NPS Form 10-900-b
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United States Department of the Interior
National Park Service

National Register of Historic Places Multiple Property Documentation Form

This form is for use in documenting multiple property groups relating to one or several historic contexts. See instructions in *Guidelines for Completing National Register Forms* (National Register Bulletin 16). Complete each item by marking "x" in the appropriate box or by entering the requested information. For additional space use continuation sheets (Form 10-900-a). Type all entries.

A. Name of Multiple Property Listing

Historic and Architectural Resources of Oak Ridge, Tennessee

B. Associated Historic Contexts

The Valley Before World War II, ca. 1800 - 1942
World War II Era, 1942 - 1945
Post World War II Era, 1945 - 1959

C. Geographical Data

The existing city limits of Oak Ridge, Tennessee.

☐ See continuation sheet

D. Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this documentation form meets the National Register documentation standards and sets forth requirements for the listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in 36 CFR Part 60 and the Secretary of the Interior's Standards for Planning and Evaluation.

Herbert L. Harper — 7/18/91

Signature of certifying official — Date

Deputy State Historic Preservation Officer, Tennessee Historical Commission

State or Federal agency and bureau

I, hereby, certify that this multiple property documentation form has been approved by the National Register as a basis for evaluating related properties for listing in the National Register.

Carol D. Shull — 9-5-91

Signature of the Keeper of the National Register — Date

E. Statement of Historic Contexts

Discuss each historic context listed in Section B.

[X] See continuation sheet

INTRODUCTION AND ORGANIZATION

The Historical and Architectural Resources of Oak Ridge are organized with reference to three contexts: The Valley Before World War II, ca. 1800 - 1942; The World War II Era, 1942 - 1947; and The Post-War Era, 1947 - 1959.

GEOGRAPHICAL INFORMATION

Oak Ridge (pop. 27,662) is situated on Black Oak Ridge, in the ridge and valley system that runs parallel to and west of the Appalachian Mountains. The city is located about sixteen miles west of Knoxville and seven miles south of Clinton, the seat of Anderson County, in the shadow of the Cumberland coal fields. Oak Ridge straddles northern Roane and southern Anderson Counties, with most of the city proper in Anderson County. The city is situated between parallel ridges with the Cumberland Mountains to the west and the Clinch River to the east and south. The topography is characterized by steep ridges bordering the Clinch River Basin. The elevation is 775 feet at river level and 1205 feet at the ridgeline that marks the western limit of the town. Walden's Ridge, slightly northwest of Oak Ridge, is the dominant western boundary of the Clinch River basin.

Natural resources in the area include an abundance of streams in addition to the Clinch River. Some river-bottom land was cultivated by early settlers, but the terrain was too mountainous to support large-scale farming. The rugged ridges provided natural barriers between early settlements. Much of the region's farmland was inundated by Norris Lake and Watts Bar Lake when the dams were built during the Depression. Coal is the region's most important and most abundant natural resource. The western third of Anderson County lies in the Cumberland coal fields.

The Manhattan Project townsite and plants were built on nearly 59,000 acres of land in the narrow valleys formed by Black Oak Ridge, Pine Ridge, Chestnut Ridge, and Haw Ridge. The city limits today contain all 59,000 acres that include the townsite and the plant areas. While most of the city of Oak Ridge is in Anderson County, a large part of the government holdings are in Roane County. Seventy square miles of the original ninety-two are still retained by the U.S. Government. The City of Oak Ridge has grown beyond its original twelve square miles and now comprises twenty-two square miles. The Oak Ridge Turnpike is the major artery going through the city and follows Tennessee Route #61. The Oak Ridge Historic District will include about six square miles (about 3800 acres) of the original townsite. The Woodland-Scarboro Historic District is made up of two post-war neighborhoods and is approximately two square miles in area.

The city of Oak Ridge is comprised of several neighborhoods situated on the east slope of Black Oak Ridge. Newer residential development has occurred in the far west and east sections of the city. Because Oak Ridge was planned to house operating personnel for the Manhattan Project, it retains its

predominantly residential character. Natural trees and greenbelts were left undisturbed in accordance with the Army's wishes to create a pleasant and liveable town for its wartime employees. Wartime commercial ventures were tightly controlled and were located in planned neighborhood centers throughout the city. Broad commercial development did not occur until after the end of World War II and has been limited to the Oak Ridge Turnpike and Illinois Avenue. The Turnpike was used during the war for access between the plants and the townsite; Illinois Avenue was not constructed until the early 1950s. These two streets have become the major arteries in Oak Ridge.

OUTLINE OF HISTORIC CONTEXTS

I. THE VALLEY BEFORE WORLD WAR II, ca. 1800 - 1942
II. THE WORLD WAR II ERA, 1942 - 1945
III. THE POST-WAR ERA, 1945 - 1959

I. THE VALLEY BEFORE WORLD WAR II, ca. 1800-1942

Settlement

The land between Walden's Ridge and the Clinch River was first opened to white settlers by treaty with the Cherokee Indians in 1798. Before Oak Ridge was built in 1943, there were four sparsely settled communities located in southern Anderson and northern Roane counties that supported about 1000 families: Scarboro, Robertsville, Wheat, and Elza. The communities served primarily as gathering centers and usually contained one or two churches and a general store. Early settlers, armed with land grants, came to the isolated valley from North Carolina, Virginia and Kentucky, many through the Cumberland Gap. Most were of Scotch-Irish descent. They first arrived when the territory opened up at the turn of the eighteenth century. The earliest dwellings built in the valley were of log construction in single and double pen forms. Freels Cabin is the only remaining example of early log structures in the area. With the introduction of sawmills in the 19th century, frame dwellings became dominant. There are two frame churches dating to the turn of the century that remain in the valley. Many of the communities and homesteads that existed in the valley until World War II were well-established by the middle of the nineteenth century. Worldly events did not intrude upon the area and the isolated and rural character of the valley remained constant until the early 20th century.

There were never any large farms in the valley, and there was little need for slavery. The valley was characterized by scattered self-sufficient farms. The pioneers who settled along Poplar Creek and on the banks of the Clinch River were farmers who grew just enough food and raised just enough livestock on which to subsist. Corn was the staple crop, but oats, wheat, and vegetables were also grown. Some farmers supplemented the family's income by doing light timbering, until the woodstands were eventually depleted. Fruit orchards were begun at the turn of the nineteenth century, but over-production devalued the

crops and the endeavor never became as profitable as farmers had hoped. The sparsely-settled region remained rural and agrarian throughout the nineteenth and early twentieth centuries. Industry did not come to the valley until 1942, when the Manhattan Project was begun.

There was a highway that came through the valley in the nineteenth century called the Emory Coach Road. The Road originated in North Carolina and crossed the Clinch River at Bull Run with a ferry. It ran through Emory Valley, roughly following the modern Emory Valley Road, to join the East Fork Valley Road, now Robertsville Road. It then continued through Sugar Grove Valley, near K-25, to the Knoxville-Nashville Turnpike, west of the Cumberland Mountains. Travellers on the Old Emory Coach Road stopped at Cross Springs in Robertsville to water and rest their horses before heading farther south or west. (The spring was dammed in the 1930s by a local farmer to form a small lake located at what is now Grove Center. The Army Corps of Engineers built the present-day outdoor municipal pool by pouring concrete to form walls and a bottom around the lake.) In addition to the highway, there were post roads that criss-crossed the valley. Since the Clinch River forms three of the valley's borders, many farmers operated ferries at intervals along the river's edge. The railroad followed the meander of the Clinch River on the east side from Knox County to Clinton, circling around the northern end of the valley.

Robertsville is known to have had a slave block, although in Anderson County there were few people who needed, or could even afford slaves. Because slavery was not as important here as it was in other southern states, the farmers of Anderson county joined other East Tennesseans in support of the Union during the Civil War and sent a few representatives to fight. The isolated nature of the valley shielded its residents from much of the Civil War.

The state managed to avoid Reconstruction by re-entering the Union immediately following the end of the war. Residents of Anderson and Roane Counties continued to depend on farming for their subsistence. Most of these farmers lived in two-story frame I-houses and kept small farms. They did not depend on money for their goods, but on a system of barter. Each farmer would raise enough cattle or harvest enough grain to have a surplus to take to the market.

The creation of the Tennessee Valley Authority in 1933 marked the first drastic change in Appalachia since eighteenth-century settlement. The construction of Norris Dam (1933) and Watts Bar Dam (1939) introduced electricity to the Clinch River Valley. When the Depression struck in the 1930s, TVA worked with the University of Tennessee's Extension Service to build demonstration farms in the rural areas of East Tennessee that showed farmers how to combat problems of soil erosion. As a result, the income of these farmers rose fifty percent during the last three years of the Depression. (These farms were built throughout the region, but none were

located on the future Oak Ridge reservation.) The end of the Depression was marked by the beginning of World War II in Europe.

Anderson County and Roane County took advantage of the "Charter Act" passed by the Tennessee General Assembly in 1875 to build several private schools, academies and institutions between 1877 and 1880. The Liberty School House was located in Scarboro and the Oak Grove Academy was in the vicinity of Robertsville. Roane College was established at Wheat, in Roane County, and attracted students and teachers from all over the region.

Collins Roberts was the first settler in the area in 1804 and acquired land grants totalling 4000 acres in what is now the center of Oak Ridge. This acreage became the community of Robertsville. Edward Freels owned another 2000 acres in the vicinity. The community of Robertsville was situated near the present-day Oak Ridge Mall. There were three or four stores, a school, a few churches, a blacksmith shop that operated as a gristmill on the weekends, and a few farmsteads. Census records indicate a steady population growth throughout the nineteenth century. Because of the cold and sweet water at Cross Springs (near present-day Grove Center), Robertsville became a stopping point on the road from Clinton to Oliver Springs and Kingston. The community's sentiments lay strongly with the Union during the Civil War and a trail was established at the crest of Walden's Ridge to aid runaway slaves. There were many churches in the area and revivals became the center of community activity. Most of the Robertsville inhabitants were farmers, but a few worked in the nearby coal mines of the Cumberland Mountains.

Scarboro was founded in the early nineteenth century and named for the Scarborough brothers who came into the area from Virginia in the early 1800s. The community was located along Bethel Valley road near the present-day University of Tennessee Agricultural Research Laboratory. There were three country stores in the valley, an elementary school and four churches: Cumberland Presbyterian (which was also attended by members of the Wheat community), New Bethel Baptist, New Hope Baptist and Mt. Vernon Methodist. New Bethel Church is the only remaining structure and is maintained by the Department of Energy. The people of Scarboro were subsistence farmers. Early family names include McCoy, Brimer, Ford, Harrell, and Freels (Jim Freels was among the last to evacuate the valley in 1942). The large Freels family was represented in almost all of the communities throughout the valley.

There were the beginnings of the community of Wheat even before Tennessee's entrance to the Union in 1796. Two eighteenth-century gristmills are known to have existed on Poplar Creek in the early days of settlement. The community became a thriving trade center named for Frank Wheat, its first postmaster, and located in Roane County at the present site of the gaseous diffusion plant (K-25). The nineteenth-century community included a Methodist church, Mt. Zion Baptist, Cumberland Presbyterian, and George Jones Memorial Baptist Church. An inventory in 1942 showed a Masonic Lodge, Robinson's School, Wheat High School (formerly Roane College and Poplar Creek Seminary),

Adam's Store, a post office and several frame residences. The George Jones Memorial Baptist Church is the only remaining building from the Wheat community. There was also a ferry across the Clinch River at the site of Gallaher Bridge. The community was made up of farmers who grew tobacco and corn.

Born of the railroad, Elza is the youngest of the pre-Oak Ridge communities. Located at the reservation's northern border, the community was a flagstop along the Louisville and Nashville Railroad. Paul Elza was a construction engineer when the railroad constructed a bridge over the Clinch River and an underpass near Dossett. Lumber and materials for the projects were marked "Elza" and were to be left at a shed near the tracks that was owned by Mr. Elza. There was never an established community at Elza--the residents received their mail in Dossett--although there was Copeland's Country Store. The name Elza was used throughout the war as Elza gate became the busiest and most public of the reservation's security gates. Elza Gate was the site of the 1949 ceremony marking the end of Oak Ridge's existence as a closed city.

Following government purchase of the lands in the valley in 1942, many of the nineteenth-century buildings were razed to make way for the industrial plants and townsite of Oak Ridge. The Army utilized 180 of the pre-WWII houses to alleviate the severe housing shortage in Oak Ridge. All but two of these houses were razed following the War. One house, the Luther Brannon House was built only months prior to the government acquisition and served as a residence and headquarters for General Leslie Groves, commander of the Manhattan Project.

The Army Corps of Engineers purchased a total of 866 land tracts making up 56,000 acres in Roane and Anderson Counties between October 1942 and March 1943. The reservation would eventually encompass nearly 59,000 acres of land whose acquisition cost $2.6 million. The Army's policy of condemning the land for purchase created a lasting bitterness among the displaced people, who were accustomed to dealing with TVA. TVA construction of Norris Dam in 1933 and of Watts Bar Dam in 1939 displaced thousands of natives and flooded much of the region's arable river-bottom land. TVA acquired the easements to thousands of acres of land at an average price of $300 per acre. In addition, all displaced persons were relocated to comparable properties. TVA's mission was two-fold. As one of FDR's New Deal programs, TVA provided work for thousands of families; TVA also provided cheap electricity to a part of the country that had not yet embraced the industrial nature of the twentieth century. The ultimate end was the social and economic uplifting of the people who lived in the Tennessee Valley.

The objective of the Army, however, was to manufacture an atomic bomb, and thus end the war as quickly as possible. The Army's greatest fear, not unfounded, was that Hitler's scientists were already far ahead of American and British scientists in their atomic quest. The Army was involved in a scientific race that they weren't sure they could win and operated under a

different set of priorities than TVA. Funds for the relocation of displaced persons were not allocated. The shortage of farmland that had resulted from the damming of the Tennessee River made relocation even more difficult. Acquiring property easements would have cost valuable time and money in the courts and these constraints required that the Army instead condemn the lands. The Army's method of condemning the needed lands meant that natives were not compensated until after they had left; often it was six months before any Government payments were received. The land prices were based on two broad assessments and one site inspection of each tract. The average price per acre in Roane County was $34.26; Anderson County residents fared better, receiving $44.10 per acre. The Army acted swiftly and some people were given only two weeks eviction.

The only course of protest open to displaced persons was through the courts. Public meetings were held where farmers could proclaim their grievances, and they charged that the government had treated them unfairly and had undervalued their lands. The government countered with a review of land transactions in the area between 1937 and 1942. These transactions revealed an average selling price per acre of $23, making the Army's offer appear more than reasonable. The price of $23, however, was unnaturally low and reflected the effect of the Depression. A few families took their cases through the courts and were rewarded an average of 15% more than the original assessment of their lands. This was far less than the 40%-50% devaluation that had been claimed by the plaintiffs.

Ultimately, the bitterness felt by local landowners faded. An estimated sixty percent of the displaced farmers worked at the Oak Ridge facilities during the war, with the result that many were earning a steady income for the first time in their lives. Those who did not work directly for the Manhattan Project benefitted greatly from the tremendous population boom that occurred. Struggling businesses that would have folded under another year of depression profited from increased volume and from government contracts (gasoline vendors, for instance).

II. THE WORLD WAR II ERA, 1942-1945

Atomic Energy and the Manhattan Project

Atomic fission had long been a theoretical possibility and in 1938, German scientists Otto Hahn and Fritz Strassmann succeeded in splitting a uranium atom by bombarding it with neutrons. Hahn and Strassmann noted that when the uranium atom was split in two, it released a tremendous amount of energy. Scientists knew then that if enough fissionable material could be produced, an atomic weapon could be built. They also knew the material had to be the rare U-235 isotope of uranium, and that extracting it from U-238 would be extremely difficult; there is only one part U-235 to 140 parts of the more common U-238. (99% of naturally occurring uranium is U-238.) Fission experiments with uranium lead to the discovery of the isotopes neptunium and plutonium. Scientists soon discovered that plutonium was also fissile and that it behaved much like uranium when split. Knowledge of the use of plutonium as fissionable material was restricted to American and British scientists alone. Both isotopes were very difficult and costly to produce.

The world's first atomic chain reaction occurred at the University of Chicago's Metallurgical Laboratory in December 1942 (NHL). A chain reaction begins when a neutron penetrates the nucleus of a U-235 atom and splits it in two, causing the release of two or three more neutrons. These neutrons are in turn capable of bombarding other uranium atoms and releasing more neutrons, thus causing a chain reaction to occur. The amount of energy released each time an atom is split is incredible and illustrates the potential of atomic energy: when splitting the nucleus of an atom, a neutron is capable of releasing six billion times as much energy as it possesses itself. In other words, a neutron with the energy of one-thirtieth of a volt can release two hundred million volts of energy in the process of splitting just one atom.

At the urging of scientists Enrico Fermi and Albert Einstein, President Franklin Roosevelt created the Office of Scientific Research and Development (OSRD) in June, 1941. The primary purpose of the OSRD was to research the feasibility of developing an atomic bomb. When it became apparent that atomic energy could indeed be harnessed, the Manhattan Engineer District (MED) was created in June 1942. The MED, eventually headquartered in Oak Ridge, was set up to be an organizational district within the Army Corps of Engineers to make it possible for the Corps to efficiently oversee the operation of the atomic weapons program while restricting knowledge of the program to a few individuals. The mission of the Manhattan Project was to produce an atomic weapon that could end the war by 1945. The three-year task was in retrospect called by Engineering News Record (December 13, 1945) "the equivalent of building a Panama Canal each year." The decision to build a nuclear development site on Black Oak Ridge was made on September 19, 1942, by General Leslie Groves, the commander of the top-secret Manhattan Project.

