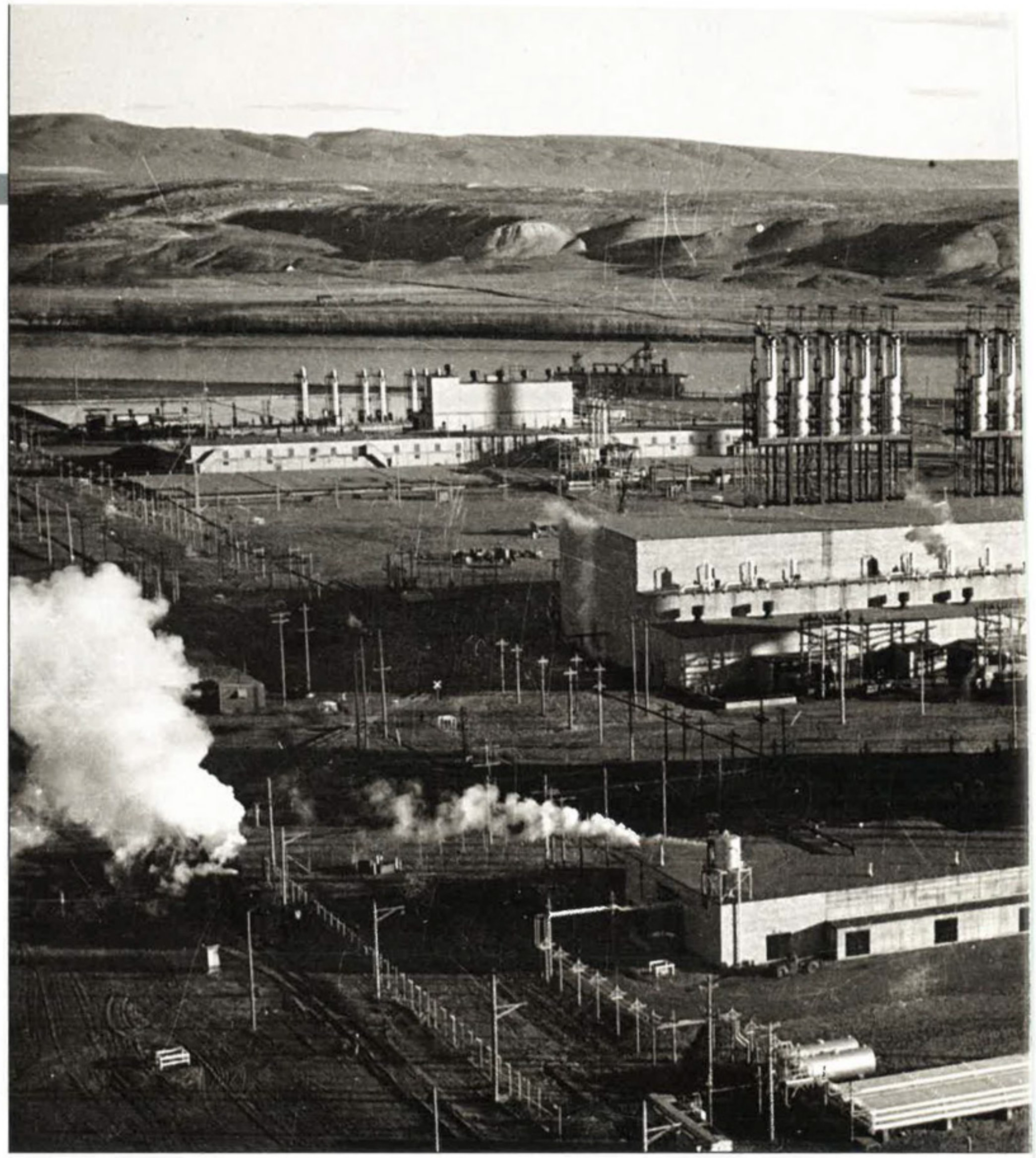
By Michele S. Gerber

The Hanford Engineer Works Comes to the Columbia Basin



OUR NUCLEAR

ONE SURPRISINGLY temperate day in late December 1942, Colonel Franklin T. Matthias flew over the lowland desert plain of the Columbia Basin in south central Washington. His fellow scouts, DuPont Corporation engineers Gilbert Church and A. E. S. Hall, had not been able to obtain clearance to board Matthias' military aircraft. So they drove and walked around the tract that lay west of three tiny, dusty towns called White Bluffs, Hanford and Richland. All three of the engineers were strangers to the sandy territory that newcomers usually saw as lean and sparse. Yet, to those who chose to stay and wrest a living from this open land, its comforts became sufficient. There was the bounty of the grains and fresh fruits that the ashy, volcanic soil could produce, the closeness of caring friends, and the beauty of the giant rivers and tiny desert flowers.

