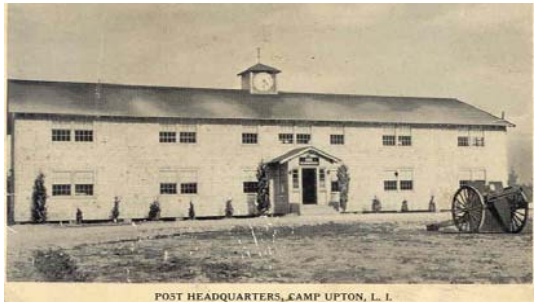
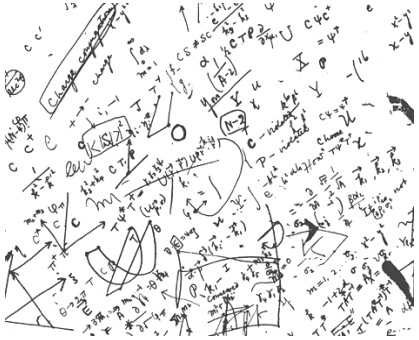
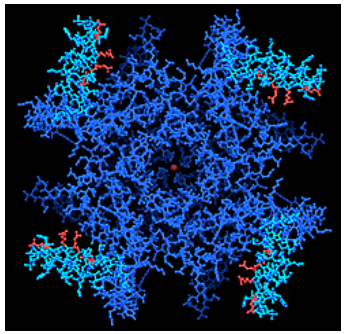
Brookhaven National Laboratory
Site History Tour

“From Basic Training to Basic Research”







Office of Science U.S. Department of Energy

The U.S. Department of Energy

BROOKHAVEN NATIONAL LABORATORY

Brookhaven National Laboratory
Site History Bus Tour

Welcome to the U.S. Department of Energy's Brookhaven National Laboratory, and thank you for joining us on this tour of the Laboratory's site. The tour will take us back almost one century, all the way back to 1917, and it will take us down memory lane — from World War I and World War II and the post-War era, up to the present day. The boundaries of Brookhaven Lab encompass over 5,000 acres in an ecological area of Long Island called the Pine Barrens. Today, close to 1,000 of these acres are occupied by the Laboratory's 300-plus buildings, facilities and other structures. The way the Lab site is laid out resembles a college campus — but this was not always the case.
So, let us go back in history, to see how the U.S. federal government, has used this site in several different ways as a national resource for the benefit of the entire country. As we tour the site, you will see how it has evolved to become the base for the large, multipurpose national research institution that is the U.S. Department of Energy's Brookhaven Lab today.

World War I Trenches

Camp Upton Trench – 1918

Camp Upton Trench – 2005

From 1917 through 1920, the site of what is now the Laboratory was the U.S. Army's Camp Upton. Named for Civil War General Emory Upton, Camp Upton was one of 16 U.S. Army training camps. Here, recruits mostly from the New York metropolitan area were trained for the famed 77th Infantry Division, also known as the Liberty Division, which began leaving Camp Upton for fighting in France in March 1918.

Training included marching, weapons-use and, among other techniques, trench warfare. Trench warfare was a form of combat in which armies dug zig-zagging lines of interconnected ditches. Within these trenches, troops lived in muddy water, among rats and lice while defending their territory and combating their opponents.

The trenches here may be some of the only surviving examples of WWI earthworks in the U.S., and they have been determined to be eligible for listing on the National Register of Historic Places.

Brookhaven Center - Building 30

Building 30 – 2005

Building 30 – 1948

The center portion of Building 30 "Brookhaven Center" was constructed by the Civilian Conservation Corps in 1930s, and has remained relatively unchanged. Brookhaven Center is presently used for conferences, banquets, and after-work get-togethers, so it is one of the site's oldest structures still in regular use today. During World War II it served as a Camp Upton officer's club.

World War II Camp Upton

In 1940, as part of the U.S. preparation for war, Camp Upton was rebuilt. When the camp reopened in 1941, it served as an induction center for draftees from the New York metropolitan area. Among those who were inducted here was Sidney Poitier, who went on to become the first African-American actor to win an Academy Award.