Scientists who had fled Hitler's Europe in the 1930s joined British, Canadian, and American scientists in 1942 to work on the Manhattan Project. Six processes for separating fissionable material were being developed by different laboratories at universities across the country: electromagnetic and centrifugal separation, and thermal and gaseous diffusion to separate U-235 from the heavier U-238; and production of plutonium by a uranium chain-reaction in enriched piles of graphite or of heavy water. Few scientists were sure which method would produce the amount of material needed to create enough energy to explode a bomb. They recognized the importance of choosing the most efficient and the most likely methods: the wrong choice could have put American scientists behind German and Soviet scientists. General Groves decided that electromagnetic separation and gaseous diffusion would be developed because they were the most productive methods of separating uranium. Groves also decided that the extraction of plutonium from uranium was to be carried out using a graphite reactor (as an atomic pile came to be called).

The Manhattan Engineering District included three sister sites: the Clinton Engineer Works (CEW) at Oak Ridge, the Hanford Reservation near Richland, Washington, and a central laboratory and assembly plant at Los Alamos, New Mexico. Oak Ridge was the first of the three sites to be constructed and was begun in the fall of 1942. [It should be noted that the name "Oak Ridge" was not adopted until the summer of 1943 and was chosen for its rural connotation.] All three sites were chosen for their remoteness and isolation, with Hanford and Los Alamos each located in a desert. General Groves had planned to locate the electromagnetic separation plants and a gaseous diffusion plant at the Oak Ridge site, where the ridges and valleys formed natural barriers between the plants. In the early months of the project, he realized that plutonium production "would proceed at such a scale and generate so vast a quantity of potentially dangerous radioactivity that it would require a separate reservation of its own", hence the designation of Hanford, Washington, as the plutonium production facility (Rhoades, 487). A pilot plant for the production of plutonium was constructed at Oak Ridge to serve as a model for the huge facilities to be constructed at the Hanford site. The uranium refined at Oak Ridge, and the plutonium manufactured at Hanford fueled the world's first atomic bombs which were designed and assembled at the Los Alamos laboratory.

Like Oak Ridge, the Hanford Reservation was located in a remote and sparsely populated region along the Columbia River. The reservation was constructed on 500,000 acres of desert in the southeastern section of Washington. Both Oak Ridge and Hanford required enormous amounts of electricity so they benefitted from the ample supply produced by the hydroelectric dams constructed along the Clinch and Columbia Rivers during the Depression. A small river village with about 100 residents was located close to the Hanford Reservation. This village, called Richland, became home to tens of thousands of project workers during the war. Like Oak Ridge, Richland was administered

by the Atomic Energy Commission (AEC) after the war, and eventually incorporated.

Los Alamos was the most secret of the three sites. Los Alamos was located atop a mesa in New Mexico and had been the site of a boarding school for boys. Because of a shortage of teachers during the war, the school had entered financial straits and was eager to sell when the Army purchased it in 1943. Los Alamos was not a production facility, as were the sites at Oak Ridge and Hanford; it was instead the scientific center of the project, designed to consolidate the work on the weapons program. The scientists involved in the Manhattan Project worked primarily in Los Alamos under the direction of J. Robert Oppenheimer, and included super-scientists Hans Bethe, Edward Teller, Enrico Fermi, Ernest O. Lawrence, and Arthur Compton. Fermi spent much of his time at Oak Ridge, supervising the construction of the electromagnetic separation facility (Y-12) which he designed.

Although the facilities at Oak Ridge, Hanford, and Los Alamos were intended to last only for the duration of WWII, government research laboratories were established after the end of the war at Oak Ridge and Los Alamos to continue scientific research of atomic energy. The four plutonium production reactors at Hanford were gradually shut down, until the last one was shut down in the late 1980s. Hanford is now home to three new nuclear power reactors, operated by Washington Public Power Supply System. Two of the reactors are under construction, and one is fully operational.

All three sites were highly secure and surrounded by guarded fences and gates. The immense area of Hanford (780 square miles) mandated that only the individual reactor sites be fenced and controlled. The townsite at Los Alamos and Oak Ridge, on the other hand, were located within the government reservations, and for this reason were tightly controlled. The location of Los Alamos atop a mesa provided for an effective natural boundary that was nonetheless fortified by a guarded fence. The townsite at Oak Ridge probably tolerated the strictest security measures of the three cities. Because it was located in the far more densely populated eastern U.S., and because of its proximity to Knoxville and to Clinton, Oak Ridge was more securely controlled than either Hanford or Los Alamos.

The construction of the facilities at Hanford and Oak Ridge demanded a sizeable work force. Workers from all over the country were recruited to work at Hanford. These workers lived in barracks, hutments, and tents in nearby Richland, making it into a boomtown with 50,000 residents in 1943 that resembled the frontier mining towns of the old west. Early planning and construction of Richland was directed by the Army Corps of Engineers. It was not until 1948 that Richland was transformed into a planned community by Gordon Trumbull, Inc., with the Chicago architectural firm of Graham, Anderson, Probst, and White.

A townsite was also constructed at Los Alamos that included prefabricated buildings, military barracks, Quonset huts, trailers, and dormitories to house 600 families. Following the war, the government demolished many of the temporary houses in Los Alamos and replaced them with 500 permanent residences and 100 prefabricated units. A town plan was commissioned in 1948 and written by W.S. Kruger and Associates. The State Historic Preservation Offices in Washington and New Mexico have not at this time undertaken an inventory of wartime houses extant in Richland or Los Alamos, and do not believe that these communities have retained much of their historic integrity.

The Oak Ridge Townsite and Reservation

Site X at Oak Ridge was the most complex of the three sites. The government was searching for a site that could safely accommodate three plant facilities and a townsite. The facilities constructed at Oak Ridge included the graphite reactor (X-10), the electromagnetic separation facility (Y-12), and the gaseous diffusion plant (K-25). Each plant was owned by the federal government but designed, operated and managed by private companies. The University of Chicago's Metallurgical Laboratory (directed by Enrico Fermi) supervised the graphite reactor during the war, until it was taken over by Monsanto Chemical Corporation; Tennessee Eastman Corporation operated Y-12; and K-25 was operated by Carbide and Carbon Chemicals Corporation (later called Union Carbide). The world's first graphite reactor, codenamed X-10 (NHL), was built to produce plutonium on the Oak Ridge reservation and served as the prototype for the reactors built at Hanford. The uranium produced through diffusion and separation at Oak Ridge fueled the world's first uranium bomb that was dropped on Hiroshima on August 6, 1945.

The Oak Ridge site was ideal because it was rural and isolated, which was good for minimizing public awareness of the project, and it was far enough inland to be protected from enemy attack. The ridge and valley system provided natural barriers between the facilities and the townsite (see Map 1, The Oak Ridge Area). The reservation was also located near TVA's hydroelectric plants at Norris Dam and Watts Bar Dam. The valley was accessible by highway and by railroad, amply providing for transportation needs. The site's location in the South was favorable for two reasons: 1) the 59,000 acres of land that was needed could be purchased at very low Depression prices and 2) there was an abundant supply of recruitable non-farm labor in the region. Only about 3000 people were displaced from the area.

The total area of the reservation would ultimately expand to 59,000 acres covering an area seventeen miles long and seven miles wide. After ceding state lands to the National Park Service (to create the Great Smoky Mountains National Park) and to the Tennessee Valley Authority, Governor Prentice Cooper refused to cede anymore taxable lands to the federal government; thus the CEW was never really a legal military reservation but a militarily restricted area. For clarification, the restricted area will be referred to

as a reservation. The entire reservation (92 square miles) was enclosed by a barbed wire fence and was heavily guarded with seven gates and three checking stations. The gates secured the outer perimeter of the reservation while the checking stations provided monitored access between the facilities and the townsite. The townsite was located in the valley ten miles north of K-25. X-10 and Y-12 were built in narrow valleys and were separated from the townsite by two ridges. The topography that had isolated the native farmers from the events of the early twentieth century now isolated one of the century's greatest scientific and military endeavors from the rest of the world. (see Map One, Clinton Engineer Works)

General Groves decided in the name of security that all CEW personnel, both military and civilian, were to be housed within the limits of the reservation. This decision to create an entire secret city under federal control is unprecedented. Within the limits of the reservation, residents were not permitted to speak about their work. Those who did were immediately debriefed and quickly found themselves without a job. The ever-present billboards placed strategically throughout the site warned: "What you see here; what you do here; what you hear here; when you leave here; let it stay here!" Security billboards are still a fact of Oak Ridge life. All residents over the age of nine were required to wear identification badges. Vehicles were searched upon entering and exiting the reservation. The entire site was enclosed by a high fence and secured by eight guarded gates and three checking stations. Mail was censored, as were library books, dictionaries, and periodicals. (Dictionaries often had to be replaced because the page containing the word "uranium" was scanned so often that it would become unreadable.)

Security was so strict that even people working at the plants knew almost nothing about what they were actually doing. They were told only that their work would help bring an end to the war. Less than a handful of top scientists and military personnel across the country knew the exact nature of the Manhattan Project. Harry Truman, who made the decision to bomb Hiroshima, was not informed of the project until two weeks after being sworn in to office. Scientists and engineers at Hanford and Oak Ridge were more restricted than those at Los Alamos in the information they were allowed to receive. Compartmentalization, in which each person knew only what he or she needed to know in order to do the job, was strongly enforced. Only select scientists at Los Alamos were allowed to share and exchange scientific theories and ideas among themselves. Such secrecy made it possible for those in charge to make important decisions without having to wade through normal peacetime political considerations. (Even amid such secrecy, it was still possible for Klaus Fuchs, a communist sympathizer working at Los Alamos, to help steal the secret of atomic energy for the Soviet Union.)

Reservation security was a joint endeavor between military and civilian forces. Each plant was managed by a private corporation (Union Carbide Corporation, or Tennessee Eastman, for example) that provided its own

security forces. Roane-Anderson Company guards protected the project administration area, and the perimeter gates and checking stations were manned by military police. By 1945, there were 4,900 civilian guards, 740 military policemen, and over 400 civilian policemen guarding the secret city. There were fourteen civilian police officers per one thousand inhabitants. Comparable southern communities had a ratio of 1.6 officers to 1000 inhabitants. Roadblocks were set up often to make sure that individuals were where they were supposed to be. Every resident was required to wear a badge denoting the status of the individual. Most plant employees worked under a "need-to-know" clearance.

The primary objective of the intelligence and security concerns was to insure that the plants would operate without interruption and to identify and prevent the possibility of foreign espionage. Security was so tight that residents were encouraged and even expected to watch each other. Many residents were not even aware why they were in Oak Ridge, or what kind of work they were doing. They were simply told that their work was an important part of the War effort and could be compromised by even the most innocent slip of the tongue. Some outsiders to the community believed that the reservation was an experiment in socialization set up by FDR's New Dealers. People all over the country, but especially in East Tennessee, were surprised at the announcement that the work in Oak Ridge was connected with the bomb that was dropped on Hiroshima. Many Oak Ridge workers learned the nature of their work from a radio broadcast shortly after the bombing.

Planning and Construction of the Townsite

The construction of Oak Ridge is often compared to planned communities like Kingsport (Church Circle H.D., NR 4/11/73) and Norris (Norris District, NR 7/10/75), Tennessee, or to the utopian communities of the past. However, the only purpose of the CEW townsite was to provide accommodations for project workers. The Oak Ridge townsite was fenced and guarded. The topography of the land permitted the construction of the townsite within the limits of the reservation, while allowing the Army maintain tight security controls.

The Army's pervasive control of Oak Ridge inspires comparisons of the city to military posts and company-run towns. The role of the civilian, however, made the reservation distinct from other military posts. Most of the people who lived on the townsite were civilians who expected to maintain a certain level of normalcy within the federal community. It is true that, like a company-run town, Oak Ridge was completely planned, built, and owned and operated for the benefit of one company--the government--and that only people who worked at the plants were permitted, and some required, to live on the reservation. However, the community lacked the stability of most company towns and also enjoyed political, social, and economic benefits not open to most company towns. Government ownership had its advantages in that it allowed for complete control over growth and planning. However, government ownership also limited the adequate development of shopping, church and

recreational facilities. The restrictive situation of Oak Ridge as a secret city mandated that the development of the city be far from normal.

The planning of the townsite was originally contracted to Stone and Webster (S&W), the engineering firm that had designed and was in the process of building the electromagnetic separation facility at Y-12. According to S&W's plan, the town was to be laid out in a standard grid. The Army dismissed the plan as unoriginal and impractical. A grid plan could never be feasibly imposed upon the rugged ridges that punctuated the valley. S&W had also grossly underestimated the construction cost of the houses by as much as $1000 per unit. Wilbur Kelly, principle engineer for the Corps, suggested that the Army look into hiring an architectural firm with experience in designing low-cost housing.

The Army approached the Boston architectural firm of Skidmore, Owings and Merrill (SOM) to design a city with houses, churches, schools, and business districts for 13,000 people. The firm was not told the location of the town, and was begrudgingly given topographic maps and photographs of the area, with all placenames omitted. When a team of architects visited the site, they were not informed of their destination until they were on a train bound for Tennessee.

The firm was chosen because of its association with the John B. Pierce Foundation of New York, a non-profit research organization associated with Yale University, that had developed a house type using panels made by the Celotex Corporation that were inexpensive and prefabricated, yet durable. The Pierce Foundation acted as consultants to SOM, who created a special office to deal with their largest and most important war-time client. No architectural firm had ever worked on a project of this size before, especially one commissioned by the government. SOM laid out the town plan and John Merrill supervised the construction using the building designs of the Pierce Foundation. Stone and Webster was responsible for all of the construction on the townsite. Although all of the dwellings on the townsite were designed by SOM, Stone and Webster designed some of the more functional public buildings--health clinics, cafeterias, dorms and some commercial areas.

SOM utilized innovative new building techniques and materials in Oak Ridge. New construction materials had been developed in the 1930s in order to keep housing costs down in the wake of the Depression. These developments included prefabricated window units, weather-resistent exterior plywood, latex glues and caulking, composition-board products, and improved drywall plasterboard. These materials and many more were used to construct the houses in Oak Ridge. The Celotex Corporation had been using a fiber board of sugar cane for insulation for decades before they developed cemesto, a durable asbestos-cement material that could be used as exterior or interior siding. The Andersen Corporation developed the first prefabricated window unit in 1932. One of the windows the company turned out using mass production techniques

was a picture window with casements on either side. This window appears very similar to the windows used in Oak Ridge, although there is no specific evidence that Andersen provided the windows or window design for townsite houses. Army officials emphasized the need for inexpensive houses that could be erected quickly and SOM decided to design an entire city of prefabricated houses.

Aside from the strict security measures, the two greatest design problems that faced SOM were the expanding population estimate and the rugged terrain. The Corps stipulated that all operating personnel were to be housed on the site. SOM was originally instructed to design a plan for a city of 13,000 people. The Army revised the population estimates every six months until at the height of the War the population leveled out at 75,000, becoming Tennessee's fifth largest city in just two years. Compared to Hanford and Los Alamos, Oak Ridge was the most complex of the three cities. 45,000 Hanford employees, most of them construction workers, lived in or near Richland. Los Alamos supported a peak of 5,000 scientists and technicians during the war. (see Map 2, Oak Ridge in December 1944)

Phase I of the original townsite plan was comprised of three distinct neighborhoods each made up of single family cemesto homes and one elementary school. Neighborhood One was Pine Valley; Two was Elm Grove; Three was Outer Drive. In each neighborhood was a small commercial area that included a market, drug store, beauty parlor, barber shop, shoe repair, and fire hall. There was also a bus stop in front of each neighborhood center. This plan was constantly adjusted and later phases of construction saw the development of a total of eight neighborhoods. The neighborhoods east and west of the original three were collectively referred to as East Village and West Village, and were made up of temporary prefabricated housing. Within these eight neighborhoods, there were areas designated for dormitories, barracks, trailer camps, and hutments, which were poorly constructed hut-like dwellings.

SOM recognized that the vital needs of a community could be met by a few standard facilities and a school. The facilities included a small shopping center that provided only the essential services: barber, beauty shop, shoe repair, drugstore, market and fire hall. Roane-Anderson's bus services ran to the neighborhood centers. Since the Army regarded church buildings as signs of permanence, the schools provided many congregations with places to worship. The individual neighborhoods were inextricably linked to the towncenter. It was there, at Jackson Square, that the business of the reservation was conducted. The high school, guest house, movie theaters, soda fountains, and department stores were all located at the central Jackson Square. Chapel-on-the-Hill was built nearby to provide a place of worship for all congregations. The Town Hall, Guest House and high school were also located in the Jackson Square vicinity. Like the rest of the city, the commercial buildings in Oak Ridge were constructed almost overnight. Altogether, there were twelve commercial areas that were built so that each

would be easily accessible to the areas it served. Some of these commercial centers still exist, although most have been converted to smaller convenience markets or have been extensively remodeled.

The plants and the city are separated from each other by natural barriers formed by the ridges. The details in the original SOM plan of the townsite indicate the efficiency of its design. The original community was laid out between two new streets running east to west constructed parallel to the existing Route 61 (later called Oak Ridge Turnpike); Outer Drive at the top of the ridge, and Tennessee Avenue at the bottom. The north/south avenues that connect these two streets follow the topography of the land and are named for states, alphabetically from east to west: California, Delaware, Florida, Georgia, Michigan, New York, and Pennsylvania. Arkansas, Illinois, and Louisiana Avenues were added by 1945 to support the rapidly expanding population. The roads, lanes, and circles leading from these state avenues are named beginning with the first letter of the avenue and also follow the contours of the land. Hence, Malvern Road is off of Michigan Avenue, and Cedar Lane comes off of California Avenue. The roads were arranged this way so that residents could find their way around in the absence of street signs, which were not added until later. Pennsylvania Avenue became the dividing line between the east and west sections of the community. Houses east of Pennsylvania Avenue included the original cemesto homes. They were considered semi-permanent and were reserved for project officials. Temporary and multi-family houses were constructed west of Pennsylvania Avenue.