As Matthias, known to his friends as Fritz, and the DuPont engineers explored the triangular tract, they noted the presence of gravel, shale and sandstone underlaid by hard basalt. Then they observed the huge Columbia River, which rushed in a big, southeastward arc past all three of the tiny towns. It was winter, yet the ground was not snow-covered nor the river blocked with ice. Downstream from Richland about six miles they checked the big loading docks and warehouses along the Columbia at Pasco, a larger town of 3,900 inhabitants. They noted the profusion of railroad and electric power lines from Spokane and Grand Coulee Dam to the north, and from Portland and Seattle to the south and west. This district, while remote and nearly empty, obviously was well-connected to the outside world.

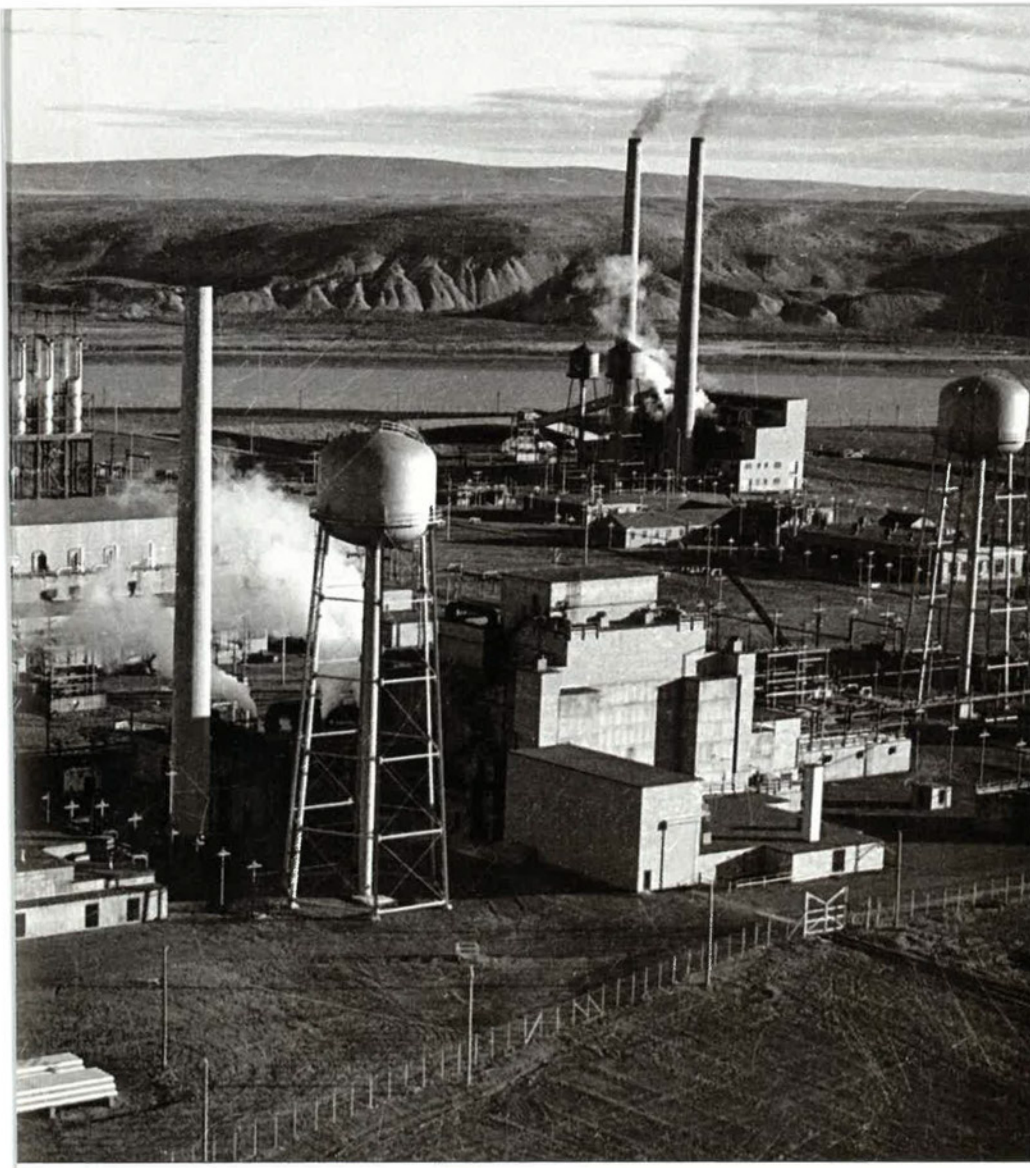
Well pleased, they left. On New Year's Eve, back in Washington, D.C., Matthias told Lieutenant General Leslie R. Groves, chief of the top-secret Manhattan Project:

> *We were unanimously enthusiastic about the Hanford area. . . . We studied and looked . . . and recommended the . . . Hanford site . . . as being far more favorable in virtually all respects to any other.*

Groves ordered government real estate appraisers to assess the costs of buying out the farms and moving the people. He told colleagues that the Hanford region was "the best site in general and, more specifically, best in regard to safety." Thus, in only a month's time and by a few men, one of the most significant decisions in American history was made.

Surprise at Site Selection

WHEN LESLIE GROVES and Fritz Matthias reached the decision that would change the Columbia Basin forever no one in the region even knew that they



Special Collections, Washington State Historical Society

B-Reactor, the first full-scale nuclear reactor in the world, began operating at the Hanford site in September 1944. Except for a brief shutdown from 1945 to 1948, the reactor produced weapons grade plutonium through February 1968, when it was closed. It is now on the National Register of Historic Places.

LEGACY

WWII HOME FRONT WASHINGTON

had visited. Behind the scenes, however, events moved quickly. The federal appraisers, working swiftly, evaluated the lowland soil as "mediocre to poor in quality and condition . . . low in organic matter." The costs of condemning this land and moving out the approximately 1,500 people living within the tract of interest, they believed, would not be prohibitive. The necessary legal procedures were instigated in February. On March 6, 1943, the affected residents learned that history and geography had come together in an unpredictable nexus and that they would have to leave their homes. The next weekly issue of the *Kennewick Courier-Reporter* proclaimed:

> *RICHLAND, WHITE BLUFFS AND HANFORD ARE TO BE TAKEN BY HUGE WAR INDUSTRY . . . MASS MEETING CALLED AT RICHLAND TO EXPLAIN THE WAR PROJECT TO RESIDENTS.*

Shock was the common reaction. People also felt a powerful curiosity as to why the federal government would want this arid, wind-blown, difficult place. They hoped for answers at the Richland meeting but were told that the military plans for the region could not be disclosed. In subsequent discussions with Army engineers who were taking their homes, explanations remained elusive. Matthias, affable yet forceful, disarmed questioners with a smile and the simple answer: "If I told you what the government is doing, I'd be court-martialed tomorrow."

Years later, of course, the residents of the Columbia Basin,along with the rest of theworld, learned why the region seemed ideal to American military planners. The secret endeavor quickly became known as the Hanford Engineer Works (HEW).

The Manhattan Project

THE PROJECT CONDUCTED at the Hanford site had its genesis in early 1940s research carried out by the federal Office of Scientific Research and Development (OSRD). The earliest OSRD studies in atomic physics concentrated on the highly fissionable (divisible) but rare isotope uranium 235 (U-235). In March 1941 a research group headed by physicist Glenn T. Seaborg at the University of California produced the first submicroscopic amounts of plutonium 239 (Pu-239).

THE UNITED STATES entered World War II soon thereafter, and the OSRD recommended that the Army Corps of Engineers construct industrial plants that could produce U-235 and Pu-239. President Roosevelt agreed and formed a new engineer district, the MED (Manhattan Engineer District), within the Corps in June 1942. In September veteran procurement, site selection, and supplies officer Leslie Groves was named to head the MED.

