocean. Legacy Project interviews discussed several special examples. On Barter Island, the location of the landfill meant material washed into the ocean. Furthermore, items would sometimes be hauled out on the frozen Beaufort Sea and left to slide beneath the surface once the ice melted. At Wainwright, the old DEW Line dump contained oil drums and lots of debris. DEW Line workers didn't realize the danger of contaminants and people in the villages that were given materials from the DEW Line were also unaware of environmental dangers and human risks.[173] One interviewee stated, "The North Slope was basically used as a dumping site for the military," because it was too expensive to remove the material.[174] Another interviewee stated that he had to quit working at the DEW Line due to chemicals exposure and concern about losing his hands.[175]

Interviews of the Inuit in Iqaluit reflected similar concerns. One elder stated, "The Americans were here to help people. The bad thing was they left behind lots of stuff."[176] Military equipment damaged vegetation, sewage polluted the tundra and roads, and airstrips and buildings changed the Arctic landscape. The addition of wage labor disrupted the local social order and denser clusters of people around the DEW Line sites could also increase the strain on hunting and fishing resources leading to disruption in the subsistence economy.[177] Although DEW Line workers from the south were not supposed to hunt in the area of the DEW Line, they did not always follow the rules. One elder interviewed lamented that children no longer were learning how to provide for their families, just how to go to school and work.[178] Stacy Fritz's dissertation points out that while some benefitted economically from the DEW Line, it did weaken community bonds and traditional skills. Furthermore, she states that the language used in connection with the DEW Line defined the land and environment as an enemy that must be vanquished. She believed this to be insulting to the local Inuit and thought it contributed to the view of them as "an other" for choosing to live in such a difficult place. To support her contention, she referenced an Inupiaq writer who said this vilification of the land had lowered the self-esteem of the youth.[179]

While WEC literature describes the DEW Line construction as a monumental achievement, it could actually be quite frightening to local residents. Fritz quotes an interviewee's impression of the arrival of construction equipment at Point Lay. He told Fritz, "that's when all the big changes came, and the people started to be trampled down. All we could do was watch them. With all these big landing craft and them tractors all over town. Like what

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[172] Norman A. Chance, *The Inupiat and Arctic Alaska: An Ethnography of Development* (Forth Worth: Holt, Rinehart and Winston, Inc.,1990), 78-79. Daniel Akootchook and Lillian Akootchook. Interview by Karlene Leeper, Jenny Brown and Martha Hopson. Legacy Project. Barter Island, nd.

[173] Dickson, 147. Bill Tegoseak. Interview by Jenny Brower. Legacy Project. Fairbanks, Sept 16, 2005. David Bodfish. Interview by Jenny Brower and Karlene Leeper. Legacy Project. Wainwright, April 8, 2005.

[174] Bill Tegoseak. Interview by Jenny Brower. Legacy Project. Fairbanks, Sept 16, 2005.

[175] Charlie Nayakik. Interview by Karlene Leeper and Jenny Brower. Wainwright, April 8, 2005.

[176] Gagnon et al, 303.

[177] Whitney Lackenbauer and Matthew Farish. "The Cold War on Canadian Soil: Militarizing a Northern Environment." *Environmental History* 12, no.4 (Oct 2007): 920-950. Accessed August 3, 2023, 932. http://www.jstor.org/stable/27976102

[178] Gagnon et al, 303.

[179] Fritz, 158, 165.

you call Normandy invasion."[180] While many of the DEW Line sites were in uninhabited areas, others were built where an existing community lived. This was a particular problem on Barter Island, the site of the Kaktovik DEW Line station.