In order to build a town as quickly and economically as possible, it was decided that sidewalks be built on one side of arterial roads only. To solve the problem of drainage, SOM opted to install gutters and curbs as a less expensive alternative to ditches. The Army emphasized to SOM that the objective was not to create a military post, but a livable and normal community. To this end, natural trees were left standing wherever possible. Houses were placed on the lots compactly, yet each was individually sited facing the inside of the block in order to promote privacy for its occupants. Service yards for every two houses were adjacent in order to maintain lower labor costs.

Approximately three thousand single-family dwellings, fourteen dormitories, and three apartment buildings were built in 1943 during the first phase of the townsite development. 980 temporary hut-like structures, called hutments, were built and 1,071 trailers were commissioned. The first trailer was occupied on July 13, 1943, and the first cemesto house became available two weeks later. As the first cemesto houses were completed in the summer of 1943, the estimated population was revised from 13,000 to 42,000 and Phase II of construction began immediately. An additional trailer camp was located adjacent to the gaseous diffusion plant during its construction and provided accommodations for 2000 workers.

Phase II included the construction of several types of frame houses and additional neighborhoods in East Village and West Village. In 1944, the population estimate was raised to 66,000. By 1945 there were 9143 family units, 93 dorms, 3 apartment buildings, 1507 hutments, 400 trailers and 181 pre-Manhattan Project farmhouses housing a peak of nearly 75,000 people. Of these, 28,834 people lived in single- or multi-family units or apartments, 1,053 lived in partially renovated farmhouses, and 13,786 lived in dormitories. The remaining 31,257 people lived in barracks, trailers, or hutments. Some of the family units that were added in 1945 were poor-quality two-family dwellings called Victory Cottages, constructed with plywood walls and rolled roofing. The town's residents included scientists, company officials and ranking military personnel who were **required** to live on the reservation. Also on the townsite were support staff, clerical workers, and plant operators. Most of the people in town were below the age of forty. The birth rate was high and the death rate low. Construction workers, for the most part, were not housed on the site, and many were transported by bus from as far away as Chattanooga to work at the project.

Housing

During the war, all housing on the reservation was segregated by rank and race, with those who were most important to the project taking priority. The cemesto homes were the largest and most comfortable and were reserved for ranking civilian and military personnel, scientists and engineers. They were built in the original townsite, north of the Turnpike between California and Pennsylvania Avenues. As the project expanded, temporary housing was built west of Pennsylvania Avenue to the Jefferson Circle area. Houses were assigned only to heads of families, and single people were usually assigned to dormitories. Chauffeurs, bus drivers, and clerical workers were not permitted to live in reservation houses and were unlikely to be quartered in dorms. They were assigned to trailers, barracks, and the remaining farmhouses. Wage laborers were assigned to the hutments and Victory Cottages. Most of the trailers and farmhouses were ill-equipped, had no running water and many did not have electricity. The bad living conditions in all neighborhoods induced a very high turn-over rate, as workers were unwilling to tolerate the unsatisfactory conditions.

House styles were denoted by letters instead of style names. A, B, C, D, and E houses built in the earliest phase of development were constructed of cemesto. Cemesto panels were made of a new water-proof and fire-resistant fiber-board with a cement-asbestos compound bonded to each side. The panels were joined together by wooden studs. The asbestos-cement compound was not used extensively until Oak Ridge was built. Bror Gustave Dahlberg, the owner of Celotex, envisioned for the future entire utilitarian cities filled with millions of inexpensive cemesto homes. Cemesto proved to be an efficient material that provided an insulating and durable exterior surface. The panels were well suited to prefabricated construction methods. SOM utilized this new material in the construction of over three thousand semi-permanent homes in

Oak Ridge. The prefabricated houses were manufactured in Indiana and shipped by truck to Tennessee. An assembly-line construction technique was adapted with work crews performing specialized tasks, allowing a completion rate of one house every thirty minutes. About two hundred houses were completed per day.

Prior to World War II, predominant suburban house types reflected the Colonial Revival style or continued the Bungalow tradition. Both styles were built using traditional methods and materials of balloon frame construction. Contrary to this tradition, the methods and materials used in building the houses in Oak Ridge had never been used on such a large scale. SOM worked with the Pierce Foundation to plan the actual house designs. The houses were designed to suit the Corps' standards of efficient living and did not display any characteristics then in vogue. If not influenced by any historical precedents, SOM was certainly influenced by Mies van der Rohe's ideal that form follows function and the firm strove to provide functional and efficient homes in Oak Ridge. Everything that could be installed prior to final construction was installed: electrical wiring, plumbing, cabinets, closets, partition walls, and window curtains. The houses were inexpensive, efficient, and utilitarian.

Prefabricated building methods originated in America during the 19th century as communities grew in the course of westward expansion. Balloon frame dwellings were often pieced together before shipping to allow for quick dismantling and moving. By the turn of the century, houses could be ordered through the mail from Sears or Montgomery Ward. All of the materials needed to build a sturdy frame house were shipped via railroad. In addition to the building materials, the package included such items as built-in cabinets and varnish for the floors. Owners of these homes had only to supply the foundation, chimney and if desired, stucco. Sears introduced Goodwall Sheet Plaster, a precursor of drywall, in the early part of this century.

The construction of entire communities using pre-fabricated houses occurred throughout the early 20th century. The Aladdin Company supplied hundreds of homes for the Dupont Powder Plant at Old Hickory, Tennessee (NR 5/24/85) in 1918 and the Standard Oil Company erected prefabricated homes for its employees in Carlinville, Illinois during the 1910s and 1920s. However, most of these dwellings were built from thousands of pieces of lumber and hardware and required several weeks for large crews to assemble. The concept of building identical house sections in factories which could then be joined together on site was not seriously considered until the early 1920s.

One of the first proponents of this type of construction was designer Grosvenor Atterbury. Atterbury recommended in the second decade of this century, that concrete panels be joined together to form floors, walls and roof and the entire house be transported to the building site. Once it was at the site a crane would lift it up and move it on a track so that different specialized crews could work on it. Decorative features could be added later

to make the house more attractive. Some of these houses were built in the community of Forest Hill Gardens on Long Island.

The houses in Oak Ridge were constructed using similar techniques, with specialized work crews moving from house to house, rather than the house moving from crew to crew. The houses arrived at the site with plumbing installed, electricity wired, cabinets built and curtains hung in the windows. A house foundation would be poured in one day and allowed to dry overnight. The prefabricated units were erected on the foundations the following morning, and often by nightfall, the houses were occupied. The assembly line construction of these houses made it possible to complete one house every thirty minutes, thirty to forty houses each day, some taking only two hours to build. The exteriors were identical, depending on the house type, and were painted in muted colors, usually Army Drab. The method of constructing houses using an on-site assembly line was used again in the post-war Levittowns that sprang up across America.

Mass production of prefabricated houses was not entirely successful primarily because Americans preferred exteriors with historical associations. House styles in the first forty years of this century predominantly reflected international or historic tastes. The Colonial Revival style was especially popular during the 1920s while Spanish and Italian revival styles were also common. The Craftsman or Bungalow style was mass produced but many designs reflected Tudor, English Cottage, or other historical antecedents. In general, innovative designs of the period such as the International or Art Moderne styles were rarely constructed in most communities. Prefabrication was also hindered by the lack of suitable materials.

The residential architecture of Oak Ridge precedes the transition from historic designs to the modern designs which predominated America after World War II. House types such as A, B, and D can be seen as part of the movement towards the "Ranch" house form which became popular in the post-war era. The ranch style is defined by Virginia and Lee McAlester as a simplified form loosely based on Colonial or Spanish Colonial precedents. Originating in California in the 1930s, this style is horizontal in form with gable roofs and minimal detailing. Porches and outdoor living areas were most often placed on rear facades in contrast to most previous architectural styles. The style is well suited to the Corps' ideal of efficiency and simplicity in the home.

In Oak Ridge, SOM's designs followed these general principals except that porches were located on both the primary and rear facades. SOM's design for the community included sidewalks adjacent to the street in contrast to many post-war developments which emphasized street and driveway access and omitted sidewalks. Detailing for Oak Ridge residences originally consisted of the vertical and horizontal divisions created by the cemesto panels, and window and door designs. Historic locations for embellishment such as gable fields, porches, and eaves were devoid of decorative elements.

The Roane-Anderson Company and Operation of the Townsite

All aspects of the operation of the townsite were incorporated into SOM's design plan. The Army had originally planned to oversee the administration of the townsite. As the size of the project grew, however, General Groves decided that it would be more advantageous to place the townsite under civilian control, while the Army maintained its presence at the plants. The Army chose Turner Construction Company to create a subsidiary management firm called Roane-Anderson Company, which assumed its duties in October 1943. Roane-Anderson operated all reservation facilities including the cafeterias, laundries, bus systems, hospital, police, and fire departments. The company was responsible for custodial service of public buildings, dormitories, and warehouses; garbage collection, housing assignment and maintenance, negotiation of and management of commercial contracts, and maintenance of stables for the guards' horses. Thus, it was Roane-Anderson, and not the Army, that affected the day-to-day life of townsite residents.

Because many of the wage laborers lived relatively close to Oak Ridge, Roane-Anderson created a special bus system and by 1944, operated the sixth largest bus transportation system in the country. At an average cost of eleven cents per passenger, bus operators carried 700,000 passengers from as far away as Chattanooga over 1,300,000 miles in 700 daily trips per month. Fares were kept low to attract workers who lived off the reservation. The company also operated townsite transportation for residents. As only the main streets on the reservation were paved in the early months, it was easier to rely on public transportation than on a personal vehicle which might become immobilized from the dense, clay-like mud.

Roane-Anderson was also responsible for making housing assignments. In spite of frantic and continuous construction, the demand for housing always surpassed its availability. The companies operating the plants kept steady pressure on Roane-Anderson to provide adequate housing for their workers. The company had to cope with problems of availability of housing and eligibility of workers. Housing on the reservation was scarce and cramped. Most of the houses were built on a semi-permanent or temporary basis, and many of the living conditions were sub-standard. Only heads of families could apply for family quarters and permanent housing was reserved for those who earned more than $60.00 a week. Workers who did not require a security clearance (e.g. construction workers) who lived within forty miles of the reservation were not considered for any type of housing. No houses were available to single people. Family size dictated house size, in general. If family size increased, and if a larger house was available, residents could be re-assigned. It was recommended that women who were heads of families find a single woman with whom to share their homes.

Dorm assignments were restricted to operating plant personnel--teachers, ministers, and even employees of Roane-Anderson did not qualify to live in

the dorms. In the fall of 1944, there were 8000 people living in 93 dorms. Early in the project, one person was assigned to each room. The population grew so quickly that less than a year into the project, by fall of 1943, there were 2-3 people assigned to each dorm room. People not associated directly with the project (support staff, clerical workers) usually lived in the trailer camps. Maintenance and cleaning of the dorms, barracks, and vacated houses (in preparation for new tenants) was done by Roane-Anderson employees. Coal was delivered and water provided to all facilities that did not have indoor plumbing, like trailers, hutments, and farmhouses.

In addition to the housing responsibilities of Roane-Anderson's Operations Division, the company also supervised all commercial businesses and services on the site, which included the laundries and cafeterias. In a typical month, the laundries processed 500,000 pounds of hospital and dormitory linens, took in 16,000 individual orders and 7,664 dry cleaning orders. Eleven cafeterias served approximately 26,300 meals a day, usually round-the-clock to accommodate shift workers.

The commercial development of this boom-town was also left up to Roane-Anderson. The Army decided which goods and services would be offered to residents and Roane-Anderson sought appropriate concessionaires, negotiated contracts, and collected rents. Rent was based on a fixed percentage--1% to 20% depending on the type of business--of the gross revenue. For this reason, businesses did not suffer so much in the unstable Oak Ridge market. Non-essential concessions, whose status was determined by the Army, paid the highest rents.

The first grocery store, movie theater and drug store opened in August 1943 in Jackson Square. As the reservation overextended its population estimates, it became clear that the towncenter at Jackson Square was insufficient to service the entire community, even with the support of additional neighborhood centers. By November 1944, there were 13 barber shops, 12 grocery stores, 10 farmers' markets, 8 beauty shops, 8 service stations and garages, 7 department stores, 6 shoe-repair shops, 6 restaurants and lunchrooms, and 3 insurance companies as well as such "non-essential" businesses as a flower shop, portrait studio, and International Correspondence School. Gross receipts of these businesses topped eight million dollars in November 1944. By the end of the war, the number of commercial establishments reached 165. Roane-Anderson strove to keep consumer prices comparable to those in Knoxville, but because of Oak Ridge's unique situation, prices were inflated in spite of Corps regulations.

With respect to racial policies, the reservation did not differ from any other Southern town during the war. The government had a policy of respecting local customs and laws in areas where federal installations were located, and Tennessee had strict segregation laws. Blacks were restricted from seeing first-run movies in the theaters, from working anyplace that did not have separate rest room facilities, and from worshipping in churches that were not

segregated. The generally low level of education among the black workers meant that they worked as wage laborers, delivering coal, or working in construction. These jobs relegated all blacks to the hutment areas. Because they lived in hutments, they were denied the privacy enjoyed by white people living in houses. The justification can be summed up by a quote by one of the project officials: "The responsibility of the Office of the District Engineer and Roane-Anderson Company is not to promote social changes, whether desirable or undesirable, but to see that the community is efficiently run and that everybody has a chance to live decently in it." (City Behind A Fence, 118) Within the hutments, men and women were separated, and even husbands and wives were not permitted to live in the same hutment. Black children were not allowed to live on the townsite until 1946. Many blacks who came to Oak Ridge during the war left their families behind and sent their wages home to Alabama, Mississippi and Georgia.

The USO operated in Oak Ridge beginning in 1944, although no records of their budget or activities in Oak Ridge could be made for security reasons. Their operations could not even be listed with the National Headquarters in the name of security. By bringing in the USO, CEW officials hoped to lower the crime and absentee rates by raising morale. Other national groups, like the Girl Scouts, formed groups in Oak Ridge, but they too were restricted from inclusion in national rosters for reasons of security.

During the summer of 1943, the Army chose Alden Blankenship as superintendent for the non-existent Oak Ridge school system from the Teachers College, Columbia University. "Army officials recognized the need for skillful, well-prepared teachers, and would agree to a reasonable salary schedule....The schools must be good, however, to meet the demands of the residents who would come from all parts of the United States" ("Four Years of Educational Pioneering"). Blankenship was given complete responsibility for the operation of the system, with no interference from the Army or the federal government. He chose his staff from universities around the country, and hired qualified teachers with a minimum of four years experience. A majority of the teachers came from Peabody Teachers College in Nashville, and the Universities of Tennessee and Kentucky. The schools operated on a system of cooperative planning by school administrators and teachers. From the beginning, the system has operated as an independent unit of the Anderson County and Roane County school systems.

Residents began moving into their homes in July 1943 and the school year began on October 4th with an enrollment of just over 600 students. By the end of the year there were 5,000 children enrolled in the schools. School construction continued over the next two years and by 1945, school enrollment was close to 11,000 students. In many cases, there were no books, desks, or teaching materials, only students and teachers in the new buildings. Oak Ridge's educational system has from the start depended more upon its teachers than on anything else. This has resulted in a democratic approach in the

administration of the schools in which the teachers are involved in planning the curriculum.

Schools began their first session October 4, 1943. Pine Valley opened in December, 1943, and Cedar Hill was completed early in 1944, followed by Glenwood and Highland View Schools. Linden and Gamble Valley were built late in 1945, after the war ended. Fairview and Gamble Valley Schools served the white and black trailer camps. Two pre-Oak Ridge schools, Scarboro and Wheat, were also commissioned. Four schools from this period survive: Pine Valley, Highland View, Glenwood, and Robertsville Junior High. Scarboro school has been converted to a research facility by DOE and has lost its integrity.

The first church built on the reservation was Chapel-on-the-Hill. The Chapel was built to ecumenically serve twenty-two denominations. So as not to show favoritism to anyone, the Army was committed to finding or providing space for all religions to worship. There were so many congregations, though, that services were held in school gymnasiums and auditoriums, theaters, and recreation halls. Ministers who requested on-base housing had to serve a minimum congregation of 100 people every Sunday. As the housing shortage grew more acute, the congregations were required to number at least 200. The Catholics held the majority, followed by the Baptists and Methodists. Army chapels were also built in East and West Villages.

Lots were not set aside to be used for church congregations because the Army wished to avoid any show of favoritism. Neither did the Army wish to instill a sense of permanence, as the CEW was slated to last only for the duration of the war. Consequently, there were no baptismal fonts, cemeteries or funeral homes built during the war. The death rate in Oak Ridge was below the national average and those that died were embalmed in nearby Clinton before being sent to their pre-war homes.

Industrial Areas

When the government began buying the land in the fall of 1942, the reservation was codenamed the Kingston Demolition Range. The site was renamed the Clinton Engineer Works (CEW) in 1943, and the gaseous diffusion plant was begun that fall, to be operated by Carbide and Carbon Chemicals Corporation (Union Carbide). The plant's codename of K-25 was derived from the name of the designer, the Kellex Corporation. The number 25 was a common nickname for U-235 and was added arbitrarily. An atomic pile was begun in February, 1943, and was arbitrarily named X-10. It was operated by the Metallurgical Laboratory of the University of Chicago until July 1, 1945, when the Monsanto Chemical Company took over operations. X-10 served as a model for the atomic pile at the Hanford Site. The giant electromagnetic plant, operated by Tennessee Eastman Corporation, was also begun in February and was designated Y-12. Local tradition holds that the codenames K-25, X-10, and Y-12 were named for fictitious map coordinates and were meant to confuse enemy spies.