As the fragile, dusty territory of eastern Washington lay waiting to discover why the Army engineers were so attracted to it, scientific developments were proceeding rapidly. Most of the nation's prestigious pioneers in physics had been assembled by the MED at the University of Chicago's Metallurgical Laboratory (Met Lab). They were brilliant, but they had to work amidst awesome uncertainties. Usually the equipment needed for their processes was not even designed, much less manufactured. And there was the question of maintaining health and safety in the presence of large quantities of new, deadly and poorly understood radioactive substances. Yet it was Groves' philosophy that "nothing would be more fatal to success than to try to arrive at a perfect plan before taking any important step." The MED plunged ahead.

Site Criteria

IN AUGUST AND October 1942 physicist and key bomb developer J. Robert Oppenheimer emphasized to MED officials the extraordinarily hazardous and toxic nature of the gases generated in plutonium's chemical separations phase. The need for a remote and isolated site was discussed. At the same time the DuPont Corporation, a large Delaware-based chemical and engineering firm, was considering General Groves' urgent request that it become the prime industrial contractor for the Hanford project. In November company president Walter S. Carpenter reluctantly accepted the assignment but voiced the opinion that, "for safety's sake . . . because of . . . unknown and unanticipated factors" in the plutonium production process, the plants that would manufacture this deadly substance and its toxic by-products should be located far from the populous East Coast or Midwest.

In his memoirs Groves has been very candid about the radiological dangers that were known to MED officials:

> *Reactor theory at this time did not overlook the possibility that once a chain reaction was started, it could . . . get out of control and increase . . . to the point where the reactor would explode. . . . We knew, too, that in the separation of plutonium we might release into the atmosphere radioactive and other highly toxic fumes which would constitute a distinct hazard. . . . I was more than a little uneasy myself about the possible dangers to the surrounding population.*

Additionally, the War Department's first public report on the Manhattan Project confirmed the early knowledge of danger. According to this August 1945 document, the Hanford site was selected partly for its "isolation . . . [because] at that time [late 1942], it was conceivable that conditions might arise under which a large pile might spread radioactive material over a large enough area to endanger neighboring centers of population."

As soon as the decision was made in December 1942 to move the plutonium production facilities far from the densely-populated East Coast, DuPont officials, Colonel Kenneth Nichols—Manhattan Project deputy chief—and Matthias met to develop site criteria. The place would have to be very large and remote, with a hazardous manufacturing area in a rectangle of at least 12 by 16 miles. Laboratory facilities would have to be situated at least 8 miles away from the nearest pile or separations plant, and there could be no existing towns of more than 1,000 people closer than 20 miles to these structures.

THE ENGINEERING requirements demanded abundant working water (estimated at 25,000 gallons per minute) and a dependable electric power supply of at least 100,000 kilowatts. In most crucial respects the open, arid Columbia Basin seemed ideal. When Matthias and the DuPont engineers found the place two weeks later they realized that the tract's composition of shale and sandstone underlaid by hard basalt would make a strong foundation for the massive concrete piles. They also noted that the plentiful gravel could be used for road-building and concrete.

Prior History of Radiation Risks

WHEN THE MED decided to seize the land and build the nation's plutonium manufacturing facilities there, it also resolved to generate there the largest amounts of radioactivity and radioactive waste ever produced on earth. Prior to the undertaking at Hanford only minute amounts of plutonium had been produced under controlled laboratory conditions. Now thousands of pounds of it would be fabricated.

Prior to the MED-sponsored atomic research in the early 1940s, the world had learned some painful lessons about radioactivity. In 1895 German physics professor William C. Roentgen published his discovery of x-rays, along with an explanation of how to produce them. Within a year a medical x-ray center had been founded in nearly every American city, and there were many x-ray machines in private physicians' offices. Doses were measured by guesswork and many quack practitioners also used the machines.

Users quickly reported such side effects as hair loss and skin burns. The medical community knew by 1903 that x-rays sometimes produced deeper side effects—cancer, sterility and "damage to the blood-forming organs." World War I greatly expanded the demand for medical x-ray services. Soon afterward concern about the dangers of x-rays infected the public as a series of news reports documented a disproportionate number of deaths among radiologists.

