Buckley AFB Radomes

Radome Landscape

Radomes are large geodesic domes that are used to protect a variety of telemetry, tracking, and communications equipment. The Buckley AFB radomes, situated in clusters across the horizon, resemble giant golf balls and have a noticeable impact on the local landscape. The primary and largest cluster of radomes is located within the northwest portion of Buckley AFB, and consists of six large radomes. There are also smaller clusters of radomes located in multiple locations of Buckley AFB.

View to Northeast

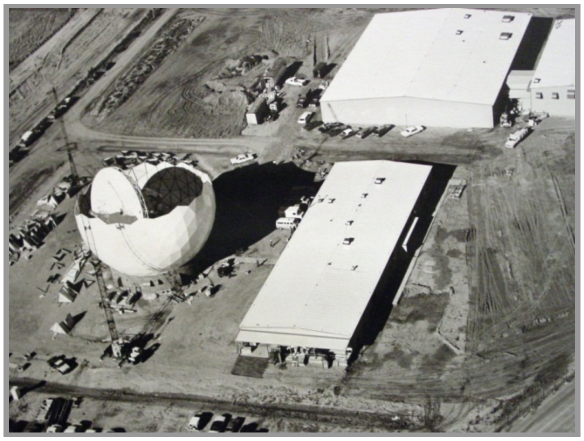
Four NRHP Eligible Radomes

NRHP Eligible Buildings

Four of the Buckley AFB radomes are considered eligible for listing on the National Register of Historic Places (NRHP). Eligibility for the NRHP affords them special protection as historically significant structures. Buildings 402, 403, 404, and 405 were built in the 1970s and consist of concrete bases supporting geodesic domes. The concrete base has one large roll-up door and one small door, as well as exhaust fans and vents. The exterior of the geodesic dome is constructed of white tedlar coated Esscolam™, and large communications equipment is housed within the dome.

Buckley AFB History

Buckley AFB was originally constructed as an auxiliary landing field for Lowry Field in 1938. With the onset of World War II, the installation was transformed into an active military installation and renamed "Buckley Field" in honor of 1Lt. John H. Buckley, who had been killed in World War I. During the World War II years, Buckley Field was one of the largest armament schools maintained for the technical training of enlisted men. Buckley Field prepared armorers for fighter planes, and Lowry Field specialized in training bombardment armorers. In addition to the armament school, the new Buckley Field hosted a basic training center, the Arctic Training Center, and an Army Air Corps Convalescent Center.



Buckley 1970

In 1945, Buckley Field became a sub-post of Lowry Field, but the basic training center (one of only four in the country) was kept open. At the end of World War II, the Army no longer had a need for Buckley Field and it was put on inactive status. Most of the buildings and structures were demolished, removed from the installation, or sold for re-use as apartments and single family homes.

In 1946, the Colorado Air National Guard (COANG) was formed as a separate air arm of the state's National Guard and acquired Buckley Field on a right-of-entry permit. It became evident soon thereafter that the state could not support the installation and, in 1947, it was taken over by the U.S. Navy. Renamed "Naval Air Station (NAS)—Denver," the installation served as headquarters for the Naval Air Reserve. During their tenure, the Navy made a number of improvements to the installation, including the renovation of many of the existing facilities and the airfield, and the construction of two new aircraft maintenance hangars.

During the 1950s, the installation also supported a number of COANG gunnery needs and a precision demonstration team known as the "Minute Men." The Navy decommissioned NAS—Denver in 1959 and returned it to the management of the COANG. It was subsequently renamed "Buckley Air National Guard (ANG) Base" in 1960.

Between 1959 and 2000, the COANG supported the Berlin Crisis (1961), the staging of Titan missiles (1959-1965), the Pueblo Crisis (1968), the Vietnam Conflict (1968-1969), and a number of search and rescue missions. In 1965, the installation was annexed by the city of Aurora. With the fall of the Berlin Wall (1989), both Lowry Field and Fitzsimons Army Medical Center were closed, leaving Buckley ANG Base as the region's largest military facility and the only military flying base in the area. The 460th Air Base Wing was activated in 1961 and Buckley ANG Base transitioned to an active U.S. Air Force Base. Today it is known as "Buckley Air Force Base."