At the start of the project in 1942, $54 million (60%) of the federal budget for the following year was earmarked for the project. The ultimate cost of the Manhattan Project in Oak Ridge alone was about $1,106,393,000 of the total two billion dollar project budget. The two billion dollars supported the construction of sites in three states as well as research at universities across the country. Since not even Congress knew about the top-secret project, President Roosevelt allocated funds through hidden pockets in the federal budget.

The separation of uranium through gaseous diffusion took place at K-25. The Oak Ridge Gaseous Diffusion Plant was the first such uranium processing plant in the world. The process involves the separation of gaseous uranium-235 from the heavier uranium-238 by diffusion through porous barriers. These barriers contain billions of holes that are smaller than two-millionths of an inch and are strong enough to withstand a pressure head of 15 pounds per square inch. Uranium particles are diffused through the barriers thousands of times before an appreciable amount of U-235 is separated. The process requires a tremendous amount of electricity, so a power plant (designated S-50) was built close to K-25 with a generating capacity of 238,000 kilowatts, twice that of Norris Dam. By 1945, Oak Ridge was consuming 1/7 of all the electricity produced in the nation.

Some of the equipment and materials used in the process had not even been successfully developed when construction of the facility was begun. The construction of ORGDP required the development of new materials and techniques and resulted in valuable technical advancements in engineering. The barriers through which the uranium was passed had to be made of a material that would not clog or corrode. Many miles of piping and electrical conductors required that fourteen new welding techniques be developed to meet tightness and cleanliness specifications. New instruments were invented to permit the successful operation of the plant. Pumps were developed with velocities greater than the speed of sound. The research involved in developing the pumps alone totalled an estimated 250,000 hours. The nature of work at the plant required refinements in the development of the mass spectroscope and in the invention of a super-sensitive electronic "leak detector".

Y-12 was another uranium processing plant. The electromagnetic process for separating U-235 from U-238 was developed by a number of scientists working under the direction of Dr. E.O. Lawrence, at the University of California at Berkeley. The electromagnetic process is the ionization of uranium particles and the acceleration of these particles in a mass spectrometer at a velocity close to the speed of light. The stream of particles is bent by an electromagnet in an almost absolute vacuum. U-235 separates from U-238 in an arc that has a greater radius and is thus "captured" and stored.

Built by E.I. Dupont de Nemours and Company in 1943, the graphite reactor at X-10 was the prototype for the huge plutonium processing plant that was later

built at Hanford. Atomic fission that produces plutonium occurs when U-238 is placed in tubes running in different geometric designs through a solid mass of graphite, called a pile. The pile slowed down neutrons and permitted them to split the uranium atoms rather than become absorbed by them, thus creating a chain reaction. X-10 was the location of the first plutonium-producing graphite reactor in the world, becoming operational November 5, 1943. The facility was built as a pilot plant for the massive reactor built at the Hanford site (completed in 1945). The reactor remained operational for twenty years before being designated a National Historic Landmark in 1966.

III. THE POST-WAR ERA, 1945 - 1959

Many Oak Ridgers were unsure of the future of the city when the war ended. Shortly after V-J Day, Congress was expected to make a decision on post-war plans to develop and control nuclear energy. The city that had been planned to last only for the duration of the war was informed that operations would continue on the reservation in a different peacetime capacity. This announcement, made three weeks after the Japanese surrendered, launched Oak Ridge as a permanent nuclear and scientific research facility.

The change in the status of Oak Ridge from temporary to permanent is significant for two reasons: the Army recognized for the first time that the reservation had a future beyond the duration of the war (although it has not been established precisely when the Army changed its attitude); the Army also recognized the uneasiness this change caused the employees of the Manhattan Project. The easing of this tension caused by uncertainty became a major concern for the Corps in the years following the end of the war.

Feeding the post-war fears felt by many Oak Ridgers was the apparent lack of decisive action on the part of the U.S. Congress in dealing with the matter of nuclear development. Relations with the Soviet Union fell apart between August 1945 and January 1947, a foreshadowing of the coming Cold War. Gosling writes retrospectively in DOE's history of the Manhattan Project, that the "beginning of the Cold War in the late 1940s was linked to the failure of the World War II allies to reach agreements on international controls respecting nuclear research and atomic weapons." Postwar planning in this country centered around whether a military or civilian agency should oversee the atomic program. General Groves and other military advisers testified at hearings in the House of Representatives that only government control of atomic energy could prevent its misuse. Scientists at the Manhattan Project laboratories, including those at Oak Ridge, felt that government control was "tolerable during war but was unacceptable during peacetime when free scientific interchange should be resumed." (Gosling, 57) Following the Japanese surrender, an entire year of tedious and indecisive deliberations passed before the Atomic Energy Act became law in August 1946. The most important aspect of the Act was the transfer of control over America's atomic research from military to civilian control, with the creation of the Atomic Energy Commission. The MED was discontinued and AEC assumed the responsibilities of postwar atomic research on January 1, 1947.

During this period, Oak Ridgers were plagued by continuous and often ominous rumors concerning the future of the city. The transition of the reservation from military to civilian authority did not assuage many fears. The fears and rumors that swept through Oak Ridge in 1946 were evidenced by the decline in population. Operations on the reservation had peaked in 1945 with 82,000 people employed on the reservation and 75,000 people living on the townsite. By November 1945, just three months after the bombing of Hiroshima, employment at Oak Ridge had fallen to 51,000 and the townsite population had

plunged to 52,000. The work force dropped to 34,000 by June 1946, and the community population stood at 43,000. By 1950, the population of Oak Ridge had shrunk to 30,205, although the community maintained its standing as the fifth largest city in Tennessee.

In spite of the uneasiness felt by some residents, the townsite began to acquire a sense of community spirit. Oak Ridgers proclaimed their community to be the "Atomic Capital of the World". Although many people left in the face of constant uncertainty, others chose to remain in Oak Ridge, perhaps because it seemed to have become more livable by 1946. The crush of people lessened and constant wartime pressures decreased. Without these wartime pressures, the Army and Roane-Anderson Company were able to concentrate on cleaning up the town by repainting, repairing, and landscaping.

The decline in population also brought about a change in demographics that made postwar Oak Ridge more appealing: forty-seven percent of the community's population was made up of families. The exceedingly high number of single adults, especially the rootless and less educated construction workers, was reduced in the months following V-J Day. The community remained young, with only nineteen percent of the population over the age of forty in 1948 (the national average was 35%). The birth rate was extremely high and the death rate unusually low. From the very beginning of the project to September 1946, 2740 babies were born in the Oak Ridge Hospital (the percentage of babies born in the hospital approached 100%, well above the national average). The number of deaths recorded during that same period or time was 241.

One of the significant reasons for the change in attitude among Oak Ridgers is that by the summer of 1946, eighty percent of them lived in houses or apartments. Eight dorms were closed as early as October 1945, and also in that month, the white hutment area was eliminated. The trailers that were borrowed from the Federal Public Housing Authority were returned. The coveted single and multi-family homes were more easily acquired and were even opened to families who had not been eligible for such housing during the war. Housing assignments based on salary and occupation were relaxed, and even concessionaires were allocated housing.

The new status of Oak Ridge as a permanent city brought about many changes in Anderson County and in the reservation itself. The CEW, as it was still sometimes called, experienced new and unforseen threats that interfered with the efficient operation of the reservation. During the war, Americans accepted deprivation and set aside personal ambitions "for the duration". Tolerance by local communities of the mere presence of Oak Ridge had worn thin and had almost disappeared by 1945. Many East Tennesseans were disgruntled by the fact that although the war was over, Oak Ridge was still there. Many were further enraged because pre-war property owners in Roane and Anderson Counties, assuming the government no longer needed their lands for the war effort, were not given an opportunity to buy them back.

What East Tennesseans did not realize, was the tremendous economic effect of Oak Ridge on the surrounding towns of Clinton, Oliver Springs, Harriman, Kingston, the city of Knoxville, and countless other communities. This effect was outlined in the 1956 housing appraisal conducted by the Federal Housing Administration. The entire region had been struck hard by the Depression, but enjoyed tremendous rebirth during the war and in the postwar years. Perhaps the best illustration of this is the 851% increase in retail sales in Anderson County between 1939 ($3.1 million) and 1948 ($29.7 million). State sales tax collections in Anderson County show a 35% increase in the dollar volume of sales between 1950 and 1955. Oak Ridge accounted for 57.3% of the total volume of sales in 1955. Workers from Oliver Springs, Clinton, Harriman, and Kingston generated an average payroll take of $4,000,000. 2900 plant workers from Knoxville earned $14,000,000. The FHA appraisal went on to note:

> "All of East Tennessee owes much of its recent economic betterment to Oak Ridge Operations. It has generally benefitted from direct expenditures of the facility itself and the personal spending of Oak Ridgers. It has materially benefitted in indirect ways from the expansion of the TVA Empire, necessary to supply Oak Ridge Area Power needs.
>
> The immediate surrounding area has been transformed from a static, sparsely settled farming section, with one-industry towns or small crossroad villages, to a vitalized progressive territory."

The impact of Oak Ridge on the surrounding area was not always seen in a positive light by the region's natives. To the dismay of most Anderson County residents, liquor sales were legalized in the county (in Oak Ridge) for the first time since Prohibition was repealed. Roane Countians were particularly incensed because their county seat of Harriman was founded as a "temperance town" in the late nineteenth century.

A significant change that occurred within the community was the unionization of project workers. Unionization efforts began in Oak Ridge as early as 1944, but were quelched by the Army. Two groups petitioned the National Labor Relations Board to be recognized as official bargaining agents on the project. The Army feared that unionization could threaten project security and a strike could prove to be detrimental if it hindered the completion of the project. Unionization efforts picked up again immediately following the end of the war. This time the Army set guidelines for the union organizers to follow. Union members had to be employed by CEW or by CEW contractors. They could hold meetings under the same conditions as other groups. Only CEW employees could attend union meetings on the project and present at all meetings would be a district engineer to insure that classified information was not discussed. All union files, books, and records were to be open to inspection by the Army and all mail pertaining to union business was censored. The efforts at unionization were fruitful and two Union buildings were constructed in the 1950s.

Oak Ridge's commercial operations remained nearly the same as they had been during the war. The federal government reimbursed Roane-Anderson for the net cost of the city's operation, paid in a monthly fee. Concessionaires operating in Oak Ridge paid a rent based on gross receipts to Roane-Anderson. These receipts were applied to reduce the cost to the government of all services performed under Roane-Anderson's contract.

Planning

With the creation of the Atomic Energy Commission, Oak Ridge entered a new phase of development. The urgency of the development of the atomic bomb was replaced with a sense of permanency as the city adapted to long range goals in the federal government's research and weapons program. SOM's Master Plan for Oak Ridge was published in 1948 and the growth and development called for in the plan guided the city through the post-war years.

In its introduction, the plan states that the "objectives of the Master Plan are to determine the complete requirements of a program for the city; to modify the temporary layout built to serve a war-time expedient; to design the framework for the building of an efficient, beautiful city; and to schedule construction in such a manner that the efficient functioning of the city will at no time be impaired." The Master Plan facilitated completely controlled planning of growth and development. All land was controlled by the government as sole owner, which allowed for efficiency in planning.

The plan is based on basic design elements of population, housing, streets, schools, recreation, commercial facilities, industrial facilities, the administrative center and the cultural center. Further assumptions of the Plan rest on the intention that Oak Ridge was to be transformed into a "normal" city with free access to outsiders, a civilian police force, private enterprise and ownership of property, and self-government. The Plan was not, nor was it intended to be, a rigid or inflexible framework, but a guideline for the development of the city.

SOM recognized that there were major adjustments to be made by the city-to-be, and that it was these adjustments that made an efficient and well-thought plan necessary:

> "Oak Ridge will change physically from a war-built city with many abnormal physical conditions to a peacetime city the facilities of which meet the usual requirements of a permanent population. It will change politically from a federally owned and operated project to a self-governing and self-financing municipality. It will change from a city necessarily isolated from its surroundings into a city carefully integrated into the life of its region."

One of the major purposes of the master plan was to permit the community to undergo a smooth and carefully planned, if rapid, transition from a wartime

defense project to a pleasant and viable city. The plan rests on an assumed maximum population of 50,000, with a buffer of 10% (i.e. if necessary, the city would be able to support 55,000 people). This figure was set by limitations of topography and by the locations of the plant sites. (Note, the wartime population of 75,000 was accommodated by densely built, temporary dorm, trailer, and hutment areas.) SOM limited the growth of the city for other reasons, as well. "The physical plant or structure of a modern city--streets, buildings, utilities--is very costly. It cannot be designed on an economical basis except in terms of a known or assumed load." The assumed load in the case of Oak Ridge was 50,000 people. By limiting the population, the city is better able to serve its residents efficiently, without becoming inadequate or congested. The final reason for limiting the population of Oak Ridge to 50,000 was for security reasons that applied to all industrial centers across the country: it is safer and more expedient to build "more cities in dispersed locations than [to add] indefinitely to the size of established centers." The National Security Resources Board recommended that industrial cities be limited to 50,000 people.

SOM's plan also rests on the assumption that atomic energy would continue to be the primary industrial interest in Oak Ridge. In order to achieve a balanced community, SOM encouraged the establishment of industrial and commercial enterprises unrelated to the atomic energy program. SOM was also planning for an open Oak Ridge in the future, that the security carriers surrounding the city would be removed in late 1948 or early 1949. Finally, SOM assumed that the operation of the city would one day be in the hands of its citizens." It is the desire of the Atomic Energy Commission to transfer to private enterprise as much of the responsibility for real estate operations as can be done without impairing the utility if Oak Ridge as a center for program operations." SOM recognized the ever-changing needs of the young community of Oak Ridge and designed a flexible framework for its administration.

Included in the Master Plan were thirteen neighborhoods, eight of which were constructed during the war. (see Map Three) Temporary houses were replaced with new houses and apartments as well as new business districts to provide facilities that could not be constructed under the limitations of war. Although five new neighborhoods were planned, in addition to the original eight, only two, Woodland and Scarboro, were actually constructed. The other neighborhoods were not constructed because there was no immediate need for them. Later, as the city grew and newer developments were constructed in the 1960s and 1970s, the plan was altered slightly. New commercial and industrial centers evolved, and the construction of new neighborhoods was influenced by land developers.

The neighborhoods of Woodland and Scarboro, however, were constructed according to SOM's plan. The firm designed ten housetypes, five apartment models, and one dormitory plan for the neighborhoods. Each neighborhood is served by an elementary school that accommodates 500 students. Prior to the

end of the war, both areas had been occupied by trailers and hutment areas. Scarboro opened to black residents in 1950. The neighborhood consisted of 15 cinderblock single-family units, 143 frame duplexes, and 7 dormitories. The one-story dormitories are constructed of concrete block and were planned so that they could easily be converted into two-room apartments.

Housing

The greatest problem facing AEC after the war was the same that had plagued Roane-Anderson throughout the war: housing. One-third of the buildings that existed in Oak Ridge in 1948 were permanent. The rest were semi-permanent or temporary, but still in use. Of the residential buildings, 29% were permanent frame or cemesto family homes and apartments; 13% were semi-permanent or converted H-type dorms; 45% were temporary S-type dorms; and 13% were sub-standard hutments and Victory Cottages. AEC supervised the construction of houses for those who had been living in trailers, hutments and in temporary housing units. By 1959, 4577 substandard temporary units were removed. Between 1948 and 1949, 3242 units, including permanent houses and apartment buildings, were constructed in Woodland, Scarboro, and throughout the older neighborhoods. Ten house types and five apartment designs were constructed in Woodland and Scarboro. AEC also financed the construction of the SOM-designed Garden Apartments at the intersection of the Turnpike and Illinois Avenue.

The neighborhoods of Woodland and Scarboro predated the rush of private construction that was to come following the 1956 release of lands and were opened for residents by 1950. Before building Scarboro, AEC consulted leaders in the black community about the location of the new neighborhood. Rejecting an East Village location, they chose Gamble Valley. The new neighborhood was almost identical to the planned white neighborhood of Woodland. The same house types were constructed, as were churches and a small commercial district. The houses and commercial areas in these districts were designed by SOM and constructed under the direction of AEC.

The removal of substandard and temporary housing was accompanied by the construction of fifty new houses, also designed by SOM, on newly vacant lots in the cemesto area (Models 31-34). AEC also leased lands to private citizens and contractors. Development of these leased lots did not progress quickly until 1956, when AEC began selling, rather than leasing lands. Banks were unwilling to make loans for the construction of permanent houses on land that was only leased. When all lands and houses were released for sale under the Oak Ridge Disposal Bill (Public Law 221), buying priorities were established in order to avoid speculative buying. The legal occupants of a house, those who were currently occupying a single family house or those who had spent the most time in a duplex, had the first option to buy their houses. Second option went to "shutouts" who had lost out to a senior occupant in a duplex. Homes that were left over were sold to AEC employees and contractors, other Oak Ridge residents, etc. A similar program was enacted in Richland,

Washington, to dispose of the government houses built for workers at the Hanford Site.

House prices were extremely low, although many houses needed some maintenance and repairs. Smaller houses sold for about $3600 and larger ones for $5000 to $6000. A purchaser was entitled to a 15% discount if he lived in the house. Another ten percent was taken off the price if he waived the indemnity clause. Indemnity was a provision whereby the government promised to buy back the house if plant employment dropped below a certain level. Nearly everyone waived the indemnity clause.

The new homeowners immediately began to renovate and remodel their homes, mainly to hide the "government issue" appearance of the houses. A homeowner who purchased his home for $5000 might spend as much as $20,000 remodeling it. Area construction contractors prospered nicely. In addition to renovating old homes, contractors were hired to build new homes on lots on upper East Drive that had been cleared of wartime "flattops". These privately built homes were constructed on lots that ranged for one-quarter acre to one-half acre and had been bought for as little as $250.