Damaging health effects from radium were recognized first in the mid 1920s. Radium, a naturally radioactive element that undergoes a spontaneous atomic disintegration ("decay" or stabilization) into lead, was discovered by Marie and Pierre Curie in Paris in 1898. Although Marie Curie, as well as her daughter Irene, later developed cataracts and died of leukemia, no connection was traced to their work with radium. Throughout the early 20th century radium was hailed as a miraculous medical restorative. It was used widely in patented tonics as a cure for ailments including rheumatism, indigestion, hemorrhoids, high blood pressure, diabetes, baldness and nervousness. It also was used to produce watch dials that glowed in the dark. The advent of World War I increased the demand for these luminous dials. Most of the watches were made by the U.S. Radium Corporation of Orange, New Jersey, and most of the dial painting was done by young women working in home "studios." They painted by hand and pointed the tips of their brushes by moistening them between their lips. At the war's end the company sought to sustain itself by switching to the manufacture of novelties such as luminous doorbells, light switches and clocks.

By the end of 1924 at least nine of the young women painters employed were dead. Autopsies performed on two of the dead women showed their bones to be highly radioactive. The lungs of painters still alive contained radon 222, arising from the decay of radium 226. Public awareness of the hazards of radium thus greatly increased.

Health Effects Largely Unknown

WHEN THE MANHATTAN Engineer District was formed in 1942 it sought to expand the basic knowledge about the health effects of radiation. It also strove to develop methods of shielding workers and the public from the puzzling hazards. The MED developed monitoring instruments and trained doctors and "health physicists" to work at the huge Hanford facilities. The new field of health physics researched the biomedical effects of ionizing radiation and devised methods of shielding and monitoring radiation workers.

DESPITE THE INTENSE research efforts of the MED and the Met Lab, however, there was a lot about the biomedical hazards and effects of radioactivity that simply was not understood in the World War II era. A 1946 DuPont report confirmed: "At the time the [Hanford] Project began, there were no established tolerance limits for certain of the hazards which would be encountered. . . . Product hazards were not completely understood."

There was an overall, though nonspecific, knowledge of danger. All of the various radionuclides that would be produced by the process at Hanford had not even been characterized. MED scientists did not know how these isotopes would interact and compound, nor how they would behave in soluble versus insoluble form. They did not comprehend how they would concentrate in the food chain in plants and tissues of insects, river plankton and algae, fish, birds and mammals. They did not know if, or to what extent, it mattered whether various radionuclides entered living organisms by inhalation, ingestion through food or contact with the skin, nor what the excretion curves would be. They did not know the dilution factors of wind and river water, and they did not know the absorption rates or capacity of the sandy earth on the Hanford site.