When the military first started construction at Kaktovik, they abruptly informed the villagers that they had to immediately relocate as the military wanted to use the site of the village. The military provided bulldozers to help them move the structures, but the villagers had to abandon their ice cellars.[181] This is not an inconsequential thing as it takes a year to build a proper ice cellar and it was the means to preserve the family's food.[182] Not knowing English, the villagers could not advocate for themselves and according to the document, *Kaktovik, Alaska: An Overview of Relocations,* it did cause, "considerable grief, hardship and dismay."[183] Despite this inauspicious start, the villagers and DEW Line personnel generally got on well together and several local Inuit took jobs at the site.[184] In 1955, DEW Line layout changes and road construction meant the village again had to be relocated. Again in 1964, the village relocated but this time in conjunction with negotiations with the villagers. They actually favored a new site yet still had to get permission from the USAF in order to move the village. In advocating for the people of Kaktovik, Reverend John Chambers wrote to Senator Bob Bartlett asking that property rights be given, "to the people who had every right to it long before it became a military reservation."[185] When local efforts to build a church were being delayed by the USAF, Chambers further insisted that the Air Force not interfere with what or what not the villages might choose to do in their village site.[186]

By the mid 1970s, the Kaktovik villagers were actively working to capture the history of their village on their own terms. Their 1977 acceptance of the Beaufort Sea Traditional Land Use Inventory provided for written records of history. Instead of the DEW Line language of desolate Arctic wasteland, the area description stated, "Kaktovik is one of the best examples of the diversity and richness to be found on the North Slope,..there is a keen interest and conviction among its residents to preserve their unique heritage and cultural roots."[187] While Kaktovik residents concluded that the Air Force was not "actively discriminatory or purposefully disruptive in its relationship with the village of Kaktovik," the military presence in the Arctic was nonetheless disruptive and disorienting, and change whether welcome or not, had become a "persistent part of the Inupiat's life."[188]

Canadian documentary filmmaker Kevin McMahon offers a critical view of those that touted the opening of the Arctic through the military's efforts, "as if it had been a kind of locked and mysterious room before some clever army engineers happened by with keys." McMahon uses military language to describe the military "carpet bombing the place with boxes" and cites Inuit who described the experience as a constant flow of boxes raining from the sky. Mary

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[180] Ibid, 162.
[181] *Kaktovik, Alaska: An Overview of Relocations*. Prepared jointly by Jon M Nelson and the North Slope Borough Planning Department for the city of Kaktovik and the North Slope Borough Commission on History and Culture. November 1977, 3.
[182] Fritz, 161.
[183] *Kaktovik, Alaska: An Overview of Relocations*, 3-4.
[184] Ibid, 4.
[185] Ibid, 6.
[186] Ibid, 7.
[187] Ibid, 10.
[188] Ibid, 15, 17.

Simon, an Inuit political leader and the current governor general of Canada, described military undertakings as "unilaterally imposed on Indigenous peoples and their territories."[189]

Others, such as Canadian historian Whitney Lackenbauer, describes military sites in the north as "beachheads of modernism during the Cold War," and contributors to the "resilient human infrastructure in the North."[190] He views the DEW Line as "an extraordinary intervention that likely did more to alter the lives of northern inhabitants than any other Cold War Initiative."[191] Canadian historian David Neufeld argues that the DEW Line transformed southern Canadian thinking about the Arctic and incorporated recognition of the Inuit identity into the Canada's identity as a nation.[192]

20. End of the DEW Line

The DEW Line irrevocably changed the Canadian and Alaskan Arctic but its usefulness as a military bulwark against Soviet bombers began to wane in the eyes of US policy makers. By the mid 1960s, the Soviet ICBM threat seemed far more pressing than the bomber threat. In February 1966, Secretary of Defense Robert McNamara complained that anti-bomber defenses could contribute little to limiting damage in the case of an ICBM attack.[193] When given proposals to improve the DEW Line with backscatter over the horizon radar for long range detection, complemented by Airborne Warning and Control System (AWACS) aircraft and upgraded interceptors, McNamara was dismissive and expressed his opinion that "the Soviet Union had no more experience in long-range bombing than the Nigerians."[194] Despite, McNamara's dismissal of their capabilities, the Soviets continued a robust program of bomber training and simulated strike missions against the US and Canada. Nevertheless, reductions to the DEW Line commenced and all 31 Intermediate DEW Line sites were shuttered in 1963.[195]