Prior to 1956, AEC hired contractors to build 900 single-family ranch-style dwellings to replace the dilapidated flattops in East and West Villages under Title VIII and Title IX of the Federal Housing Act. 500 Title VIII houses were built by East End Village Homes, Inc., on eighteen parcels of leased land. 400 Title IX houses were built on three parcels of leased land near Grove Center and on the extreme west end. Developers were Clinton Builders Corporation, Oak Ridge Development Company, and Glencoe, Incorporated. Some of the Title IX housing on the extreme west end appears to have been replaced in later years and it is nearly impossible to identify the original 900 homes. The Postwar housing policies were similar to wartime policies. Roane-Anderson Company, which had handled housing assignments during the war, was replaced in 1954 with a new streamlined nonprofit corporation called Management Services, Inc. (MSI), set up by AEC. MSI was responsible for housing allocations. Title VIII and IX houses were limited in lease and ownership to certified defense workers. Tenants in the new houses had to follow policies and procedures set by the Oak Ridge Housing Policy and by Housing Allocation and Assignment, administered by MSI. All tenants seeking occupancy in Title VIII houses had to supply a certificate verifying employment at an AEC-approved employing group. An applicant for rental or purchase of a Title IX house had to be an "eligible defense worker". That is, all applicants had to be employed at an installation listed by the Housing and Home Finance Administration on a defense activity list for the area.

Segregation in Oak Ridge

Oak Ridge has never considered itself to be a "Southern" town, especially at its inception, when most of its occupants came from outside the region. President Roosevelt's Executive Order 8802, issued in 1941, forbade

discrimination at defense projects on the basis of race, creed, color or national origin. However, it was also the policy of the federal government to respect and conform to the local customs and laws of the states in which federal installations were located. Tennessee had strict segregation laws and since the CEW was subject to state laws, segregation policies were practiced on the reservation.

Black workers were recruited from all over the South, but especially from Alabama. Mississippi, Georgia, and Tennessee, in order of representation. It can be assumed that nearly all worked as common laborers, doing construction, digging ditches, and delivering coal. The segregated eduction system in the South made it nearly impossible for blacks to progress beyond high school, and many did not make it that far. The low level of education among blacks who came to Oak Ridge relegated them to common labor. The high wages, $.58/hour versus the government minimum of $.40/hour, made working at the reservation attractive at first. A desire to contribute to the war effort also brought many blacks to Oak Ridge.

Blacks who came to work at Oak Ridge lived in shabby hutments and Victory Cottages in the area now occupied by Woodland. In 1946, the Ridenour Management Company was subcontracted by Roane-Anderson to operate the black hutment area. J. Carson Ridenour, head of the company, was serving as the state representative for Morgan and Anderson Counties. In 1949, occupants of the white hutments and trailers in Gamble Valley were moved to more substantial housing in other parts of the community. The neighborhood of Scarboro was built in its place and was opened to blacks in 1950. Quality of life under Ridenour management was abominable. Oil stoves were immediately replaced with inferior coal grates, over the objections of the occupants. Tenants were compelled to rent more than one space (one corner of a 16' by 16' structure) in order to keep out undesirables, and rent was doubled if it was so much as a day late. Prices in the Ridenour-operated stores were 50% to 75% higher than prices in Jackson Square stores.

Men and women were no longer separated and were permitted to live as families. Black children were permitted to live on the reservation beginning in 1946. A school serving grades one through eight was organized in that year under the direction of Mr. and Mrs. Robert Officer, who were hired by the oak Ridge school system. The black children attended the old Bethel Valley School at the intersection of Bethel Valley Road and Scarboro Road. Because the school was located close to the plants, children often rode the plant busses to school. In 1949, black students ere permitted to attend the Scarboro School that had been left vacant in Gamble Valley. Black high school students were sent with other Anderson County blacks to Austin High School in Knoxville, the only high school for black students in the area. With the help of volunteer teachers, a black high school was set up in 1950 in the old Scarboro School. The Scarboro School was the first and only high school for black students in Anderson County. The black high school operated for five years until the Oak Ridge school system was desegregated in 1955, the first

in the state and one of the first schools in the deep South to do so. Desegregation of the schools had been discussed by the Advisory Town Council since 1953, but the resolution was adamantly opposed by a "Citizen's Action Committee". The 1955 desegregation, however, went smoothly and without incident.

Permanent housing in Scarboro replaced the Gamble Valley Trailer Camps and hutment area in 1950. Housing for blacks was restricted to the Scarboro neighborhood until 1955. MSI took over management of Scarboro as it did the rest of the community in 1955. AEC and MSI housing officials stated in 1955 that "no Negroes had ever asked to live elsewhere." (Peelle, 7) In 1955, a black technical employee succeeded in renting a room in Cambridge Hall, a dormitory near Jackson Square, claiming that the dormitory in Gamble Valley (Scarboro) was unsuitable. In 1956 and 1957, two more black tenants moved into the new brick apartments adjacent to Woodland after extensive consultation between Union Carbide (a major plant employer), AEC and MSI. With only a few exceptions, however, most black Oak Ridgers lived in Scarboro and the neighborhood continues to be predominantly black today. (see Map Four, Oak Ridge 1952)

When it was constructed, Scarboro appeared to be equal to, and separated from, the new white neighborhood of Woodland. The same house plans were used in both neighborhoods. Significantly, there were only fifteen single family homes constructed in Scarboro, and 143 duplexes. By 1970, there were 111 single family homes and only 25 duplexes, reflecting both new construction and renovation of the original duplexes.

Incorporation

Before the community was transferred to AEC, Army officials investigated appropriate options for status of the new city. Under Tennessee State Law at the time, application for incorporation had to be made by one hundred property-owners. Because Oak Ridge was located in a restricted military area and was fully owned by the federal government, Oak Ridge was not eligible for incorporation. There were no private land-owners, nor was there any planned provision for future ownership of property. The Army concluded that the community should remain under federal control, operating as a federal district, similar to the District of Columbia.

The move towards incorporation began in 1947, when AEC took over the administration of the community and encouraged incorporation by commissioning a Master Plan for the community to be drawn up by SOM. AEC hired John C. Treadwell and George Goldstein, consultants from Chicago, to conduct an appraisal and evaluation of the town in 1948. After surveying the community's resources, they offered several suggestions for incorporation. After living under the thumb of the federal government for so long, Oak Ridgers were certainly eager for independence, yet tentative about the new responsibilities (and taxes) that accompanied incorporation. Under Tennessee

law in 1953, there were only two forms of city government, a council/alderman form or a manager/council form. Neither form was deemed acceptable. Thus the first vote to incorporate failed in 1953.

The biggest push for incorporation came in 1955 with Public Law 221, the Oak Ridge Disposal Bill. Under this law, AEC was permitted to sell the houses and lands in Oak Ridge and to give the town its municipal facilities, with the condition that the city incorporate and all transactions made complete by August 4, 1960. If the community did not incorporate, it would have become charterless and dependent on Anderson and Roane Counties for its public administration. Oak Ridge stood to loose its schools (including the brand new $3.5 million high school), public buildings, streets, sewers, utilities, and waterworks to the counties.

So, to encourage incorporation, houses were offered for sale beginning in 1956 and by 1958, all of the houses in the city were privately-owned, and the city was ready to be incorporated. By 1959, nearly 100% of the city's residents owned their homes, more than in any other city in the country. Oak Ridge's Advisory Town Council (created in 1944 to advise the Army of community needs) devised a modified council/manager form of government which provided for precinct-type elections. This plan was accepted and the town incorporated in 1959. The plan has since become a state statute under which any community can choose to incorporate.

Incorporation pleased both the AEC and the citizens of the new town. Sam Sapirie, AEC's manager of Oak Ridge, expressed his relief to The Saturday Evening Post that "in the past the AEC manager has had to spend about ninety percent of his time on community problems, with only ten percent left for the production job. Now, thank goodness, it's the other way around." Oak Ridgers were no longer under the constraints of the government and finally had a say in the operation of the city.

Following the War, the Oak Ridge plants remained in operation to produce uranium for atomic weapons and nuclear power plants. Studies in biology, chemistry, physics, and many other areas of science are emphasized at the Oak Ridge facilities in addition to scientific and engineering roles in nuclear energy, Oak Ridge's plants are nationally known for their role in the development and production of atomic energy.

National and Exceptional Significance

Because Oak Ridge's significance has been achieved only within the last fifty years, district and individual properties within the boundaries of the city all meet criteria consideration G. They are all associated in some way with the Manhattan Project and are exceptionally important because of the impact of the Project on the outcome of World War II, as well as the subsequent development of atomic energy and research in related scientific fields.

The graphite reactor at X-10 was the world's first nuclear reactor and has been recognized for its importance to the Manhattan Project and to the development of atomic energy by NHL listing in 1966, and by various scientific and engineering societies. Post-war historical analysis has shown that Oak Ridge was a primary factor in the development of atomic power during the war. Oak Ridge was also important after the war as a center for scientific research in the fields of biology, chemistry and physics, as well the new fields of nuclear medicine and radiation technology. The city shares this distinction with its sister cities of Los Alamos, New Mexico, and Richland, Washington.

The planning of the "atomic cities" has not been treated with the scholarly attention given to their scientific and technological roles in the Project. As recently as 1981, Oak Ridge was the only one of the three that had been given any scholarly attention, in Jackson's and Johnson's City Behind A Fence. Oak Ridge is known to have been the most complex site and the first of the three cities to be constructed. Both during and after the war, it was the anonymous home to some of the greatest scientific and engineering figures of the twentieth century.

The ability of the Army and the federal government to coordinate and work with private firms on such a large-scale and secretive project in so short a time (less than three years) was unprecedented in the United States. Relatively new building methods and materials were used to construct a massive industrial complex and townsite according to the innovative plans of Skidmore, Owings, and Merrill. The firm of Stone and Webster also made important contributions to the construction of the community. The federal government worked closely with private firms, such as Roane-Anderson to provide needed services on the townsite, and Tennessee Eastman and Carbide and Carbon to operate the plants.

Post-war operations of the site continued in a similar manner, with Roane-Anderson and other private firms overseeing the "disposal" of Oak Ridge. Security around the townsite itself was relaxed in 1949. Houses were released for sale in 1956 in preparation for incorporation in 1959. The federal government relinquished control over the townsite to the citizens of the new city, but retained ownership of the plant sites. The "city fathers" showed foresight by including the entire reservation (with the plants) within the boundaries of the city.

The cities of Richland and Los Alamos have not been surveyed by their respective State Historic Preservation Offices, although discussions with the SHPOs indicate that Oak Ridge is probably more intact than its sister cities. Oak Ridge displays a large degree of integrity in housing and in its plan. Because of this high degree of integrity, the city's close association with the Manhattan project, and the unique way in which it was constructed and operated, Oak Ridge is nationally significant.

Several nominated properties are not located in either of the districts because they are either too far removed from the city proper, or because they are separated from the districts by non-contributing properties or by new development. Still, they are historically associated with the town and the Manhattan Project. These properties are also nationally significant and have achieved significance within the last fifty years. For example, the checking stations were important factors (representing security) in the plan of the town and their locations separating the townsite and the plant sites is important. Pre-WWII buildings, some in remote areas of the reservation, were incorporated into the operating plan of the town. New Bethel Church was used as a planning office during the construction of the graphite reactor; the Brannon house served as a residence and headquarters for General Leslie Groves, the commander of the Project; and Freels Cabin was preserved and used for recreational purposes by the Army, the Atomic Energy Commission, and now by the Department of Energy. Because of their specific historic associations with and adaptation for use during the Manhattan Project, these properties are being nominated as nationally significant.

Other pre-war buildings, like the J.B. Jones House and the George Jones Memorial Baptist Church were used only until they were condemned and purchased by the government. It is not known, or it has not as yet been documented, whether the buildings were used in connection with the Project. In any case, they were preserved and maintained and today they represent some of the last traces of pre-war life in the valley. In local context, they have exceptional significance as examples of settlement and social pattern in the Clinch River valley up until 1942, when the region was dramatically altered by the presence of the Army and the federal government. Although 181 pre-WWII buildings were utilized during the war as dwellings, nearly all were so poorly equipped with modern conveniences (like electricity and indoor plumbing) that they were demolished after the end of the war. The buildings that are included in the nomination are the last pre-war buildings that retain enough integrity to be individually nominated to the National Register.

F. Associated Property Types

I. Name of Property Type Pre- World War II Buildings; ca. 1800 - 1942

II. Description

III. Significance

IV. Registration Requirements

☒ See continuation sheet

☒ See continuation sheet for additional property types

G. Summary of Identification and Evaluation Methods

Discuss the methods used in developing the multiple property listing.

[X] See continuation sheet

H. Major Bibliographical References

[X] See continuation sheet

Primary location of additional documentation:

- [X] State historic preservation office
- [ ] Other State agency
- [ ] Federal agency
- [ ] Local government
- [ ] University
- [ ] Other

Specify repository: Tennessee Historical Commission

I. Form Prepared By

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OUTLINE OF PROPERTY TYPES

I. PRE-WORLD WAR II BUILDINGS, ca. 1840 - 1942

II. WAR-TIME RESERVATION BUILDINGS, 1942 - 1945
- a. War-time Housing, 1942-1945
- b. Commercial and Public Buildings, 1942-1945
- c. Schools, 1942-1945
- d. Churches, 1942-1945
- e. Industrial Buildings, 1942-1945

III. POST-WAR RESERVATION BUILDINGS, 1945 - 1959
- a. Post-War Housing, 1945-1959
- b. Commercial and Public Buildings, 1945-1959
- c. Schools, 1945-1959
- d. Churches, 1945-1959
- e. Industrial Buildings, 1945-1959
- f. Security Buildings, 1945-1959

I. PRE-WORLD WAR II BUILDINGS, ca. 1840 - 1942

DESCRIPTION

There are only three extant pre-World War II dwellings known to exist in Oak Ridge: The Freels Cabin, the J.B. Jones house and a bungalow close to the former Elza community. Freels Cabin is located on Freels Bend, southeast of Y-12, overlooking the Clinch River. The cabin was included in George Fielder's 1974 survey of the federal areas for the Oak Ridge National Laboratory. The dwelling is constructed of two separate cabins that were joined in the mid-1800s. When the two log pens were joined, they were built to share a central stone chimney. Freels Cabin is the only 19th century dwelling remaining in the city limits of Oak Ridge. (see Map Five, Oak Ridge Historic Sites)

The J.B. Jones house is a one-and-one-half story three-bay frame bungalow built ca. 1920 on Old Edgemoor Road across from the Bull Run Steam Plant. The house was built in a rectangular plan and has a brick foundation, gable roof of asphalt singles, and weatherboard siding. The Brannon house is on the far east end of Oak Ridge Turnpike, barely inside the city limit. The house is a four-bay, one-story stone bungalow with a gable roof that was built in 1941 by Owen Hackworth. These houses were acquired by the government in 1943 and were used for on-site housing during World War II. General Leslie Groves, the commander of the entire Manhattan Project, resided in the house and kept his headquarters there until the administration buildings were completed in Oak Ridge.

There are two churches that pre-date the construction of Oak Ridge: the George Jones Memorial Baptist Church and the New Bethel Baptist Church.

George Jones Church served the Roane County community of Wheat and was built in 1904 on land donated by the Reverend George Jones. The church is a frame, gable-front, three-bay building with weatherboard siding on a stone and brick foundation. New Bethel Baptist Church is on Bethel Valley Road and served the Scarboro community. This building is also a frame, gable-front, three-bay church built in 1924. The church has weatherboard siding and rests on a poured concrete foundation. There is a large cemetery located directly behind the church.

No other church, public building, commercial building, or industrial building constructed prior to 1942 is known to exist within Oak Ridge. Numerous historic and pre-historic archaeological sites have been surveyed in Oak Ridge during the past two decades but these sites are not included in this nomination. All three dwellings and the two churches are being nominated individually to the National Register.

SIGNIFICANCE

Pre-war buildings are significant as representatives of early settlement in the Roane and Anderson Counties. The counties were formed in the early nineteenth century and were sparsely populated until 1942. The pre-war buildings reflect the rural character that made the area attractive to Army officials looking for isolation in which to locate the Manhattan Project.

Freels Cabin is significant under criterion A for its association with the early settlement of the Oak Ridge valley. The cabin is the only remaining dwelling in Oak Ridge from the 19th century and is representative of log structures from this period, therefore making it eligible under criterion C. The building has not been significantly altered and retains its original architectural character. The building qualifies under criteria consideration G because of its continued use by the Atomic Energy Commission (AEC) and its successor, the Department of Energy (DOE). The cabin has been used as a recreation area for plant employees and as an educational center for local schools.

Both the J.B. Jones House and the Luther Brannon House are significant under criterion A for their associations with 20th century settlement in the Oak Ridge Valley. The J.B. Jones House was built with Bungalow influences and is the only remaining early 20th century farmstead extant on the reservation. In addition to the main residence an original barn also exists on the property. The house was purchased by the Anderson County Board of Education in 1956, when Oak Ridge properties were released by AEC for sale. The school has served as a recreational and educational center for the Daniel Arthur Rehabilitation Center and for the Girl Scouts.

The Luther Brannon House was built in 1941 and was one of the most modern structures in the valley when purchased by the federal government. Built near the community of Elza, the house is the only extant residence associated with

the original valley settlements. The house is significant under criterion A for its association with the early development of the Manhattan Project, and under criterion B for its association with General Leslie R. Groves, the commander of the Manhattan Project. The house is eligible under criteria consideration G because its significance has been achieved within the last fifty years, notably in 1942-1943.

The George Jones Memorial Baptist Church and New Bethel Baptist Church are also significant under criterion A because they are representative of the settlement patterns and social structure of rural communities in the Clinch River valley from the early nineteenth century to 1942. Originally located at the center of the Wheat and Scarboro communities respectively, they reflect early settlement patterns that remained intact throughout the nineteenth century and well into the twentieth century. These churches represent the only existing religious structures from the pre-war period and are typical of the frame, gable-front, vernacular churches used for worship by valley residents. Both buildings retain their original design and detailing and have not been extensively altered. The churches are eligible under criteria consideration G because it was not until 1942 that they were closed by the government. Wheat Church is opened one day a year for community homecomings. New Bethel Church served housed planning offices during the construction of the graphite reactor (X-10) directly across the road. The church is currently under renovation (directed by DOE)and will open as an interpretive center and museum in 1992.