Building 50

Building 50 - 2005

Building 50 - Circa 1940s

Building 50 currently houses the Lab's Security Group – However, in the 1940's, during World War II, it was the headquarters for the Commander of Camp Upton. Its main rectangular framework and distinctive clock tower have remained unchanged.

Commemorative Markers

In front of the Brookhaven Center, by the flagpole, are three markers, commemorating the soldiers who trained here during World War I and those who were inducted here during World War II.

The first marker was placed at the flagpole in 1944 by officers who had been stationed at Camp Upton during World War II but never sent into battle. The stone reads: "In Memory of the Departed Mice Who Became Men"

The second marker was placed by World War I veterans who had taken umbrage at being called "mice" in the first marker. So the Veterans of World War I, Patchogue Barracks No. 2981, dedicated a marker on Memorial Day 1981 which reads: "In Memory of Camp Upton and Those Who Did Not Return."

The third plaque is one that the Laboratory mounted to a small boulder, in honor of "Sgt. Irving Berlin" and his creation of Yip! Yip! Yaphank. The plaque was revealed during a May 1982 ceremony celebrating Berlin's 94th birthday.

Headquarters Hill

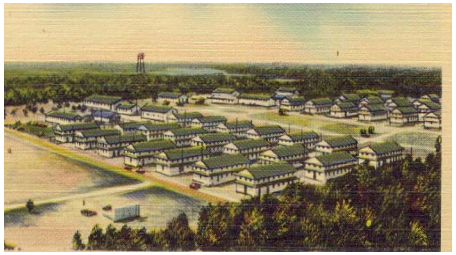
During World War I, Camp Upton (1918 – 1921) consisted of everything you would find in a small city; a hospital, theaters, lecture halls, store houses, shops, heating plants, railroad yards, stables, a fire department, several YMCA and Knights of Columbus centers. The woodlands were totally cleared of trees to make way for over 1700 wood framed buildings, and rows and rows of tents. The peak population of the camp was 38,000 people, which immediately doubled the population of Suffolk County.

The camp was dominated by a central ridge, known as Headquarters Hill, where the camp Commander had his Headquarters, along with tall lookout tower. Since 1950, the Brookhaven Graphite Research Reactor **(**BGRR) has occupied this prominent hill.

BGRR situated on Headquarters Hill

The pictures shown below were taken from the same location atop Headquarters Hill, facing south (near the current BGRR).

Camp Upton - World War I (1918 - 1921)

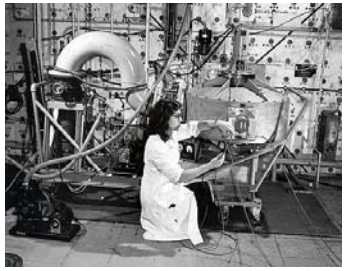


Camp Upton – World War II (1940s)

Founding of Brookhaven National Laboratory

On March 1, 1947, the site of Camp Upton became Brookhaven National Laboratory — the first national laboratory dedicated to discovering peaceful uses of the atom. The former Camp Upton site was selected because of its size, its location in the then unpopulated backwoods of Yaphank, its proximity to New York City university scientists, and its Army barracks which could be remodeled into laboratory space. The concept behind establishing a National Laboratory in the northeast was to design, construct and operate large scientific machines that individual institutions could not afford to develop on their own.

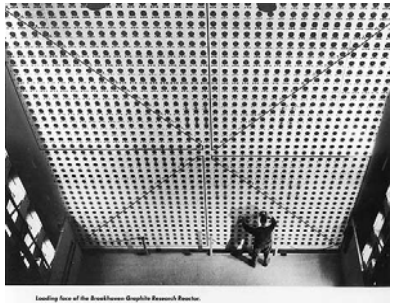
Brookhaven Graphite Research Reactor (BGRR)