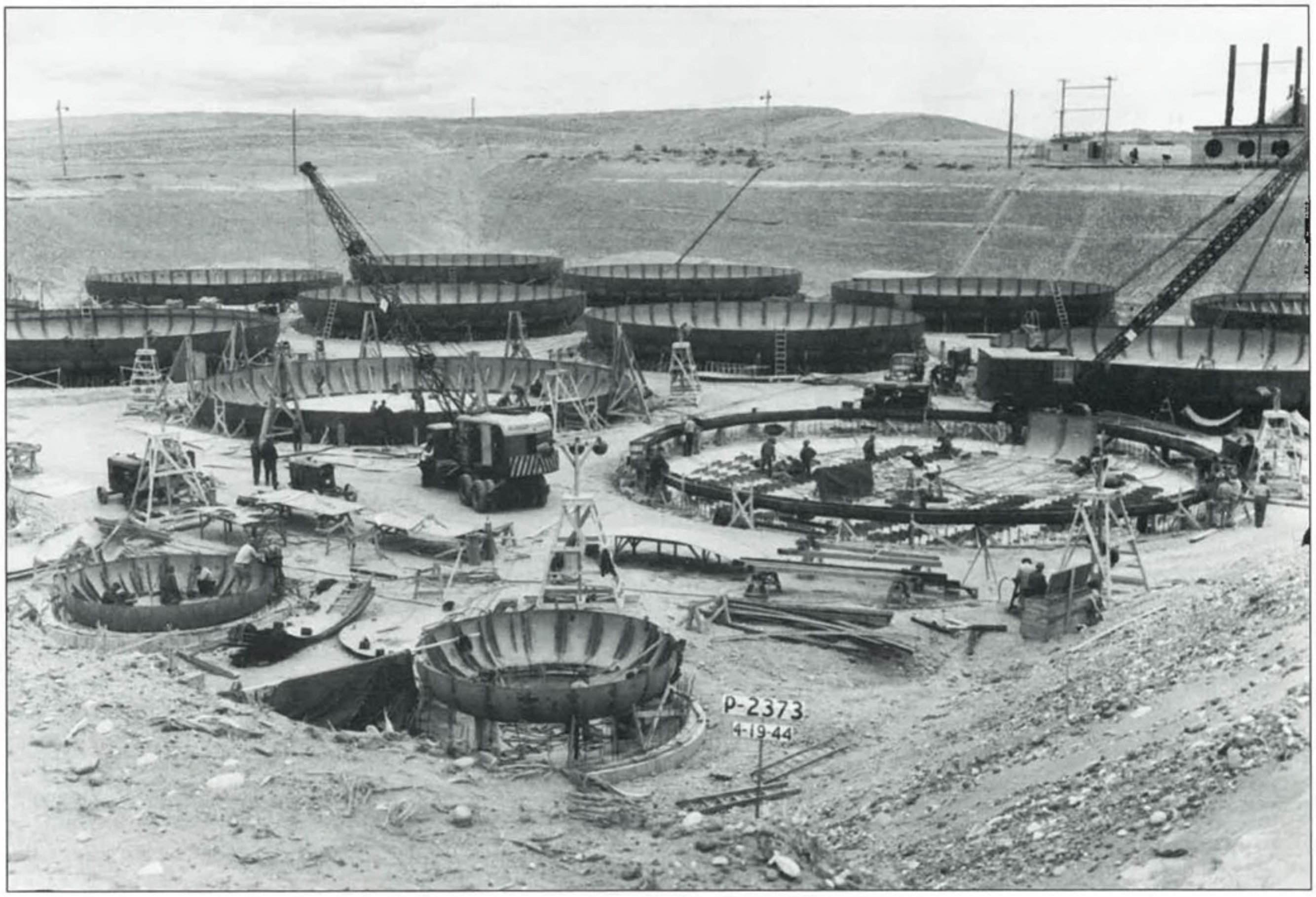
The Delicate Balance

MANHATTAN PROJECT officials, moving swiftly to seize the dusty, triangular tract in the Columbia Basin, weighed a delicate balance. There were far fewer people living in all of eastern Washington than in Knoxville, Tennessee,

(continued on page 34)

Special Collections, Washington State Historical Society

Richland as seen looking northwest shortly after the close of World War II. The large square building in the center was a clothing and "general merchandise" store, while the complex of government buildings that dominates the top center of the photo was the "700 Area"—the administrative center of the Hanford Engineer Works.



The massive engineering and construction effort that created the Hanford Engineer Works during World War II not only built the world's first full-scale atomic reactors but also the first plutonium processing facilities and 64 huge tanks to store the highly toxic waste generated by those plants. This April 1944 photograph shows an early stage of construction of one of the first "tank farms," a term still used today.

By Michele S. Gerber and Eric J. Campbell

HANFORD'S OMNIPRESENT STORAGE TANKS

EDITOR'S NOTE

The Hanford site's storage tanks are frequently under discussion in the contemporary press. In the following photographic essay the history of commonly-referenced installations is highlighted.

Throughout Hanford's history, high level wastes have been stored in underground tanks, and tank space has always been limited. Of 64 single-shell tanks (SSTs) built during World War II (B, C, T and U tank farms), half of these tanks were 100 percent full and the other half were 40 percent full by late 1946. A huge expansion at the Hanford Engineer Works took place in 1947 with 46 SSTs of BX, BY, and TX tank farms; and from 1950 to 1952 (the Korean War Expansion) with 18 additional tanks in TY and S tank farms.