In 1970, in response to changing defense priorities, the USAF closed five DEW Line sites in the Aleutians including Cape Sarichef, Driftwood Bay, Nikolski, Port Heiden and Port Moller. Maj Gen Moore, Chief of the Alaskan Air Command at the time, stated that the reductions were due to improvements in the air defense system.[196] Despite this, indications of continued concern over the Soviet bomber threat were apparent in a 1985 letter from the ALCOM Deputy Chief of Staff asking for a study on whether to add radars in the Aleutians due to the intensity of Soviet BEAR Bomber activity.[197] Alaskan DEW Line sites at Point Lay and Bullen Point were deactivated in 1970 and 1971. However, when the North Warning System (NWS) came to

[189] Lackenbauer, 3.
[190] Ibid, 3-4.
[191] Lackenbauer and Farish, 928.
[192] David Neufeld, "Commemorating the Cold War In Canada: Considering the DEW Line." *The Public Historian* 20, No. 1 (Winter 1998),17. https://www.jstor.org/stable/3378865
[193] Winkler, 37.
[194] Richard F. McMullen, *The Aerospace Defense Command and Antibomber Defense 1945-1972*. ADC Historical Study No. 39. 673rd Air Base Wing History Office, JBER, AK, 164.
[195] Herd, 192.
[196] Press release quoting Maj Gen Moore, Commander AAC on closure of Aleutian DEW sites. 673rd Air Base Wing History Office, JBER Alaska. (#40) Cloe, 221.
[197] "Radar Coverage in the Aleutians," Letter from DCS/Operations AAC Colonel James Andrus to 11TCG/CC dated 30 December 1985. 673rd Air Base Wing History Office, JBER, Alaska.

fruition in the mid 1980s to replace the DEW Line with upgraded capabilities, both Point Lay and Bullen Point received upgraded radar and rejoined the air defense network. Cold Bay received an upgraded radar in 1985 but in a different location from the DEW Line site which was demolished in 1988.[198]

A 1985 agreement between the US and Canada opened the way for a wholescale modernization and transition from the DEW Line to the NWS. Construction of the NWS infrastructure proceeded from 1987-1999 and in the early 1990s the US withdrew its NWS personnel from Canada and turned over full operational control to the Canadians. The NWS integrated improved radar and communications equipment with automated transmission of radar data to central processing facilities. These Regional Operational Control Centers (ROCC) received the automated data and provided warning and control for the overall air defense system.[199] Canadian and American operators at Elmendorf AFB coined the name TOP ROCC for their regional center. Alaskan DEW Line sites at Barter Island, Cold Bay, Oliktok, Point Lay, and Point Barrow became Long Range Radar Stations (LRRS) and received the AN/FPS-117 Minimally Attended Radar (MAR). Alaskan DEW Line sites at Bullen Point, Point Lonely and Wainwright became Short Range Radar Stations (SRRS) equipped with the AN/FPS-124 Unattended Radar (UAR). In Alaska, the NWS radars combined with the former AC&W sites are collectively known as the Alaska Radar System (ARS). Further reductions occurred in 2000 with Point Lay LRRS closing and in 2007 with the closure of Bullen Point, Point Lonely and Wainwright SRRS. Currently, the ARS is comprised of 15 LRRS. Alaska houses three of the NWS sites.[200]

The remaining 47 out of 50 sites in the NWS are located in Canada and remotely monitored and controlled by NORAD through the Canadian Air Defense Sector at North Bay, Ontario.[201] As the NWS replaced the DEW Line, the deactivation of the Canadian sites left behind PCBs and other toxins creating a huge environmental problem.[202] In 1996 Canada reached an agreement with the US to jointly share clean up costs at some military facilities in Canada.[203] Clean Sweep was a similar program for Alaska. Currently the majority of the NWS sites in Canada are located within Inuit Settlement Areas. In January 2022, Canada awarded a seven-year $592 million maintenance contract for their NWS sites to Nasittuq, an Inuit company.[204]

Despite the many challenges, Canada and the US have been discussing the necessary upgrades to the NWS to respond effectively to new and emerging threats to include advanced

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[198] United States Air Force Integrated Cultural Resources Management Plan: Distant Early Warning (DEW) System Sites, Alaska. Prepared for: Air Force Civil Engineering Center Joint Base San Antonio-Lackland, Texas by Oneida Total Integrated Enterprises and Cardno, Inc. 2020, 16-17, 19.