BGRR Experimenter Loading Face Circa 1950s

The BGRR

BGRR Fuel Loading Face

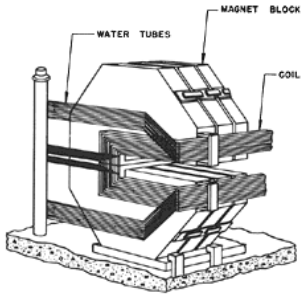


The BGRR, which operated from 1950–1968, was the Lab's first "big science machine" and the first nuclear reactor constructed for the sole purpose of exploring peaceful (non-military) scientific uses of the atom. Researchers used the BGRR's neutrons as tools for studying atomic nuclei and the structure of solids and other physical, chemical and biological systems, and for investigating the effects of radiation on materials. The reactor is now being decommissioned.

Cosmotron

Cosmotron construction (1950)

C-Magnet on display



C-Magnet Assembly

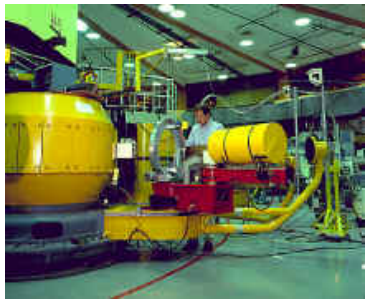
The Laboratory's 2nd large science machine was a particle accelerator known as the Cosmotron that operated from 1952 – 1966 In simple terms – particle accelerators are machines that take part of an atom (an electron, or proton) and use huge magnets to circulate it around in a tube, until it reaches a desired energy – and then direct the particle into a target (a certain type of material). From the results of the collisions, scientists can then determine specific facts/properties about the particle or the material.

- The Cosmotron consisted of 288 C-shaped magnet blocks, each weighing 6 tons, arranged like beads around a 75-foot diameter necklace. After one second of acceleration in the Cosmotron, the protons had traveled 135,000 miles and had reached an energy of about 3 billion electron volt – a record at that time.
- Observations made at the Cosmotron proved to be tremendously important for a better understanding of the complex nature of many subatomic particles
- All that remains today from the Cosmotron is one of the C-Magnets, displayed in front of Bldg 911.

High Flux Beam Reactor

HFBR Construction – 1963

HFBR – 2005



Experimental Floor – 1990s

The 2nd generation research reactor was the High Flux Beam Reactor (HFBR), which operated from 1965 to 1999. That facility was housed in a unique domed structure and was one of the premier neutron beam research reactors around the world for many decades.

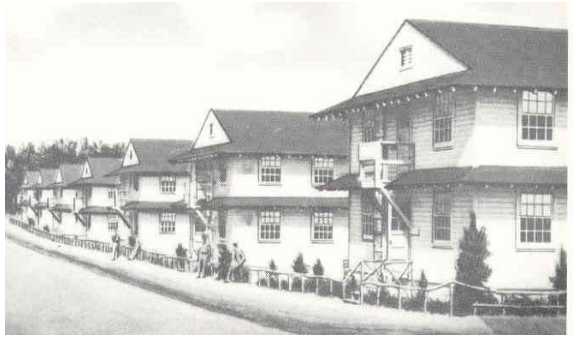
Among the discoveries made during the HFBR's tenure at BNL, are —

- in biomedicine: the structures of the 23 amino acids that make up all protein within living cells
- in solid-state physics: a new understanding of magnets, high-temperature superconductors, and super-fluids
- And in nuclear physics: new data on the isotopes found in supernovae and other astrophysical phenomena.

--- Planning for its decommissioning is now underway.

World War II Barracks – Building 120

Barracks Building – 2005



Barracks Buildings – 1940s

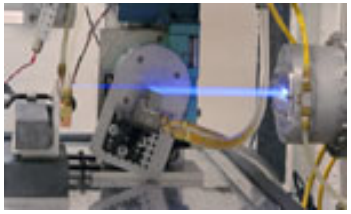
Building 120 is an example of a World War II army barracks - military housing for the men being inducted into the Army at Camp Upton.