In 1952 the opening of both U-Plant (the Metal Recovery Plant) and the REDOX (reduction extraction) Plant introduced new complexities in tank wastes. U-Plant's mission to recover wasted uranium out of SSTs created unexpectedly large volumes of chemically complicated wastes. In an attempt to conserve tank space, Hanford Works scientists "scavenged" the new U-Plant wastes with ferrocyanide salts and nickel. The addition of these chemicals caused the cesium-137 in the wastes to precipitate to the bottom of tanks, thus rendering much of the remaining liquid waste volume available for evaporation. Today the presence of

ABOVE: Steel was scarce during World War II, but due to Hanford's high priority for materials procurement it received the carbon steel needed for its radioactive waste storage tanks. This September 1944 photograph shows progress on the steel shells in one of the first four tank farms. Each had 16 tanks—12 with a capacity of 500,000 gallons and four (visible at far right) with a capacity of 55,000 gallons. Each weld joining the steel plates was checked by x-ray to verify its integrity.

BELOW: Just as work on Hanford's first three atomic reactors progressed at different speeds, some waste tanks were completed before others. The tanks in this photograph, also from September 2, 1944, had finished steel shells, and some already had their covering of reinforced concrete. About three weeks later the world's first full-scale atomic reactor, B Reactor, went into operation.

The storage tank photographs reproduced here are courtesy of Westinghouse Hanford Company.

ABOVE: Concerns about the size of the nation's nuclear arsenal led to a major expansion of Hanford from 1947 to 1949. It included the construction of two more reactors and 42 new waste storage tanks. On February 27, 1948, workers pour the concrete base for one of the 18 tanks in the TX tank farm. At a capacity of 750,000 gallons each, the TX tanks were the largest built at Hanford at that time.

BELOW: Post-war construction at Hanford was no less urgent once the decision to expand was made. This August 13, 1948, photograph shows TX Tank Farm, located near T-Plant, nearly ready to be covered with soil. TX Tank Farm was the principal processing facility at that time. The pipes on top go through the concrete to the steel shell inside; they connect to ventilation and monitoring equipment.

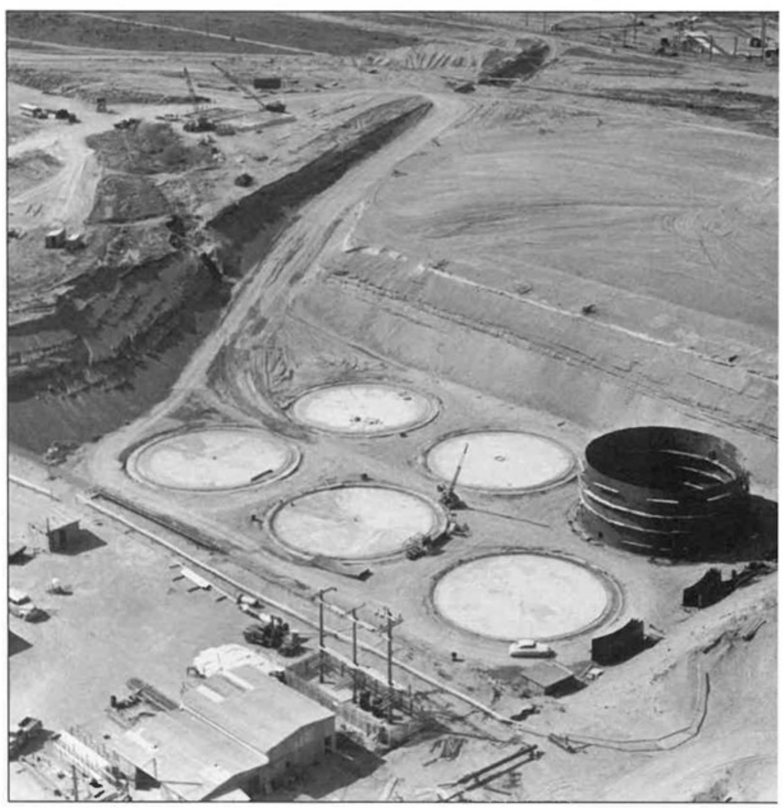
ABOVE: Hanford's environmental monitoring program turned up evidence in the mid 1950s that radioactive waste in some tanks was leaking into the surrounding soil. As a result, when more tanks were needed later that decade, they were built with two steel shells instead of the one-shell design used for the first 149 tanks. The improved design has been used at Hanford ever since. This 1969 photograph shows the construction of Hanford's first two double-shell tanks.