[199] Roy Fletcher, "Military Radar Defense Lines of Northern North America: an Historical Geography." *Polar Record* 26, 159 (1990), 267, 273. Cloe, 239-240. Jockel, 121-123. Winkler, 58.

[200] United States Air Force Integrated Cultural Resources Management Plan, 14-21.

[201] "Backgrounder – North Warning System In-Service Support." Government of Canada Website. Accessed 10 October, 2023. https://www.canada.ca/en/department-national-defence/news/2022/01/backgrounder--north-warning-system-in-service-support.html

[202] Grier, np.

[203] Lackenbauer and Farish, 941.

[204] "Backgrounder – North Warning System In-Service Support."

cruise missile and hypersonic weapons.[205] While the ICBM threat still exists, the Ballistic Missile Early Warning System was constructed in response to that threat. Additionally, new missile systems offer a far more flexible option and a greater likelihood of utilization against the US and Allies. The focus of NWS upgrades would be to counter the improved cruise missiles that fly longer distances at higher speeds and hypersonic missiles which combine ballistic missile speeds and cruise missile maneuverability. Longer ranges mean that missiles could be launched from far greater distances, necessitating longer range detection systems. Furthermore, the dissolution of the Intermediate-Range Nuclear Forces (INF) Treaty in 2019 means that Russia has no limitations on deploying ground based cruise missiles in the Arctic. The current NWS would be unable to effectively counter such advances in technology.[206]

Upgrades to the NWS will require extensive consultation with Indigenous people in the Arctic. The Canadian government is a signatory to a UN declaration that requires it to consult Indigenous groups before using any of their land for military purposes.[207] Any changes to the NWS requires the Canadian government to comply with three Comprehensive Land Claim Agreements, the Directive on Government contracts including Real Property Leases in the Nunavut Settlement Area, and the objective identified in the Arctic and Northern Policy Framework Framework to uphold increased self-determination and representation of Indigenous Peoples in the North and Arctic.[208] The US government also must consult Alaska Natives regarding federal projects.

In a 2022 Wilson Center dialogue entitled "Overcoming Remoteness: Arctic Innovation in Transportation, Energy and Connectivity," Madeline Redfern, the chief operating officer for CanArctic Inuit Networks, referred to her community's "literal" use of the military dump at the DEW Line site in their local community. This unequal partnership wasted precious capacity that a more balanced partnership can leverage. Ms Redfern used this reference to point out that NORAD's NWS modernization should embrace a coordinated and strategic vision employing multipurpose infrastructure to confer social, economic and security benefits on both a federal and local level.[209] While she was referring to the Canadian Arctic, her perspective is relevant to Alaska. Thus, NORAD modernization of the North Warning System, which will include sites in both Canada and Alaska, will require partnership with the Inuit in Canada and Alaska.

21. Conclusion

The current focus on deterring new, more advanced airborne threats is in some ways an echo of the concerns that drove the construction of the DEW Line in the 1950s. It seemed to many that ICBMs would supersede the threat from aircraft, but the airborne threat has been revived with new, advanced weapon systems. Reflecting on the enormity of the DEW Line

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[205] Ibid.
[206] "North America's Arctic Radar Shield is Due for an Upgrade." *The Economist*. July 29, 2021. https://www.economist.com/the-americas/2021/07/29/north-americas-arctic-radar-shield-is-due-for-an-upgrade
[207] Ibid.
[208] "Backgrounder – North Warning System In-Service Support."
[209] Wilson Center, "Overcoming Remoteness: Arctic Innovation in Transportation, Energy and Connectivity," YouTube Video, 1:00, December 7, 2022, https://www.wilsoncenter.org/event/overcoming-remoteness-arctic-innovation-transportation-energy-and-connectivity?utm_campaign=pi&utm_medium=email&utm_source=event&emci=e7fd5c64-c975-ed11-819c-000d3a9eb474&emdi=1c71a46c-3776-ed11-819c-000d3a9eb474&ceid=360232.