REGISTRATION REQUIREMENTS

Dwellings, Religious, Commercial, Educational, and Public buildings from the 19th and early 20th century may be individually eligible if they meet one or more of the following requirements:

1) Dwellings should retain their original form on all but the rear facades, retain original roof forms, fenestration, chimney placement, and integrity of materials. Outbuildings may also contribute to a site if they were built during the period of significance and have sufficient architectural design and detailing to identify them of this period.

Religious, Commercial, Educational, and Public Buildings should retain their original form on all but the rear facades, retain original roof forms, fenestration, integrity of materials, and site and setting. While original interior features are significant elements of a property's character, their retention is not mandatory if the majority of exterior detailing and form is intact.

2) They are associated with individuals or patterns of growth and development of particular importance in the county. For religious buildings this may include buildings of particular importance in the history of a congregation or buildings which are representative of houses of worship built in Oak Ridge

before World War II. For commercial buildings this may include buildings associated with an individual, business, or patterns of growth and development or particular importance to the area. For educational buildings, properties may be eligible if they are associated with the growth and development of the public school system of the 19th and early 20th century. Public buildings may be eligible if they are associated with local, county, or state governmental functions or with social organizations of particular importance to the county. All nominated properties for this property type and for the following property types meet the registration requirements.

II. WAR-TIME RESERVATION BUILDINGS, 1942 - 1945

DESCRIPTION

a. War-Time Housing, 1942-1945

The location of the different house types in Oak Ridge represents many phases of construction. These phases are not distinct, but concurrent. The first phase began in early 1943 with the construction of three thousand cemesto houses between California and Pennsylvania Avenues. Also included in this phase were fourteen dormitories, three apartment buildings, nearly one thousand hutments, and over one thousand trailers. As population estimates expanded, construction became more frenzied. By the summer of 1943, four thousand additional houses, fifty-five dorms, two thousand trailers, five hundred hutments and forty-two barracks were constructed. A final phase that included the addition of thirteen hundred family units, twenty dorms, and seven hundred trailers commenced in early 1945. There is no period of demarcation separating the phases of construction. The townsite was in a perpetual state of flux from late 1942 when ground was first broken until well after the end of the war. (see map Two, Oak Ridge 1944)

Skidmore, Owings, and Merrill originally designed five house types, designated A, B, C, D, and E, all constructed of cemesto. Three more cemesto designs, F, G,and H, were added before the first phase of construction ended. Ultimately, nearly 3000 cemesto houses were constructed. All A, B, C, D, and E cemestos are located on the east end of the original townsite between California and Pennsylvania Avenues. 53 cemesto F-houses are scattered throughout the original townsite. An additional 40 cemesto G-houses and 10 H-houses of cemesto are located in a small neighborhood east of California Avenue. The F, G, and H houses were added in late 1943, after the initial phase of development was completed. The lots range from one-fifth acre to one-half acre in size with the houses sited with the kitchen nearest to the street to facilitate utility hook-up and coal delivery. None of the cemesto homes were built with basements, although almost all have had basements added. A single house took only two hours to build, and with work crews performing specialized tasks, one house was completed every thirty minutes. Thirty to forty houses were being occupied daily. All of the single family homes that were built in the initial phase of construction are of cemesto. They were better built than other house-types constructed during the war and were expected to have a life-span of twenty-five years.

With the exception of the multi-family E-houses, each of the cemesto dwellings (A, B, C, D, F, G, and H) is a one-story frame structure on a concrete block foundation with cemesto board siding and Celo-Rok roofing. Celo-Rok is similar to rolled asphalt. Interior partitions and ceilings are of painted gypsum board over wood studs. Floors are hardwood over wood sub-flooring, with linoleum over the kitchen and bathroom floors, and a concrete floor in the utility room. Original doors are paneled wood in a wood

frame and casement windows are also of wood. Picture windows in A, B, G, and H houses have one fixed light flanked by casement windows on either side. All units have an open porch with a simple wood railing and ladder trellis. The porches are located on the front facade, which often faces away from the street. Each unit was originally heated with a coal-fired, thermostatically controlled, hot air furnace. Of the original 2617 cemesto homes built, 2453 (94%) remain standing; 2174 (89%) of those are contributing.

A and B houses are most likely to have been altered because they are the smallest of the cemestos. Almost all the C-houses retain their original floor plans and designs. The most common alteration to the D-house has been the extension of the recessed entry. Almost all of the E-houses that are still standing retain original cemesto siding but have had a brick veneer applied to the lower sections of the front facades.

The neighborhoods located on the west end of the original townsite, between Pennsylvania and Louisiana Avenues, are made up for the most part of multi-family units and temporary dwelling units (TDUs), and TVA flattop designs (designated RB-1, RC-1). The TDUs were dismantled from projects of the Federal Public Housing Authority as far away as La Ponte, Indiana. They are of frame construction and originally had siding of wood or composition shingles. Many houses retain their original siding materials. These houses represent the second phase of construction.

Three house-types were borrowed from regional Tennessee Valley Authority projects. The prefabricated A-6, B-1, and C-1 houses were designed by TVA architects to house construction crews at TVA projects during the Depression. The TVA houses were prefabricated and constructed of plywood glued to wood frames. There are no A-6 houses remaining in the community today. The A-6's were located between California Avenue and East Drive. They were all in such a dilapidated condition after the war that all were removed by 1960 and replaced by privately built homes. B-1 and C-1 (also designated RB-1 and RC-1) dwellings are located on Outer Drive, west of Highland View School (Now the Children's Museum) almost to Louisiana Avenue. It is not known how many TVA houses were constructed. 230 RB-1's and 98 RC-1's were surveyed. A large number of the RB-1's and RC-1's were refurbished after they war and as a result, have exceeded their original life expectancies of six years.

Also in the Highland View neighborhood are the temporary dwelling units (TDUs). TDUs included the standard multi-unit TDU and the two-unit T and U houses. These temporary units were built with a life expectancy of eight years. All are one-story, multi-family frame units on concrete footings with siding of either wood or composition shingles. The interior partitions and ceilings are of plywood and gypsum board. Heat was provided by a coal-fired space heater or a coal-fired hot air furnace. All were furnished with an electric range and electric water heater. Almost none of the houses have had basements added. The T's and U's are located throughout the neighborhoods west of Pennsylvania Avenue to Louisiana Avenue. There are 554 temporary

dwellings standing on the west end of town. They remain for the most part in original condition. Some TVA houses have been clad with aluminum siding, and some have basements, but few have been extensively altered since they were refurbished in 1947.

One-hundred and nine multi-family frame K and L houses are located throughout the Highland View neighborhood. Neither the K-unit nor the L- unit are built of cemesto. They are of frame construction on foundations of concrete block on concrete footings. The exterior walls are wood siding over gypsum board sheathing. The interior walls are also gypsum board with sound-deadening insulation. The deck-type roof is clad with two-ply felt and two-ply composition over wood sheathing. An interior chimney rises from the middle of the roof.

In addition to the single-and multi-family dwelling units, there are two types of apartment buildings: A and N. There are three Type A efficiency apartment buildings with exterior walls of asbestos cement fiber-board on a wood frame. The foundation is of concrete block on concrete footings and the roof is mineral surfaced composition over insulation board and wood sheathing. Fifteen Type N apartments are located in the Highland View neighborhood, most in poor condition. These two-story buildings have foundations of concrete block and exterior walls of wood siding over a wood frame. Each building contains twelve apartment units. The apartments were originally heated by radiators supplied from centrally-located coal-fired boilers.

The cemesto family units, apartments and even the temporary and TVA structures were built on a semi-permanent basis. In fact, most of the TDUs remain standing nearly fifty years after they were built. The temporary houses were refurbished after the war to extend their life expectancy. Military and civilian personnel were lodged in "permanent" and semi-permanent housing. Over 31,000 clerical workers, wage laborers, service and maintenance personnel, however, lived in less accommodating and sometimes sub-standard conditions: the Victory Cottages, hutments and trailers. Most single men and women, or those whose spouses did not join them in Oak Ridge, lived in dormitories that were segregated by gender and race. A few people lived in barracks until they were assigned more permanent quarters. Of the Victory Cottages, hutments, trailers, dormitories and barracks, only two dormitories remain standing. The less substantial structures were torn down immediately following the end of the war.

The hutments were by far the cheapest and most uncomfortable accommodations on the reservation. They were constructed of plywood and had pyramidal roofs. Each 16′ by 16′ hutment contained four to six beds and a coal stove for heat. The Victory Cottage was a prefabricated two-family hutment with roll roofing on a flat roof. There was no glass in the window openings and no indoor plumbing. Bathhouses were constructed in the hutment areas with each one serving thirty-six hutments. The bathhouses were segregated by race and by

sex. The white hutment area, for white men only, was located south of the Turnpike, where the Library and Civic Center are presently located. White women were never assigned to live in the hutments. A "Colored Hutment Area" was located further south, on Scarboro Road. The hutments were built to last only three years and all were removed between 1946 and 1950.

Thousands of trailers had been borrowed from the Federal Public Housing Authority for use as temporary housing during the war. Trailer camps were located in the Midtown area bounded by the Turnpike and what is now South Illinois Avenue on the north and south, and Scarboro Road and Gamble Valley Road on the east and west. Four trailer camps and the white hutment area were served by Fairview School, the Middletown Center, a cafeteria and a recreation hall. Because these buildings were of temporary construction, they were all removed after the war.

Dormitories in Oak Ridge were built in an H-plan or an S-plan and were designed by Stone and Webster Engineering Corporation, the general construction contractors for the project. Over 13,000 people lived in 93 dormitories that were concentrated in five locations throughout the reservation. Two to four people lived in each room.

A barracks area was located east of Scarboro Road, where the Downtown Shopping Center was later built. Field research yielded no photographic or written description of the barracks.

Because the properties were rented from the government, residents were not allowed to make exterior or interior alterations until after the war, when the Atomic Energy Commission (AEC) permitted residents to paint the exteriors of the houses. It was not until the mid-1950s, after residents were permitted to purchase their homes that extensive changes to the residences took place. Basements were added to many cemesto homes and to a few of the temporary TVA flattops. Other alterations included lateral or rear additions for additional space, attached and detached carports, and detached garages.

The most common alteration to the residences has been the addition of a variety of siding materials to the exterior walls. Although some homeowners retained the original cemesto siding, many covered the cemesto with steel or aluminum siding in the 1950s and 1960s. Brick and stone veneer was also common and used to provide individual touches to the residences. In the late 1950s AEC encouraged property owners to make these exterior changes to provide variety and diversity in the town's appearance. Approximately 20% of the cemesto homes retain their original cemesto siding.

b. Commercial and Public Buildings, 1942 - 1945

Only three of the original commercial areas that were built during the war remain close to their original condition and retain integrity: Jackson Square, Ogden Center, and Elm Grove Center. These neighborhood centers

the Oak Ridge Children's Museum. Glenwood School was designed with a large central section and adjacent lateral wings. The original building is one-story in height, of frame construction and rests on a concrete foundation. The classrooms have exterior doors as well as interior hallway entrances.

d. Churches, 1942 - 1945

Only three churches were built by the Army during the war years: Chapel-on-the-Hill near the Guest House, East Chapel in East Village, and West Chapel on the west end. West Chapel burned in the 1950s, but the other two remain in use. Both the Chapel-on-the-Hill and East Chapel are standard "700 Series" chapels built by the Army Corps of Engineers. This chapel design is a one-story, gable-front, wood frame building with weatherboard wood siding and a concrete foundation. Each building has three bays on the primary and rear facades and five bays on the secondary facades. The primary facades have gabled entry porches supported by double square columns. Entrances have wood doors and transoms and windows are six-over-six rectangular wood sash. There is a round attic window in the gable field on the primary facade. A steeple rises from the crest of the roofs above the entrance. Both churches are oriented with the front of the building facing east.

e. Industrial Buildings, 1942 - 1945

The industrial complexes at Oak Ridge, K-25,X-10, and Y-12, are not included in either of the district nominations. They will therefore be described in more detail than other property types.

Industrial buildings at Oak Ridge are concentrated at three separate plant sites which are known as K-25, Y-12, and X-10. The K-25 plant is located on the western edge of Oak Ridge adjacent to the Clinch River. Y-12 is located to the south of the residential section of Oak Ridge in a valley between Pine Ridge and Chestnut Ridge on Bear Creek Road. The X-10 plant is located in south southwest section of the community in a valley between Haw Ridge and Chestnut Ridge on Bethel Valley Road. The plants were located away from each other and between ridges for security and safety reasons.

The separation of uranium through gaseous diffusion took place at K-25. The process of gaseous diffusion was developed expressly for the purpose of manufacturing an atomic weapon. Construction of the main plant began in September of 1943 and the plant was designed by the Kellex Corporation, a unit of M.W. Kellogg Corporation, of New York City. The chief construction contractor was the J.A. Jones Construction Company of Charlotte, North Carolina. The first four units began operating seventeen months after construction began. The main gaseous diffusion plant is U-shaped and covers 44 acres. Each side of the building is 2450 feet long and averages 400 feet wide. At one time, K-25 was the largest building under one roof in the world. A smaller, 1/4 size gaseous diffusion plant is nearby. The plant area

contains an additional 70 buildings. The original buildings are of reinforced concrete to the main floor with steel frame and cemesto siding to the roof. A third processing plant was completed in 1951 at a cost of $65,000,000.

Y-12 was another uranium processing plant. The electromagnetic process is the ionization of uranium particles and the acceleration of these particles in a mass spectrometer at a velocity close to the speed of light. The stream of particles is bent by an electromagnet in an almost absolute vacuum. U-235 separates from U-238 in an arc that has a greater radius and is thus "captured" and stored. Stone and Webster designed and built the Y-12 plant and production began in January, 1944. The plant was operated by Tennessee Eastman Corporation, a subsidiary of Eastman Kodak. The original plant contained 170 buildings and covered 500 acres. The electromagnetic plant was the first and only of its kind in the world.

The pumps needed to create the nearly perfect vacuum for the electromagnetic separation were of a higher speed and lower pressure than any previously developed. The vacuum produced by the pumps was 30,000,000 times that commonly used in power plants. The magnets used were nearly 100 times larger than any magnet previously built. They were 230 feet long and were so strong that the pull on the nails in shoes made it difficult for workers to walk. 14,000 tons, or $400,000,000 worth of silver was borrowed from the U.S. Treasury to replace unavailable copper needed for the many magnets. Stone and Webster designed and built the Y-12 plant at a cost of $427,000,000. Production began in January, 1944, and the plant was operated by Tennessee Eastman Corporation, a subsidiary of Eastman Kodak. The original plant contained 170 buildings and covered 500 acres. The electromagnetic plant was the first and only of its kind in the world. There was no time even to construct a pilot plant that could test the methods of electromagnetic separation, making Y-12 one of the biggest gambles in history. The equipment was manufactured by General Electric, Westinghouse, and Allis-Chalmers. The enormous amount of electricity required for the operation of the plant was produced by TVA. The materials required to build the plant included 275,000 cubic yards of concrete and 37,562,000 board feet of lumber.

Built by E.I. Dupont de Nemours and Company in 1943, the graphite reactor at X-10 was the prototype for the huge plutonium processing plant that was later built at Hanford, Washington. X-10 was the location of the first plutonium-producing graphite reactor in the world, becoming operational November 5, 1943. The plant is made up of over 150 buildings, including three chemistry buildings, a technical laboratory, a pile building, a physics lab, a power house, an electrical instrument development building, machine shop and research development shops, a lead shop, a medical building and several administration buildings and warehouses. The graphite reactor was listed on the National Register in 1965.

The construction cost of the plant was $13,000,000. Operation of the plant was supervised by the University of Chicago until July 1, 1945, when the

Monsanto Chemical Company took over operations as a research center. Carbide and Carbon Chemicals Corporations (Union Carbide Corporation) operated the plant beginning March 1, 1948, and the site name was changed to the Oak Ridge National Laboratory. Operations are presently managed by Martin Marietta Energy Systems. The Lab is made up of over 150 buildings, including three chemistry buildings, a technical laboratory, a pile building,a physics lab, a power house, an electrical instrument development building, machine shop and research development shops, a lead shop, a medical building and several administration buildings and warehouses.

Since the construction of the plants there have been numerous additions and alterations to the original buildings and many other buildings have been built in recent decades at each plant site. Due to security considerations an accurate number of original buildings at each plant site is not available nor has there been access to ascertain the integrity of remaining original buildings. Former plant workers have provided information on buildings from these years which may retain sufficient integrity to meet National Register criteria. These buildings are: the original K-25 building; and Buildings 9731 and 9204-3 at the Y-12 plant.

SIGNIFICANCE

Oak Ridge is significant under Criterion A because of its association with the top secret Manhattan Project during World War II. The buildings in the original townsite are significant under Criterion C because they are distinct in design, materials, and methods of construction, and because they represent the work of Louis Skidmore, Nathaniel Owings, and John Merrill, three of the most prominent 20th century American architects. War-time buildings meet criteria consideration G as properties that have achieved significance within the last fifty years. Churches built by the Army on the townsite qualify under consideration A because they are significant in context with the planning and development of the townsite.

The development and construction of Oak Ridge is unprecedented in America's history. Never before had the federal government attempted to build industrial plants as complex or costly as those at Oak Ridge. "The mighty scale of the works at Clinton...is a measure of the desperation of the United States to protect itself from the most serious potential threat to its sovereignty it had yet confronted..." (Rhoades, 500). The requirements for housing and commercial services for workers at the plants were also at a scale never before attempted in the country. Although designed to be temporary, the community plan and much of the original housing and commercial areas retain their integrity after fifty years. This integrity reflects the vision and innovations of the federal government, and of the community's designers and builders.