Aerospace Data Facility-Colorado Mission:

The ADF-C is a multi-mission ground station responsible for supporting worldwide defense operations and multi-agency collection, analysis, reporting, and dissemination of intelligence information. It provides data to defense, intelligence, and civil agencies supporting the U.S. Government and its allies.The Aerospace Data Facility-Colorado is the largest tenant on Buckley Air Force Base today.

Buckley ANGB 1969

Buckley ANGB 1970

Buckley ANGB 1986

Buckley AFB 2005

Buckley AFB 2009

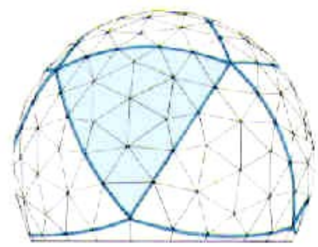
ADF-C 2012

Radome Purpose

The radomes are part of the Aerospace Data Facility-Colorado and the 2nd Space Warning Squadron (ADF-C and 2 SWS) complexes. The ADF-C and 2 SWS complexes are located in the northwestern portion of Buckley AFB, and consist of buildings that support the ADF-C and 2 SWS missions. The complexes contain satellite network tracking and intelligence equipment. Data collected is used to detect and report information on threats to the United States and allied nations. Information is gathered and processed by ADF-C and 2 SWS, and is reported to the pertinent components worldwide.

Development of the Geodesic Dome

The geodesic dome was invented and patented by R. Buckminster Fuller—inventor, architect, engineer, mathematician, poet, and philosopher—in 1927. Although this was not his only invention, it is the one for which he is most widely known. Fuller recognized that applying pressure to a rectangle and a triangle equally would cause the rectangle to fold and become unstable. The more rigid triangle, twice as strong, would not fold. With the idea of "doing more with less," Fuller discovered that if a spherical structure was created from triangles, it would have unparalleled strength. He also knew that spheres can enclose the greatest volume of interior space, with the least amount of exterior surface area (thereby saving on materials and cost) and that doubling a sphere's diameter would quadruple its square footage and produce eight times the volume.



Radome Superstructure

The sphere is extremely energy efficient due largely to the ability of air and energy to circulate without obstruction, allowing for more efficient and natural heating and cooling. According to studies, domes are 30 percent more energy efficient than rectangular buildings. Fuller once remarked that if he could construct a two-mile-in-diameter dome over Manhattan, New York, the temperature-controlled environment "would pay for itself within ten years, from snow removal alone."

Radome Construction

How Radomes are Constructed

Radomes are constructed using straight or circular arc structural elements in tension, arranged in a framework of geometric patterns such as triangles or hexagons. The design results in a structure that provides maximum volume with minimum material, reduces stress and weight, and can be tailored to meet a variety of specifications. Radomes can vary in size from several inches to 180 feet in diameter and can be installed at just about any location in the world.

History of Geodesic Domes

Using his knowledge of spheres and triangles, Fuller's goal was to change "human shelter." He planned to do this by: applying the "sphere principle" to shelter construction, making shelter more comfortable and efficient, and (most importantly) making shelter more economically available to a greater number of people. Designed to be the "lightest, strongest, and most cost-effective structure ever devised," the geodesic dome can cover more space, without internal supports, than any other enclosure and is extremely easy to construct.

In 1928, Fuller described his concept for geodesic homes:

> *These new homes are structured after the natural system of humans and trees with a central stem or backbone, from which all else is independently hung, utilizing gravity instead of opposing it. This results in a construction similar to an airplane: light, taut, and profoundly strong.*

Near the end of World War II (ca 1944), the United States suffered a serious housing shortage. Government officials knew that Fuller had developed a prototype single family dwelling that could be produced rapidly using the same equipment that had previously built war-time airplanes. The structures could also be installed anywhere and with little difficulty. When one official flew to Kansas to see one of Fuller's domes, he quickly dubbed it the "house of the future."