project, the effort was staggering in its ambitions. Once apprised of the project, press reports indicated the importance and enormity of the project. In a February 1955 article, *The Economist* noted, "it is doubtful if American methods have ever met a more formidable adversary than they face this time." The magazine characterized it as "a mass assault on the Arctic the like of which the northern wilderness has never seen before."[210] It was the largest research and development project since the Manhattan Project and as NORAD Commander General Partridge would observe, "the DEW Line was one of the most difficult construction jobs ever undertaken by anybody anywhere."[211] General Partridge candidly observed that it could not stop every bomber, but he calculated that even shooting down one that was headed to a major city in the US could "save billions of dollars and maybe a million lives."[212] While in retrospect it is easy to criticize the vast expenditure on a system that required upgrades almost as soon as it was built, at the time, such a system seemed imperative for defense. NORAD officers echoed this sentiment stating, "if we didn't have the DEW Line…We'd be sitting ducks, that's what we'd be…gone goslings" and emphasized that, "The DEW Line is our lifeline." As far as the high cost, airmen expressed the sentiment, "since we were the ultimate target there was no alternative."[213]

The stories of constructing and operating the DEW Line are compelling and intriguing. A 1952 Alaskan Air Command history document observed "The stories of building the Alaska radar net, communications system, and DEW Line are picturesque enough to challenge the pen of a Jack London."[214] For the many people who served at DEW Line stations, the experience provided a sometime exhilarating, often monotonous, but unique perspective on the Alaskan and Canadian Arctic. For the Indigenous people impacted by the DEW Line sites, their perspective on the DEW Line was generally dependent on their individual experience. Many saw benefits in the pay, resources and access and the utility of the sites themselves for navigation and landmarks. Others remember the DEW Line sites as disrupters to their lives, homes, and communities. The negative environmental impact of the pollutants and debris left behind is undeniable. However, many interviewees acknowledge that the DEW Line served a purpose that at least at the time seemed important and necessary. Furthermore, the interaction between the personnel at the DEW Line sites and the local communities was largely cordial and friendly. Local Inuit mostly viewed the DEW Liners from the south as well-meaning and generous in sharing resources. They acknowledge the dumping and pollution left behind but see it as neglectful and expedient rather than malicious in its intent. In some ways, the relationship between local communities and the DEW Line was seen as less exploitive than previous contact with traders or whalers. In the case of Canada, the more laissez-faire attitude of the Americans contrasted with the more paternalistic interference of the Canadian government in the day to day lives of the Inuit. Furthermore, the mass entrée of southern Canadians into the Arctic and the concomitant increased exposure and knowledge gained of the Canadian Arctic and its Indigenous people intensified Canadian identity as a northern nation. The presence of the DEW Line also raised the hackles of a Canadian government always sensitive about infringements on its sovereignty. This led to very carefully

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[210] "Radar in the Far North." *The Economist*. February 16, 1955, 719.
[211] "Interview with Gen. Earle E Partridge, Commander in Chief, North American Air Defense Command," 82. Winkler, 32
[212] Interview with Gen. Earle E Partridge, Commander in Chief, North American Air Defense Command," 77.
[213] Morenus, 18, 23.
[214] Thomas A. Sturm, *Air Defense of Alaska 1940-1957. Historical Reference Paper Number Two, (*Colorado Springs: Headquarters Continental Air Defense Command, Office of Information Services Directorate of Command History, 1957), 20.

drawn out rules of engagement for the American involvement in DEW Line construction and operation.

Today both the Canadian and American militaries face common challenges in preparing forces for the unique and rapidly changing operating environment of the Arctic. In a February 2023 podcast with the Mitchell Institute, RCAF Commander Lt Gen Eric Kenny emphasized the importance of the Canadian military's close collaboration with the US and that the northern tier defense mission is more relevant than ever to the two nations.[215] The US and Canada are both Arctic nations with unique national interests but clearly recognize the strategic value of maintaining a strong, collaborative security presence in the Arctic.

[215] John Baum and David Deptula, hosts, "Episode 115 - Aerospace Chief Conversation RCAF Commander Lt Gen Kenny." Mitchell Institute Aerospace Advantage podcast, February 11, 2023, accessed 20 February 2023, https://mitchellaerospacepower.org/episode-115-aerospace-chief-conversation-rcaf-commander-lt-gen-kenny/.