Architecture

The Army did not intend to create a permanent facility at the CEW. The Manhattan Project was projected to last only for the duration of the war. Consequently, many of the buildings at all three sites were of temporary construction. Richland was made up of tents and Army barracks, while Los Alamos was characterized by dormitories, barracks, and temporary prefabricated houses. The Army's wishes to create a livable town at its largest facility (CEW) is reflected in the hiring of Skidmore, Owings, and Merrill to design and plan the city.

Of the three communities developed as part of the Manhattan project, Oak Ridge retains the greatest number of original buildings and integrity of design. The government facilities at Hanford and Los Alamos were smaller in scale and many of the buildings were of temporary construction. About three hundred buildings were constructed at Los Alamos during World War II and many of these were replaced after 1945. In Richland, several thousand buildings were constructed during the war on an impromptu plan by the Army Corps of Engineers, but an overall master plan for the community was not developed until 1948, by Graham, Anderson, Probst, and White. Many of the buildings in Richland were of temporary construction and were razed or have been extremely altered since the war. Neither Los Alamos nor Richland has been surveyed or nominated to the National Register.

Oak Ridge was SOM's first large-scale contract for the federal government. The firm was chosen because of its association with the Pierce Foundation of New York, who had been developing prefabricated house designs using cemesto. The cemesto houses in Oak Ridge were drawn from the SOM-Pierce collaboration. The designs of the houses in Oak Ridge are significant because they were not based upon any historic precedent. The houses are instead, early representatives of the ranch houses that dominated suburban architectural design after the end of the war. SOM's work at the Chicago World's Fair in 1933 and the New York fair in 1939 gave the firm the experience it needed to take on a large project like Oak Ridge. The Oak Ridge project led to other government work, notably the Air Force Academy Chapel (1955-1959), and helped to establish SOM as one of the premier design firms in post-war American architecture. The firm later achieved notoriety for designing the John Hancock Building and the Sears Tower, both in Chicago. The founders of the firm, notably Louis Skidmore and John Merrill, were actively involved with the Oak Ridge project. John Merrill headed a branch office in Oak Ridge created especially to deal with the project.

The properties in Oak Ridge are architecturally significant because they are well preserved examples of a particular architectural design and retain their forms, methods of construction, and integrity of site and setting. Time constraints and wartime materials shortages required that SOM create prefabricated house designs that could be constructed quickly and efficiently using newly-developed materials. The use of prefabrication in building construction had existed for many years but Oak Ridge, under tremendous time and material limitations, is the most extensive example of this type of

construction in the country. Innovations in building materials in the 1930s allowed for greater speed and flexibility in construction techniques. The use of cemesto and other products at Oak Ridge demonstrated the practicality of these techniques - techniques which became widespread for building construction in the post-war years. The houses have changed little in fifty years and have integrity of design. Approximately 20% retain their cemesto siding. Because the houses were so compactly constructed in the community, there has been little room for modern intrusions and as a result the neighborhoods possess integrity of feeling as well as setting.

Community Planning and Development

Oak Ridge is significant under criterion A for its innovations in community planning and development. The details in the original SOM plan of the townsite indicate the efficiency of its design. The original plan of Oak Ridge by SOM was innovative in scope, relationship with the topography, and emphasis on individual neighborhoods. In addition to the town plan itself, SOM planned the functional requirements of the city with attention to everyday details. The success of the SOM plan has been recognized as a significant achievement in American planning. The creation of Oak Ridge had a major effect on the growth and development of Anderson and Roane Counties and transformed a rural farming area into an important national industrial and scientific center.

It is important to realize that in addition to the layout of the town, SOM designed an entire system of living on the townsite. Apart from designing the buildings, the firm incorporated all aspects of the operation of the townsite into the design plan. Roane-Anderson Company was created in October 1943 as a subsidiary management firm of Turner Construction Company, with whom the Army had worked before. Roane-Anderson operated all reservation facilities including the cafeterias, laundries, bus systems, hospital, police, and fire departments. It was responsible for custodial service of public buildings, dormitories, and warehouses; garbage collection, housing assignment and maintenance, negotiation of and management of commercial contracts, and maintenance of stables for the guards' horses.

The creation of TVA and the Manhattan Project are the two most important contributors to the modernization of the Clinch River Valley. TVA introduced electricity to the area and the Manhattan Project introduced industry and technology. The most immediate effect, however, of Oak Ridge on the surrounding area was economic. Retail sales in Anderson County rose 851%, from $3.1 million to $29.7 million, between 1939 and 1948. The increase in retail, of course, meant an increase in revenues from the state sales tax. The nearby towns of Oliver Springs, Clinton, Kingston, and Harriman supplied nearly 3000 workers who generated a payroll of more than $15 million. Another $14 million was paid to 3000 Knoxvillians who worked at the Oak Ridge facilities. New houses and new businesses were spawned by the demand created by the influx of 81,000 workers. Oak Ridge transformed the area from a

sparsely populated valley dependent upon a static agrarian economy to an industrial and technological corridor.

Engineering and Industry

A scientific endeavor with the magnitude of the Manhattan Project has never before been attempted. The monumental scale of the project reflects not only the desperation of the country to protects itself at all costs from any foreign threat, but also the ambition of the nation to be the first and only government in the world to possess atomic technology.

The industrial buildings at Oak Ridge are significant under criterion A for their role in the Manhattan Project and atomic energy. The processes for manufacturing fuel for the world's first atomic weapons led to important scientific, engineering and medical discoveries, and opened the door to the atomic age. The plants are significant in the areas of engineering, industry, invention, and science. The project has been called one of the greatest industrial achievements in our time. Largely theoretical and unproven processes were developed and used to create the world's first atomic bombs in less than two and a half years at a government expenditure of over two billion dollars in an international effort that brought science into the realm of warfare and diplomacy.

The significance of the Manhattan Project is borne out by the fact that the government spent billions of dollars to develop unproven and unknown processes and they did so under such a cape of secrecy that not even Vice-president Truman was aware of the project. The project has been called one the greatest industrial achievements of our time because in less than 2-1/2 years, the Manhattan Project went from the purely theoretical to the practical. The significance of Oak Ridge has been recognized by such organizations at the American Society of Mechanical Engineers and the American Nuclear Society.

Nothing like the gaseous diffusion plant (K-25) had ever been contemplated, much less built, and many people doubted that the process would even work. New processes and materials had to be developed to insure successful operation of the plant. A suitable material had to be found to use as a barrier in the separation process. Uranium in its gaseous form (uranium hexafluoride) is extremely corrosive and the material for the barriers had to be porous enough to separate the uranium without clogging or corroding. The corrosive nature of uranium hexafluoride also required that the pumps and many miles of pipes be sealed with a material other than the traditional grease, which is eaten away by uranium. A plastic seal material was developed to make the pumps gastight and greaseless and has since become known commercially as Teflon. A single pinhole leak anywhere in the miles and miles of pipes could upset the entire system. Concern for leaks at joints and seams led to the development of fourteen new welding techniques. A portable mass spectrometer was invented to serve as a leak detector. According to the Oak

Ridge handbook, first published by AEC in 1949, the estimated "time spent in research, development and the design of the pumps alone total 250,000 hours or the equivalent of one engineer working 100 years."

General Groves decided to build electromagnetic isotope separation plants at Oak Ridge because of the three processes considered, electromagnetic separation was the furthest developed. The plant at Y-12 became the first and only plant of its kind in the world; in the race for the bomb, there was not even time to build a pilot plant. When the ground was broken for the first building at Y-12 in February 1943, the process was not improved to the point of practical uranium production. The construction of the facility allowed the first unit to operate before the second was completed, and so on. As the units were built, they were improved upon and early units that had become obsolete were replaced. The process of electromagnetic separation required the production of pumps that could create a vacuum 30,000,000 times that commonly used in standard power plants. The magnets used in the process were 100 times larger than any magnets ever built, making it necessary to design tools that were non-magnetic.

The process of manufacturing plutonium from uranium was more dangerous than the other processes and required a separate reservation in Hanford, Washington. It was also for this reason that a pilot plant was built to test the process at Oak Ridge. The plant, a graphite reactor, was codenamed X-10 and in November 1943 it became the world's first uranium chain-reactor. This plant was the model for the huge plutonium production plant built at Hanford. The plutonium manufactured at Hanford was used in the second atomic bomb that was dropped on Nagasaki. The significance of the X-10 reactor was recognized in 1966 with its listing on the National Register and as a National Historic Landmark. Hanford's B Reactor was nominated in November, 1989 to the National Register.

Military History

The development of the world's first atomic bomb was an unprecedented experiment. Richard Rhoades comments in The Making of the Atomic Bomb that the monumental scale of the Manhattan Project reflected the desperation and ambition of the United States to "claim the prize" of atomic energy. Not only did the task envelope the combined work at laboratories in Canada, Great Britain, and throughout America, it more specifically involved the cooperation of the Army, the federal government and private industry. When the war had ended, the product of the Manhattan Project affirmed America's position as the world's first superpower.

Security is perhaps the most indelible characteristic of the city's past and of its association with the development of the first atomic bomb. The workers and residents were subjected to security measures that effectively deprived them of many of their civil rights. Individuals were not allowed to speak freely to anyone about the work they were doing. Every resident over the age

of nine was required to wear an identification badge. Neighbors were expected to notify authorities of anyone who appeared to be a security risk. The Federal Housing Administration noted in their 1956 appraisal: "History will record concealment from public notice of the Oak Ridge project as one of the world's greatest security achievements."

REGISTRATION REQUIREMENTS

All but one of the eligible residential, commercial and public buildings from the war years are located in the Oak Ridge Historic District. There is one war-time public building located in the Woodland-Scarboro Historic District that is subject to these requirements. These buildings may be considered contributing to the historic districts if they meet one or more of the following requirements:

1) If they retain sufficient integrity of plan and design to identify them as built between 1942 and 1945 and evoke feelings and associations of the era. Contributing properties should retain their original plan and form on the primary facade, original roof forms, the majority of original fenestration, chimney placement, and original lot orientation. Dwellings may also be eligible if additions on secondary facades are limited to no more than two rooms added laterally to the original dwelling and which are in keeping with the scale, character, and materials of the original dwelling. The addition of siding materials such as aluminum, vinyl, wood, and stone and brick veneers has been widespread and properties so altered shall not be considered non-contributing unless the application of these siding materials results in the loss of integrity of the original plan and design. The addition of exterior siding materials over the original cemesto was encouraged by the AEC and later by the city to provide for individuality and diversity along Oak Ridge's streets.

Outbuildings such as garages or storage sheds may also be considered contributing if they were built between 1942 and 1945 or if they were added to a site between 1945 and 1959 when Oak Ridge was under AEC control. Outbuildings may be contributing if they retain their original plan, form, and majority of original details and materials.

2) Commercial buildings may also be significant if they retain architectural integrity and are associated with an individual, business, or pattern of growth and development of particular importance to the community. These individuals may include residents prominent in commerce or who promoted significant commercial development in Oak Ridge. Public buildings may also be significant if they retain architectural integrity and are associated with federal government functions or with social organizations of particular importance to the community.

All industrial buildings in Oak Ridge are located outside the boundaries of the two historic districts. Industrial buildings at Oak Ridge may be

considered eligible for the National Register individually or as part of a complex if they meet the following requirements:

1) If they retain sufficient form, structural design, and exterior detailing to identify them as built in this period, and evoke feelings and associations of the era. These properties should maintain their original form, retain original roof forms, location of fenestration, and maintain their original site and setting.

2) If they are significant in the manufacture of fuel for the atomic bomb as part of the Manhattan project. These may include buildings which housed significant machinery used in the gaseous diffusion, electromagnetic, and graphite reactor processes. Significant buildings may also include those important in research and development and secondary buildings associated with the process of uranium separation by gaseous diffusion.

3) If they are significant for their engineering or construction techniques to facilitate the development of nuclear energy. These may include buildings which are unique in their construction methods or engineering.

4) Industrial areas may be eligible as historic districts if they retain concentrations of buildings built during the War years; if they were of significance in the nuclear fuel processes; and if the area possesses clear and definable boundaries.

III. POST-WAR RESERVATION BUILDINGS, 1945 - 1959

DESCRIPTION

a. Post War Housing, 1945 - 1959

Like the neighborhoods built during the war, Woodland and Scarboro were built quickly in accordance with SOM's Master Plan. As in the original town, the houses are at odd angles to the streets and to each other to provide tenants with some semblance of privacy. The lots are small, about one-fifth of an acre, and irregularly shaped resulting in densely populated neighborhoods.

Scarboro opened as a segregated neighborhood in 1950. The neighborhood consisted of 15 cinder block single-family units, 143 frame duplexes, and 7 dormitories. The one-story dormitories are constructed of concrete block and were planned so that they could easily be converted into two-room apartments. Houses in Woodland were opened to white occupants only. Both neighborhoods were constructed while the townsite was under the control of the newly-created Atomic Energy Commission (AEC). There was still an acute housing shortage in Oak Ridge and the announcement that operations at the site would continue in peacetime demanded the rapid construction of permanent single-family homes. (see Map Four, Oak Ridge 1952)

Defining characteristics of the AEC houses in Woodland and Scarboro are roof form and an absence of exterior decoration. AEC Models 15 through 24 are single-family and two-family houses of frame or concrete block construction with two to four bedrooms. All models rest on a concrete pad foundation and have composition roofing. Door frames are metal and the casement windows are also metal. Each single family unit has between 576 and 1084 square feet, depending upon the number of bedrooms. Models with similar characteristics were generally grouped together in sections of the neighborhood.

Apartment models 25-30 were also constructed in the Woodland area between Rutgers Avenue and North Purdue Avenue. The apartment building are constructed of brick on concrete block foundations and have flat roofs, with the exception of the gable roof on Model 30. Most of the apartment buildings have been removed, but there are a few original examples of Models 25, 26, and 27.

The AEC also built two Garden Apartment designs, Redwood and Southill, on the south side of the Turnpike, west of Illinois Avenue. The Redwood Apartments are of concrete and redwood on a concrete block foundation with a flat composition roof. Each unit has a carport and the two-bedroom units have a patio. The Southill Garden Apartments are two and three story concrete block walk-up apartment buildings on a concrete slab foundation with a composition roof. The facade is divided into four sections separated by stairs and porches or balconies. There are fixed metal windows in both designs.

Under the direction of the AEC, fifty new houses were built throughout the original townsite to replace deteriorating or temporary housing: Models 31, 32, 33, and 34. These models are modern in design, of frame construction with one or two stories, gable roofs, and siding of wood, asbestos shingle, or wood shingle.

In addition to constructing 3,242 new housing units, the AEC removed 4,577 temporary and dilapidated houses from the townsite. Private developers were permitted to lease the land and construct new houses under Title VIII and Title IX of the Federal Housing Act. The TVA flattops in East Village were replaced with such Title VIII houses. These houses are variations of a Ranch plan. They are all one-story, three-bay, frame residences on concrete foundations with gable roofs. Almost all have attached carports. Two styles have large six- or nine-light picture windows on the front facade. A third style is a gabled ell with a picture window. Original siding appears to have been composition or wood shingles and composition panels. Most have been reclad with aluminum siding.

The neighborhood located near Grove Center is a Title IX development. The houses in this neighborhood are different from any other in Oak Ridge because they do not look like they were built under government contract. The basic form resembles the Colonial Revival cottages that were popular immediately prior to World War II. Almost all are one story, two- or three-bay frame structures on concrete block foundations. Some of the houses have a front-gable wing in the facade with a picture window that is identical to those used in the cemesto houses: one fixed-light picture window with three-light stacked windows on either side. The houses that did not have the front gable had a flush picture window. Window and door frames are aluminum, and some window openings are shaded by metal awnings. Almost all are clad with aluminum or composition siding. Outbuildings include detached frame garages.

b. Commercial and Public Buildings, 1945 - 1959

No significant commercial building from this period was inventoried in Oak Ridge. The majority of commercial activities during these years continued to center on Jackson Square, Jefferson Square and the other commercial areas which were developed during the War years. Between 1945 and 1959 new commercial buildings were also constructed along the Oak Ridge Turnpike such as the Downtown Shopping Center. These buildings were primarily structures of concrete, brick, and metal and were built with minimal designs and detailing. Most of these buildings were in turn razed for buildings constructed after 1959 or have been significantly altered. The commercial areas along the Turnpike and adjacent streets and roads are not included in either historic district and no property appears to meet National Register criteria.

The only public buildings that were built between 1945 and 1959 were the union halls. The cafeterias, recreation centers, and health buildings

constructed during the war continued to serve their original purposes in these years.

Two union halls remain from the early 1950's when the labor unions were formed. The Oil, Chemical, and Atomic Workers Local #3-288 (OCAW) is on Raleigh Road behind Grove Center. It is a two-story brick structure on a concrete foundation built ca. 1952. There is a concrete belt course which extends around the building and on the primary facade is a brick pier with an aluminum canopy. The primary and secondary facades have one-over-one horizontal sash windows and other windows are five-light jalousie designs.

Local Union #270 of the International Brotherhood of Electrical Workers (IBEW) is housed in a two-story, five-course brick building built in 1954. There are casement windows in the secondary (east) facade. Primary facade window openings have structural glass blocks. The entrance doors are wood frame with glass lights. The gable roof is covered with asphalt shingles.

c. Schools, 1945 - 1959

With the growth of Oak Ridge in the 1950s, construction of new schools continued to meet increasing student enrollment. The school system was recognized as an independent part of the Anderson County School system and four major school buildings were constructed in the post-war years. Two of these, Willow Brook and Woodland, were elementary schools and a new Oak Ridge High School was also constructed. Willow Brook School was built in 1949, while Woodland was completed in 1950. Both buildings are one-story masonry structures and have been extensively remodeled in recent years. Due to the extensiveness of renovations both buildings are non-contributing to the historic districts.