Shortly thereafter, Fuller was inundated with orders from people wanting to buy his new geodesic home; but because of Union labor problems associated with utility hookups (power, water, etc.), he was never able to manufacture the geodesic home domes at full production.

By the 1950s, the geodesic dome had become a well-accepted and readily identifiable form of construction. By early 1960, they were widely used to house airport radar units. Once in place at the airports, radomes became common around the world to shelter a variety of government, military, and scientific instruments. The following press release from the Goodyear Tire & Rubber Company was issued in November 1960, and provides some insight on the historic perspective of radomes during the 1960s:

> *Great nylon "mushrooms" called "radomes" will be raised atop major airports across the county within the next few months as part of a special radar system that will increase the safety of every air traveler. The domes are being built by the Goodyear Tire & Rubber Company to protect Airport Surface Detection Equipment, a radar system designed to minimize airport traffic problems.*

The radomes, constructed of white hypalon-coated nylon fabric to protect the radar equipment from wind and weather, are a startling enigma; perfectly evident to the human eye, it is "invisible" on the radar picture, Goodyear officials explained. This permits transmission of airport traffic patterns without distortion. Each radome is 14 feet high and 17 feet in diameter and is constructed to withstand winds of more than 100 miles per hour and heavy snow or ice accumulation.

Worldwide Distribution of Radomes

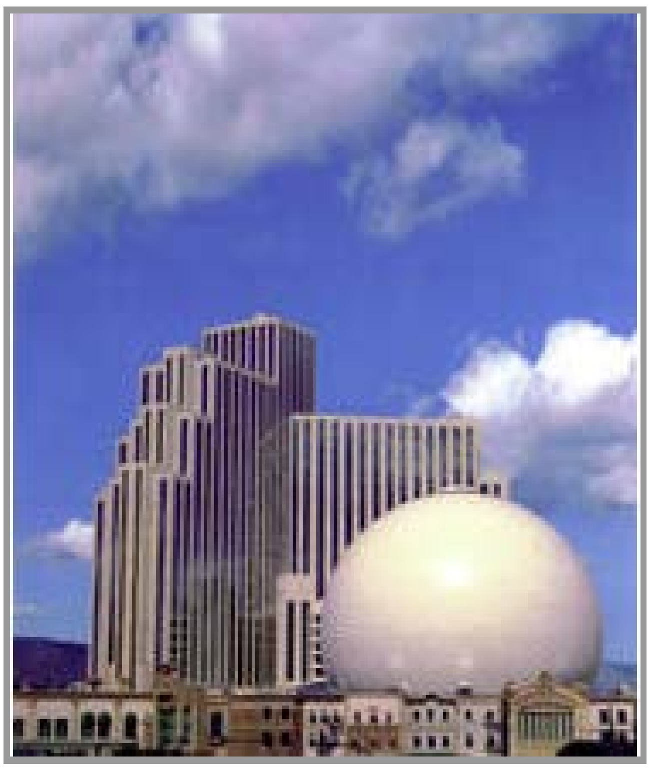
There are currently about 300,000 radomes located throughout the world, from the tropics to the arctic. Plastic and fiberglass radomes house delicate radar equipment in artic areas; corrugated metal domes shelter families in Africa; and the U.S. Marine Corps has hailed the radome as the first basic improvement in mobile military shelter in 200 years.

Radomes are widely used by the governments of many countries to shelter radars; telemetry, surveillance, tracking, and communications systems; airfield antennas; and radio-astronomy equipment from the environment. This improves system availability since the equipment is not affected by wind, rain, blowing sand or ice, and improves performance since high winds can distort signals. The domes are proven to reduce lifecycle maintenance costs compared to unprotected environments.