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List of Acronyms

AAC	Alaskan Air Command
AC&W	Air Control and Warning
AEW&C	Airborne Early Warning and Control
AFB	Air Force Base
ALCOM	Alaskan Command
ARS	Alaska Radar System
ARDC	Air Force Research and Development Center
AWACS	Airborne Warning and Control System
BAR	Designation for Barter Island associated DEW Line Sites
CAM	Designation for Cambridge Bay associated DEW Line Sites
CANOL	Canadian Oil
DER	Naval Destroyer Escort
DEW	Distant Early Warning
DEWPO	Distant Early Warning Project Office
DOD	Department of Defense
DRB	Defence Review Board (Canadian)
DYE	Designation for Cape Dyer associated DEW Line Sites
FPIS	Frequency Propagation Ionospheric System
FPTS	Frequency Propagation Tropospheric System
FOX	Designation for Hall Beach associated DEW Line Sites
HBC	Hudson's Bay Company
HF	High Frequency
HQ ACC	Headquarter Air Combat Command
INF	Intermediate Nuclear Forces
LRRS	Long Range Radar Station
MAR	Minimally Attended Radar
NARL	Naval Arctic Research Laboratory
NEAC	Northeast Air Command
NORAD	North American Air Defense Command (currently North American Aerospace Defense Command)
NRMA	National Resources Mobilization Act
NSC	National Security Council
NWS	Northern Warning System
PJBD	Permanent Joint Board on Defense
PIN	Designation for Cape Perry associated DEW Line Sites
POW	Designation for Barrow associated DEW Line Sites
RCAF	Royal Canadian Air Force
RCMP	Royal Canadian Mounted Police
ROCC	Regional Operational Control Centers
SAC	Strategic Air Command
SLBM	Sea Launched Ballistic Missile
SRRS	Short Range Radar Station
TAC	Tactical Air Command
TCS	Troop Carrier Squadron

USAAF	US Army Air Force (prior to 1947)
USAF	US Air Force (established in 1947)
USN	US Navy
YAGR	USN Ocean Radar Station Ship
WAMCATS	Washington-Alaska Military Cable and Telegraph System
WEC	Western Electric Company

DEW Line Timeline

- 1944 at Pt Barrow Navy established geological and geophysical HQ to test for oil in the Arctic; Pt Barrow later became receiving and distribution center for DEW Line construction
- March 1946 SAC, TAC and ADC established (Mitchel Field, NY)
- 1947 Kaktovik relocated when Air Force arrived to build airfield
- Jan 1954 Project 572 inspection by officers and civilians of USAF, ARDC, the Canadian DTRB, WEC, RCAF and HQ AAC; determined they would need 400 hours testing (B-29s or B-50s
- August 31, 1954 CONAD formed in response to Soviet thermonuclear threat; first commander Gen Benjamin Chidlaw as CinC and dual hatted as commander of component USAF Air Defense Command
- 1954 Project Corrode declared a success and Western Electric named contractor for Project 572
- Oct 1954 Press report that WEC developing new radar system to give 6 hours warning and Barter Island was first location
- 21 February 1955 official press release stating WEC chosen as prime contractor, joint project office in NYC and Air Research and Development Command executive managers; system will have better warning and automatic capabilities; radar inspired by Canadian Defence Research Board's McGill Fence Line; cost would be between 200 mill and 1 bill
- Sept 1955 senior military and security personnel from the US and Canada conduct inspection of Barter Point to evaluate the state of construction
- 31 March-1 April 1956 News Tour
- July 1957 - Main DEW Line completed and operational (Main sites with AN/FPS-19 search radar and Aux sites with AN/FPS-19 and An/FPS-23 fluttar receiver); 57 total sites at 50 mile intervals
- August 1957 WEC turned over control to USAF (AAC operational control for West, Air Defense Command operational control for East and Federal Electric Corporation contractor for operations and maintenance)
- August 1957 Operation Stretchout began with Aleutian Extension
- August 1957 USSR announced successful ICBM launch
- July 1958 Operation Stretchout continued with Greenland Extension
- 1958 Began construction of BMEWS
- 1958 Began construction of ICBM detection facility at Clear, AK
- April 1959 Aleutian Extension operational (equipped with AN/FPS-19 search radar and integrated with White Alice (WACS))
- August 1961 Greenland Extension operational
- Early 1960s BMEWS completed (Thule in Oct 1960, Clear, AK in 1961 and Fylingdale in 1963)
- 1963 31 Intermediate Sites abandoned but left behind pollutants that weren't cleaned up until the 80s
- 1968 ADC became Aerospace Defense Command; changed to ADCOM in 1975 and dismantled as a command in 1980