Because it has not been extensively renovated on the outside, it is an excellent example of the once predominant style of buildings at Camp Upton in the 1940s, the type that the early Laboratory inherited from the Army. This building was not originally located at this intersection. It was moved here in the 1950s to accommodate the needs of the Laboratory.

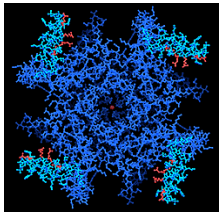
National Synchrotron Light Source (NSLS)

NSLS Arial View

NSLS lobby



Visible Light at NSLS



Potassium ion channel structure
Associated with 2003 Nobel Prize

When operations at the NSLS began in the early 1980s, it became the world's first electron synchrotron dedicated to the production of this very bright synchrotron light for research.

Over the past 20 years since its commissioning, the NSLS's beams of light have been used by some 2,500 visiting researchers a year — including physician and biophysicist Roderick MacKinnon from Rockefeller University. In 2003, MacKinnon was awarded the Nobel Prize in Chemistry for discovering how nerve impulses are generated — much of the work for which he earned the Nobel was done right here at the NSLS.

Scientific Equipment Artifacts

At first glance, you may think that this is a sculpture garden full of modern art. But what is really on display here is the high-tech hardware of science past — the artistically made apparatus and well-designed devices that made many discoveries of old at Brookhaven Lab possible.

HFBR beam plug

This is a spare beam line plug for the Cold Neutron Facility at the High Flux Beam Reactor. This device was installed within the beam line to direct the neutrons out to the experimental areas for the scientists use.

Bubble Chambers

The majority of pieces on display are parts or the whole of what were called bubble chambers. In their heyday between the late 1950s and the late 1970s, each was the largest such device in the world.

A bubble chamber is a type of detector used to see the tracks of charged particles that are released following the collision of an accelerator's beam of particles into a fixed target. It was designed to employ the same effect that causes bubbles to arise in a bottle of beer when the pressure inside the bottle is released as the cap is opened.

This bubble trail was then photographed. Since thousands upon thousands of particles were released in particle-beam collisions, thousands upon thousands of photographs were taken. They were then scanned for evidence of new particles produced in the collisions.

Among the then new particles discovered at Brookhaven using a bubble chamber are what is called the sigma-zero, the omega minus, and the charmed lambda. Technological advances eventually made the bubble chambers obsolete.

31-inch Bubble Chamber

When the 31-inch bubble chamber was installed in 1959, it was the largest particle detector of its kind in the world. It is named for the width of the chamber, which was originally 20-inches before being modified. The silver material lining the chamber is super insulation, an aluminized metal developed from space exploration research. The circular structure was the vacuum tank. Inside the tank were magnetic coils that encircled the liquid hydrogen chamber. The magnets created a magnetic field to show both the polarity and energy of a particle. This bubble chamber was the first in the world to use Scotchlite "wallpaper" inside the chamber. The Scotchlite reflected light back through the bubbler into the camera lens. This eliminated the need of a back window for lighting which might have added a potential for leaks.

Bubble Chamber Window (80-inch)

This is the largest piece of lens quality glass ever cast. It is made out of borosilicate crown, a glass commonly used for high quality camera lenses. It is close to colorless and no optical distortion occurred when pictures were taken of particle tracks. The window weighs 1500 pounds.

Piston from 7-foot bubble chamber

7-foot Bubble Chamber

This concludes our trip into the site's historic past. It is our hope that, as a result of this tour, you can understand how and appreciate why the U.S. government has made use of this site for national benefit — by transforming it from undeveloped land into an Army camp during both World Wars, into a national forest between the wars, and, finally, into the high-tech campus full of futuristic facilities that make up Brookhaven National Laboratory today.

Brookhaven Lab is owned by the Office of Science of the U.S. Department of Energy and operated by Brookhaven Science Associates for DOE. The Laboratory is also an internationally renowned research institution, a national resource for scientific knowledge and education, a New York economic powerhouse, and your Long Island neighbor.

We thank you for taking the time to get to know our past, present and future — and we look forward to seeing you on site again! In the meantime, please visit us at www.bnl.gov.

Additional points of contact:

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