Photographs

NOAA Weather Radome, Evansville, Indiana

Air Traffic Radome, Costa Rica



Reno, Nevada - 180 foot diameter radome. Largest composite radome in the world.

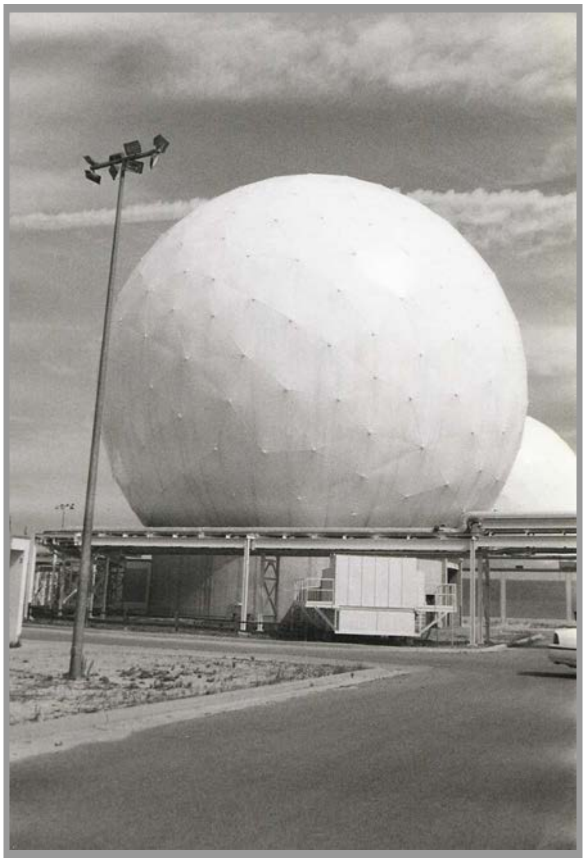
Novosibirsk, Russia

Shemya, Alaska

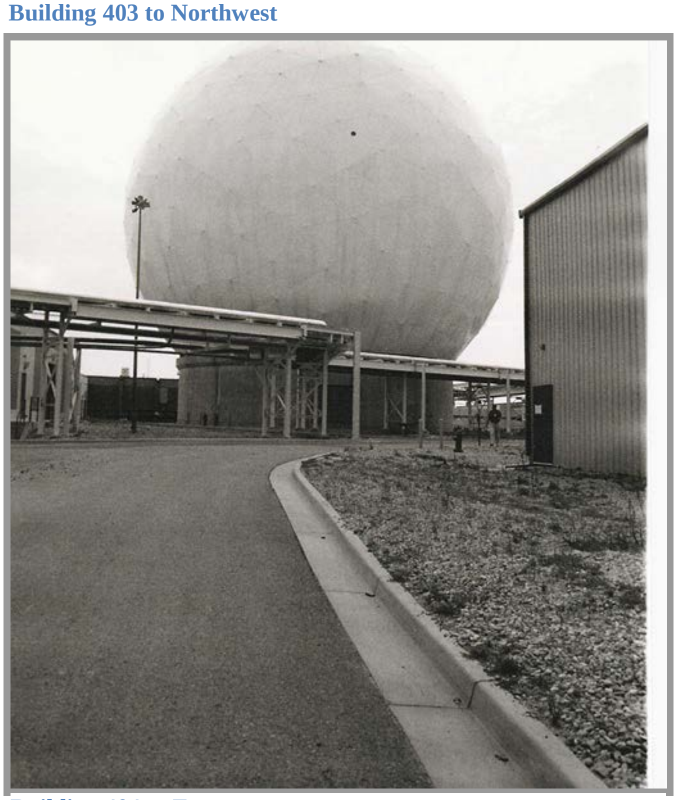
Thule, Greenland

Building 401 to Northwest

Building 402 to South



Building 403 to Northwest



Building 404 to East