- 1969 Cold Bay converted to a NORAD Command Surveillance Station. AN/FPS-19 replaced by AN/FPS-93A search radar and An/FPS-90 Height Finder Radar (in 1985 converted to AN/FPS-117 MAR under Seek Igloo program but moved from DEW site)
- 1970-1 Bullen Point deactivated and abandoned
- 1970 5 DEW Line sites deactivated including: Cape Sarichef, Driftwood Bay, Nikolski, Port Heiden and Port Moller (all on Aleutian Chain)
- 1971 Pt Lay deactivated
- 1973 Raytheon began building Cobra Dane (AN/FPS-108) to track Soviet missile tests and support Air Force Spacetrack System at Shemya. (A single-faced phased array radar and the most powerful ever built)
- 1983-4 ROCCs established to replace RCCs, 2 added in Hawaii and Alaska and 2 in Canada at North Bay; ROCCs weren't hardened so designed to be able to transfer control to AWACS. Vastly smaller computers than SAGE and didn't need super cold environment to operate, easier to maintain
- 1985 US – Canada agreement to modernize the North American defense system and select sites upgraded to form the NWS (improved radar and comms equipment and automated transmission of radar data to central processing facilities and composed of LRRS equipped with AN/FPS-117 (MARs) and SRRS equipped with AN/FPS-124 (UARs)
- 1983-1985 Top ROCC established at Elmendorf AFB
- 1986 DEW System determined eligible for listing in the NRHP under criterion A for importance in Cold War era and Criterion C for engineering design
- 1987 AN/FPS-117 installation began at Oliktok, Pt Barrow, Pt Lay
- 1986-89 Barter Island served as test site for short range radar prototype (but became LRRS)
- October 1990 AN/FPS-117 LRRS installed at Barter Island and 11th Air Control Wing assumed responsibility for site and 11AF assumed responsibility for NWS
- 1989 Pt Lonely personnel left and placed on inactive status
- November 1990 Barter Island operational as LRRS
- 1992-4 Bullen Point reopened and converted to NWS SRRS (new facilities as SRRS completely automated to send data via satcom to ROCC and on to NORAD HQ)
- 1994 Pt Lay Radar turned off
- 1994 Pt Lonely, Wainwright and Bullen Point chosen as SRRS and equipped with AN/FPS-124 (completely new facilities had to be constructed since SRRS were fully automated)
- 1995 Bullen Point fully operational, Point Lonely fully operational, Wainwright fully operational (Dew line site manned until Wainwright fully operational)
- Early 1990s US withdrew NWS personnel in Canada and turned over operational control
- 1994 Seek Igloo radars/former AC&W sites (Cape Lisburne, Cape Newenham, Cape Romanzof, Cold Bay, Fort Yukon, Galena, Indian Mountain, King Salmon, Kotzebue, Sparrevohn, Tatalina, Tin City) and NWS radars (Barter Island, Bullen Point, Oliktok, Point Barrow, Point Lay, Point Lonely and Wainwright) merged to form ARS (at that point ARS had 17 LRRS and 3 SRRS with mission to provide airspace surveillance, early warning, intercept control and navigation assistance to aircraft operating within ANR; today there are 15 LRRS managed by PRSC)

- Mid 1990s USAF initiated Environmental Compliance and Restoration Programs at remote PRSC installations in Alaska (including former DEW sites)
- 1998 Pt Lay AN/FPS-117 shipped to Puerto Rico ANG
- 2000 611th ASG closed Pt Lay LRRS
- 2004-6 environmental restoration and clean up of Pt Lay and North Slope Borough given 25 year lease to include runway, buildings and roads
- 2005 environmental remediation at Pt Lonely
- 2007 Bullen Point closed due to coastal erosion and budget issues
  2007 Pt Lonely closed, Wainwright closed