

Coming in Over the Pole?

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(Photo courtesy of Charles Carney)

At first glance this image seems to confirm the existence of the monolith in Stanley Kubrick's film *2001, A Space Odyssey*. That mysterious structure established a fictional link between human evolution and a higher intelligence in distant space. This monolith, looking out over an imposing arctic landscape, should also remind us of special links and fruitful relationships, only forged closer to home, during NGA's Cold War past.

This black structure, an ultra high frequency directional antenna, and many others like it formed part of the Distant Early Warning, or DEW Line designed in 1954 at President Dwight Eisenhower's direction. He wanted a means of detecting the possibility of Soviet bombers armed with nuclear weapons coming in over the North Pole. The construction of a series of stations starting in Alaska and stretching across all of northern Canada and then on to Greenland began shortly after both the President's authorization and the decision of our Commonwealth partner, Canada, to collaborate.

With American funding support, Canada accomplished all of the surveys, many in their largely uncharted and inhospitable northern territories. The Canadians also built the stations with contract assistance from The Federal Electric Corporation, a division of IT&T, and manned the facilities on their soil with personnel from both the Royal Canadian Air Force and the U.S. Air Force. The American subsidiary of AT&T, Western Electric took responsibility for the electronic systems used by the allied personnel, with Bell Laboratories designing the equipment and conducting the final acceptance tests. Raytheon designed and built the long range radar systems and Collins Radio, the American company that supplied Admiral Richard Byrd with the communication devices he took to the South Pole in 1933, supplied *scatter* radio systems attuned to the arctic environment.

Arctic atmospheric and climate conditions made it difficult to use high frequency sound effectively as the basic means of detection and transmission. Instead a combination of systems using high-powered transmitters, ultra high frequencies, and multiple highly directional antennas, worked together in a new way called *scatter communications*. This innovation made the DEW Line effective. The lowest layer of the atmosphere, called the troposphere, permitted refraction of radio signals due to moisture, sending refracted or “scattered” signals in predictable directions. Those angles determined the positioning of directional antennae clusters formed by two or three of the black monoliths. In addition, long range radar provided the primary detection capability and shorter range radars, mounted on 300 foot towers, guarded against any Soviet attempt to fly under the coverage.

The creation of the DEW Line brought Canada and the United States together to defend the North American continent against the Soviet threat, leading to the creation of NORAD, the North American Air Defense Command in 1958. By the time the Line went active, it consisted of 21 stations established along a trans-continental procession extending for 3,693 statute miles. It took as many as 25,000 people and all sorts of technical and construction skills to fashion the finished product.

In one way the DEW Line had a very short useful life and in another it still lives and operates in a way we find essential. The effective life of the Line ended with the introduction of intercontinental ballistic missiles. This technology literally took off during 1957 and 1958 with the Soviet R-7, of Sputnik fame, and the American Atlas A. In 1960 the U.S. Navy also perfected the Polaris submarine launched ballistic missile with a range of 1200 nautical miles. These missiles could fly over the DEW Line and perform in ways bombers could not. However, the determination displayed in coming together to design and build, in a very difficult environment, a defensive barrier against early Soviet nuclear capability demonstrated the vitality and flexibility of the Canadian-American relationship. In this case *the homeland* became North America, and the threat served to bring us together as it did in World War Two, as it would in later conflicts, and as it does now in the war on terrorism.



(Image courtesy of the Canadian National Mapping and Charting Establishment)