Oak Ridge High School was built in 1951 and consists of 4 buildings arranged in two groups connected by a 265 foot enclosed glass corridor. The entire school is built of reinforced concrete with brick over masonry walls, concrete floor slabs with the second floor supported be open web steel bar joists and concrete block and pyrobar partitions. All buildings have aluminum projected windows, hollow metal frames, wood doors with extruded aluminum frames and wood doors and entrances. The circular E and F buildings were built in 1963. Recent renovations have been done to the interior of the building only, and some of the glass in the connecting corridor has been replaced by insulating panels.

Robertsville Junior High School was originally built in 1943 and essentially rebuilt in 1952. Construction in 1952 included four buildings and a gymnasium. Robertsville has the same characteristics of plan and design as the high school.

d. Churches, 1945 - 1959

In 1949, AEC began selling land to congregations so they could build their own churches. Thirty-two churches were built between 1951 and 1959. Some, like St. Stephen's Episcopal Church and First United Methodist Church, are constructed with historical influences. A few other designs follow architectural trends toward the Mission and Craftsman styles. Most, however, are simple and modern in design. The majority of churches from this period were built along Oak Ridge Turnpike and adjacent streets. Many are located within the boundaries of the Oak Ridge Historic District and are described fully in that nomination.

e. Industrial Buildings, 1945-1959

Post-War industrial buildings at Oak Ridge continued to be concentrated at the three separate plant sites known as K-25, Y-12, and X-10. Since the construction of the plants there have been numerous additions and alterations to the original buildings and many other buildings have been built in recent decades at each plant site. Due to security considerations an accurate number of buildings constructed between 1945 and 1959 at each plant site is not available nor has there been access to ascertain the integrity of remaining buildings from this period.

f. Security Buildings, 1945 - 1959

Security for Oak Ridge was a paramount concern during the war years and seven gates and three checking stations were built to monitor access to and from the reservation. The entire reservation of ninety-two square miles was originally protected by a guarded fence and the only entrances were through the gates and check points leading into the community. The gates were located on all roads leading from the reservation along the perimeter of the fence. The checking stations were located within the limits of the reservation and monitored access between the townsite and the plant areas. When the community was opened to the public in 1949, security around the townsite was relaxed while security at the plants was tightened. All of the gates and checking stations were removed in 1949 and replaced with checking stations located only at access roads to the plant areas. These checking stations are located at the perimeter of the townsite and were intended to monitor traffic into the plants. The Bethel Valley Road Checking Station monitored access to Y-12, but it is not included in the secured area of the complex. The Oak Ridge Turnpike Checking Station monitored traffic leaving the townsite and traveling to the gaseous diffusion plant. The Bethel Valley Road Checking Station monitored X-10 traffic.

Checking stations were placed at the west end on the Turnpike, on Scarboro Road close to Bear Creek Road, and at Bethel Valley Road, leading to X-10. They are identical structures of concrete block construction. The buildings are made up of a two-story tower with narrow horizontal openings that serve

as windows (or gun slots). The flat roof is topped by a large spotlight. Adjacent to the tower is a single-story, L-shape room. Original doors were of glass and metal frame design with a full length sidelight and transom. On the secondary facade were originally large window openings with concrete sills. The window openings in all of the checking stations have been covered with plywood and the original window configuration is unknown. The flat roof extends to form a recessed, L-shape porch supported by a single metal post at the exterior corner.

Across each road, opposite the main building is a small, closet-size, wood frame structure. During the war, these buildings were probably connected by a gate to the main building and used to check the vehicles that passed through.

SIGNIFICANCE

Community Planning and Development

The relinquishment of the community by the federal government to AEC held a special significance to Oak Ridge citizens because it indicated that the temporary community would continue to exist on a permanent basis. It also signified a transition from federal control to civilian control, an important matter in community made up mostly of civilians. In order to make the transition form a temporary government-operated community to a permanent (and someday) self-governing city, the AEC commissioned SOM to draw up a Master Plan for Oak Ridge.

Oak Ridge is significant under criterion A for its post-war innovations in planning and development. The formalization and expansion of the community's Master Plan was done in 1948 by SOM. This plan continued an expanded on the original innovative plan created by SOM in 1942. The adoption of SOM's Master Plan for Oak Ridge allowed the community to continue a policy of controlled growth. 1948 also marked the year that Richland, Washington, Oak Ridge's sister city, adopted a formal city plan. The Chicago firm of Graham, Anderson, Probst, and White created a plan adapted to the wartime layout of the town that was done by the Army Corps of Engineers. The master plans have been successfully implemented in both cities.

The post-war development represented a step towards permanence and normalization for the community of Oak Ridge. Officials considered removing the gates that surrounded the residential section of the reservation as early as 1946, but the city remained closed until 1949. When AEC assumed management of the reservation, it supported property ownership and incorporation. AEC began selling commercial land in 1949 and residents were permitted to purchase their homes beginning 1956. Mr. and Mrs. Luther Brannon were among the first six couples to purchase their homes (see individual nomination). The community became independent of federal control when Oak Ridge was incorporated in 1959.

Architecture

Oak Ridge's post-war residential buildings are significant under National Register criterion A because of their association with the growth and development of Oak Ridge while it was under the jurisdiction of the Atomic Energy Commission. They are significant under Criterion C because they are distinct in design, materials, and methods of construction. War-time commercial and public buildings continued in the same capacity after the war, thus there were few significant commercial/public building constructed after the war. The most significant additions to the town were two union halls, several churches, and thousands of new single-family homes in the new neighborhoods of Scarboro an Woodland. These neighborhoods were built for the primary purpose of alleviating the post-war housing shortage. Post-war buildings constructed before 1959 meet criteria consideration G as properties that have achieved significance within the last fifty years.

There are no significant commercial buildings that remain intact from the post-war period. The Downtown Shopping Center was built in 1952 and was one of the country's early covered shopping centers. However, it has lost its integrity through several remodelings and in 1990 was undergoing an extensive conversion to a modern shopping mall. There are a few other pre-1959 shopping centers, but they too, have lost much of their integrity. They are located on the east end of town or on the south side of the Turnpike, outside the borders of the proposed historic district.

Development of city public buildings did not occur until after Oak Ridge was incorporated in 1959. The post office and city offices were constructed in the early 1960s and the Civic Center and Public Library complex were not built until 1970. Oak Ridge High School and Robertsville Junior High School are the only unaltered school buildings remaining in Oak Ridge from the post-war period. Both schools are significant under criterion A for their association with the growth and development of the post-war school system in the city. Despite additions to both schools they retain their overall integrity of design.

Churches from this period in Oak Ridge are significant primarily under criterion A for their association with the growth and development of the city. The churches illustrate Oak Ridge's sense of community and permanence in the years following World War II. None of the churches appear to have particular architectural significance. The designs of the buildings are either based on historic precedents or are modernistic forms typical of the 1940s and 1950s. None of the church buildings have been recognized in past decades for their architectural significance by professional organizations or other groups.

Military History

The Checking Stations are significant under criterion A for their association with the original plan and development of Oak Ridge. They are some of the most visible reminders of Oak Ridge's beginnings as a secret military reservation involved in the most significant military and industrial effort of this century.

Science and Technology

The industrial buildings constructed at Oak Ridge in these years are significant under criterion A for their role in the post-war development of atomic energy. The processes for manufacturing fuel for the world's first atomic weapons led to important research and the production of peaceful uses of the atom. The plants are significant in the areas of engineering, industry, invention, and science.

In These Are Our Voices, Dr. Alvin Weinberg names Oak Ridge as a great contributor to the scientific and technological development of the South since World War II. Weinberg is a former director of the Oak Ridge National Laboratory (ORNL) and of Oak Ridge Associated Universities (ORAU), and a member of the original team of scientists that developed the first chain reaction in 1941. Emphasis at the plants in the post-war years has transferred from weapons production to scientific research in all areas of science.

One of the most important roles of Oak Ridge in the development of nuclear energy was the establishment of the Oak Ridge School of Reactor Technology (ORSORT). Following the war, there were very few people in the entire country who understood the technology of nuclear reactors enough to develop commercial uses for atomic energy. In 1946, this technology was only a few years old and of course, still in its developmental stage. One of the first students of ORSORT, and its most famous, was Captain (later Vice-Admiral) Hyman Rickover. Rickover was charged with developing a nuclear powered submarine. With his work, the Navy supported the school and it has become the basis of all nuclear training schools in the country, both civilian and military. Oak Ridge has been involved in many nuclear development programs since Rickover's successful nuclear submarine *Nautilus*, notably the Breeder Reactor, gas cooled reactors, and the nuclear ship *Savannah*.

The most important work conducted at ORNL after the war was the large-scale production of both radioactive and stable isotopes. Alvin Weinberg qualifies the importance of this work by stating that had "ORNL done nothing else in its...history, the large-scale use of radioisotopes made possible by ORNL would assure the Laboratory an honored place in history." Throughout the 1950s, ORNL developed a series of research reactors whose designs became the basis of all nuclear reactors now in use throughout the world. The Navy's nuclear submarines are powered by pressurized versions of these basic reactors.

Oak Ridge also played a major part in the development of computers in the 1950s. ORNL cooperated with the Argonne National Laboratory to construct one of the first programmable Von Neumann-type computers, called Oak Ridge Automatic Computer and Logical Engine (ORACLE). "When it was completed in 1953, it was the world's most advanced computer. Though ORACLE held this distinction for only a few months, it was an important landmark in the computer revolution." (Weinberg in These Are Our Voices, 361)

The scope of work at ORNL has gone beyond the realm of nuclear studies, although it is a world research center in classical nuclear physics and chemistry. Influential work at the Laboratory has included the biological effects of radiation with the establishment of the Biology Division. Medical science has been extensively explored and it was in Oak Ridge in the 1950s that bone marrow transplants were first investigated as a means of combatting radiation overexposure. The bone marrow transplants at Oak Ridge were among the first organ transplants conducted between animals.

Because Oak Ridge was the world's first nuclear facility, it was the first place where radioactivity was handled on a large (enormous) scale. Waste disposal techniques for radioactive and other dangerous waste were pioneered in Oak Ridge. Equally important is the work conducted in Oak Ridge concerning reactor safety. In addition to conducting safety research, ORNL has established the Nuclear Safety Information Center, which disseminates information throughout the world via its journal Nuclear Safety. Oak Ridge has evolved into a center of research for alternative forms of energy that include thermonuclear fusion, solar energy, ocean thermal energy, conservation methods, coal and synthetic energy sources.

REGISTRATION REQUIREMENTS

All of the Post-war properties which were identified in the Oak Ridge survey are located within the boundaries of either the Oak Ridge Historic District or the Woodland-Scarboro Historic District.

1) Dwellings within the two historic districts may be contributing to the districts if they retain sufficient integrity of plan and design to identify them as built between 1945 and 1959 and evoke feelings and associations of the era. Contributing properties should retain their original plan and form on the primary facade, original roof forms, the majority of original fenestration, chimney placement, and original lot orientation. Dwellings may also be eligible if additions on secondary facades are limited to no more than two rooms added laterally to the original dwelling which are in keeping with the scale, character, and materials of the original dwelling.

The dwellings in Woodland and Scarboro are characterized most by their roof forms. The neighborhoods originally contained hundreds of flat-roofed models. Many of the flattops have had gable roofs added which has significantly altered their original design. All houses with gable roofs that had

originally been flat were counted as non-contributing. However, models which originally had gable or hipped roof and retain them are contributing.

The addition of siding materials such as aluminum, vinyl, wood, and stone and brick veneers has been widespread and properties so altered shall not be considered non-contributing unless the application of these siding materials results in the loss of integrity of the original plan and design. The addition of siding to the houses in Woodland and Scarboro is thought to have occurred in the 1950s, immediately after residents were permitted to purchase their homes. No study has been done to determine the application date of siding for each house.

2) Commercial buildings may be significant if they retain architectural integrity and are associated with an individual, business, or pattern of growth and development of particular importance to the community. These individuals may include residents prominent in commerce or who promoted significant commercial developments in Oak Ridge. Public buildings may also be significant if they retain architectural integrity and are associated with federal government functions or with social, fraternal, or labor organizations of particular importance to the community.

3) Schools may be significant if they are associated with the growth and development of the public school system between 1945 and 1959; and if they retain sufficient form, structural design, and exterior detailing to identify them as built in this period, and evoke feelings and associations of the era.

4) Churches may be considered contributing to the historic district if they retain sufficient form, structural design, and exterior detailing to identify them as built in this period, and evoke feelings and associations of the era. These properties should maintain their original form on all but the rear facades, retain original roof forms, location of fenestration, materials, and maintain their original site and setting. While original interior features are significant elements of a property's character, their retention is not mandatory if the majority of exterior detailing and form is intact. Additions to church buildings shall not be considered negative to the integrity of the original building if placed on rear facades. Additions built laterally to the original building may result in a loss of integrity if the addition's size, scale, and placement substantially obscures or overwhelms the original church structure.

The Checking Stations which remain from the war years are located at three different locations on the perimeter of the townsite. Checking Stations may be individually eligible if they retain sufficient form, structural design, and exterior detailing to identify them as built in this period, and evoke feelings and associations of the era. These properties should maintain their original form on all facades, retain original roof forms, location of fenestration, materials, and maintain their original site and setting.

All industrial buildings in Oak Ridge are located outside the boundaries of the two historic districts. Industrial buildings at Oak Ridge may be considered individually eligible for the National Register if they meet the following requirements:

1) If they retain sufficient form, structural design, and exterior detailing to identify them as built in this period, and evoke feelings and associations of the era. These properties should maintain their original form, retain original roof forms, location of fenestration, siding materials, and maintain their original site and setting.

2) If they are significant for their engineering or construction techniques to facilitate the development of nuclear energy. These may include buildings which are unique in their construction methods or engineering.

3) Industrial areas may be eligible as historic districts if they retain concentrations of buildings built during the Post-War years; if they were of significance in the nuclear fuel processes; and if the area possesses clear and definable boundaries.

The multiple property listing for Oak Ridge, Tennessee includes thousands of buildings that were constructed while the city was under federal control, from 1942 to 1959. Because Oak Ridge did not exist prior to 1942, the survey also includes any pre-World War II buildings that remain standing within the boundaries of the original reservation.

The survey was funded by matching grants from the Tennessee Historical Commission and the Oak Ridge Chamber of Commerce. Primary and secondary sources for the nomination are located in the Oak Ridge Room (ORR) of the Oak Ridge Public Library. A master list of all Oak Ridge properties was provided to the consultant. This list included the address, house type, lot number and acreage for each house constructed between 1942 and 1959. Located in the ORR are original photographs, floorplans, and specifications for each housetype according to its alphabetical or numerical designation (e.g. Type A, Model 18). The houses now existing in the historic districts were judged according to these original specifications. The surveyed properties were mapped, and the district boundaries drawn to reflect the original neighborhoods as designed by SOM.

Other resources located in the ORR included collections of newspaper articles documenting common alterations that were made to the cemesto houses in the 1950s and 1960s. Also included was a series of articles about Scarboro neighborhood, its history, residents, and its personality. Files in the ORR include histories of the school system, city directories dating back to 1946, copies of SOM's Master Plan, and other resources having to do wit any and all aspects of Oak Ridge.

Although there are many histories of the Manhattan Project, there are very few books written about the cities that were born of the Project. City Behind A Fence, by Charles Johnson and Charles Jackson, proved to be the most thorough and informative resource concerning wartime Oak Ridge. The authors chronicle the birth of the city and the daily life of its residents. Personal recollections of Oak Ridge are recorded in These Are Our Voices, written by people who came to Oak Ridge as scientists, engineers, teachers, wives, and children. Selections by Major General Kenneth Nichols (ret.), John Rice Irwin, and Dr. Alvin Weinberg are included. Technical and historical information concerning atomic energy and its development came from Richard Rhodes' The Making of the Atomic Bomb. The birth of the atomic bomb is traced from the discovery of atomic energy at the turn of the century to the dropping of the first bombs on Japan in 1945.

There is little readily available information about the firms that worked to build Oak Ridge. Histories of Skidmore, Owings, and Merrill give a cursory mention of the firm's work in Oak Ridge in the preface before exploring their better-known accomplishments. Nathaniel Owings' autobiography The Spaces in Between gives an interesting personal account of Oak Ridge in its planning and early construction stages. An internally-published history of Stone and Webster also touches briefly on the work at Oak Ridge, although it lacks

detail. Much of the documentation that has been written about Oak Ridge and its history concerns the plant sites rather than the community.

Efforts were made to work with the Department of Energy to nominate the three plant areas (or sections thereof) to the National Register. DOE may choose at some time in the future to undertake the nomination, but is reluctant to do so at this time.

Although THC usually requests property maps of nominated properties, they were not always available in Oak Ridge. Many of the nominated properties are on U.S. Government land, and there are no maps available for them. In such cases, sketch maps were drawn and detailed boundary descriptions written.

The property types are divided into historical periods that reflect three stages in the development of the city. There are five properties that reflect the settlement patterns in the Clinch River valley from ca. 1810 to 1942. Properties that were constructed after 1942 are divided into two property types: those built between 1942 and 1945 that are directly related to the Manhattan Project, and those built between 1945 and 1959, when the townsite was under the jurisdiction of the federal government. These two contexts also reflect the military presence during the war years and the post-war presence of a civilian government.

The typology of the buildings was based on function and association with the development of the city. Outbuildings were not included in the survey as none were constructed as part of the overall plan of the city. Those that are now standing are for the most part of temporary construction, and therefore are not counted as either contributing or non-contributing.

Integrity of the property types was based on National Register Standards, taking into account that many of the changes and alterations to the buildings occurred as soon as people were able to purchase them.

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