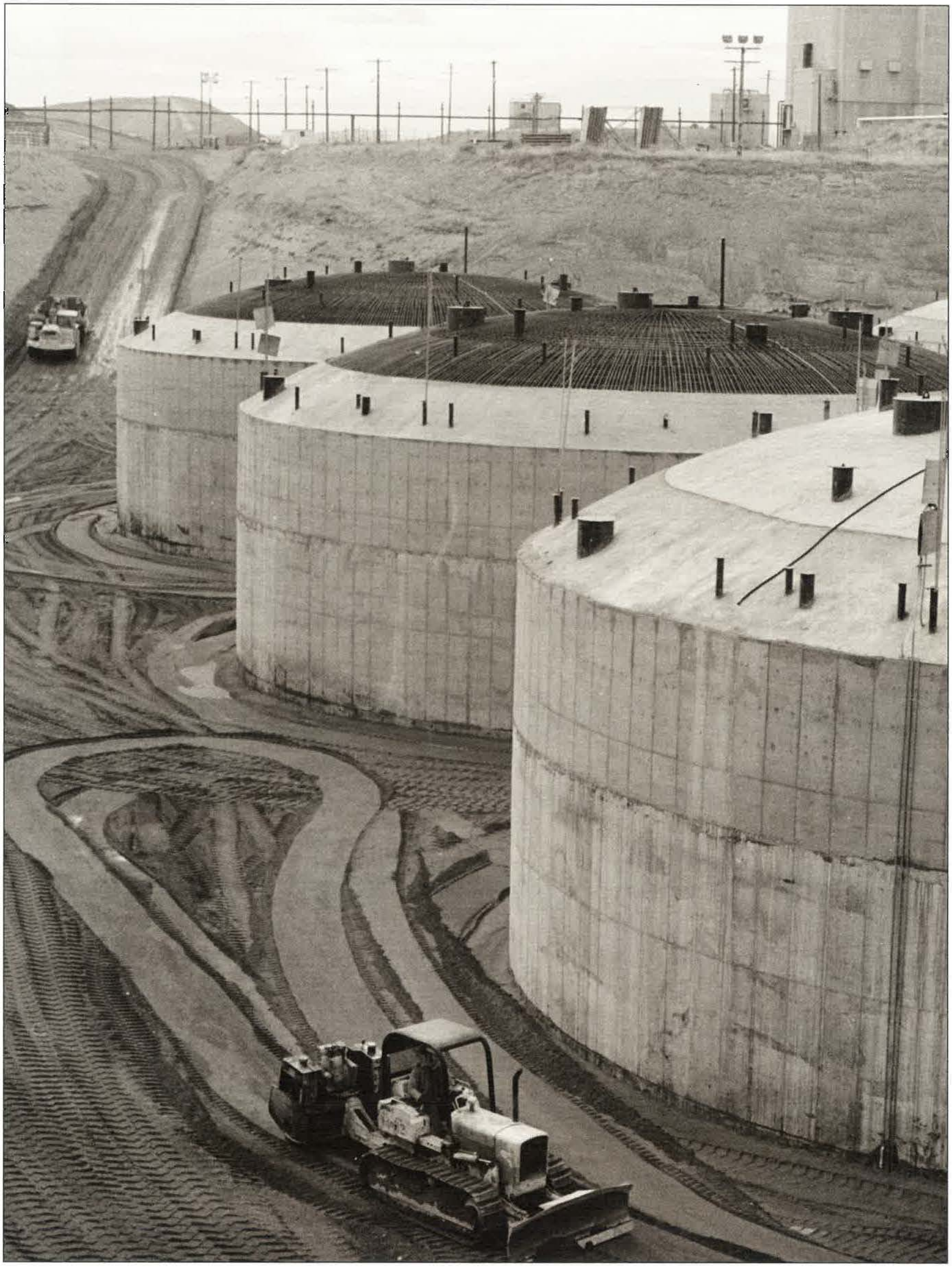
BELOW: By 1955, because of expansion prompted by the Korean War and increasing Cold War tensions, Hanford had eight reactors and two new processing plants ready to produce more plutonium than ever. The six tanks in A Tank Farm, shown here under construction in April 1954, served the Plutonium-Uranium Extraction (or PUREX) plant. They were among 81 tanks built during the first half of that decade to store waste generated by the increased production.

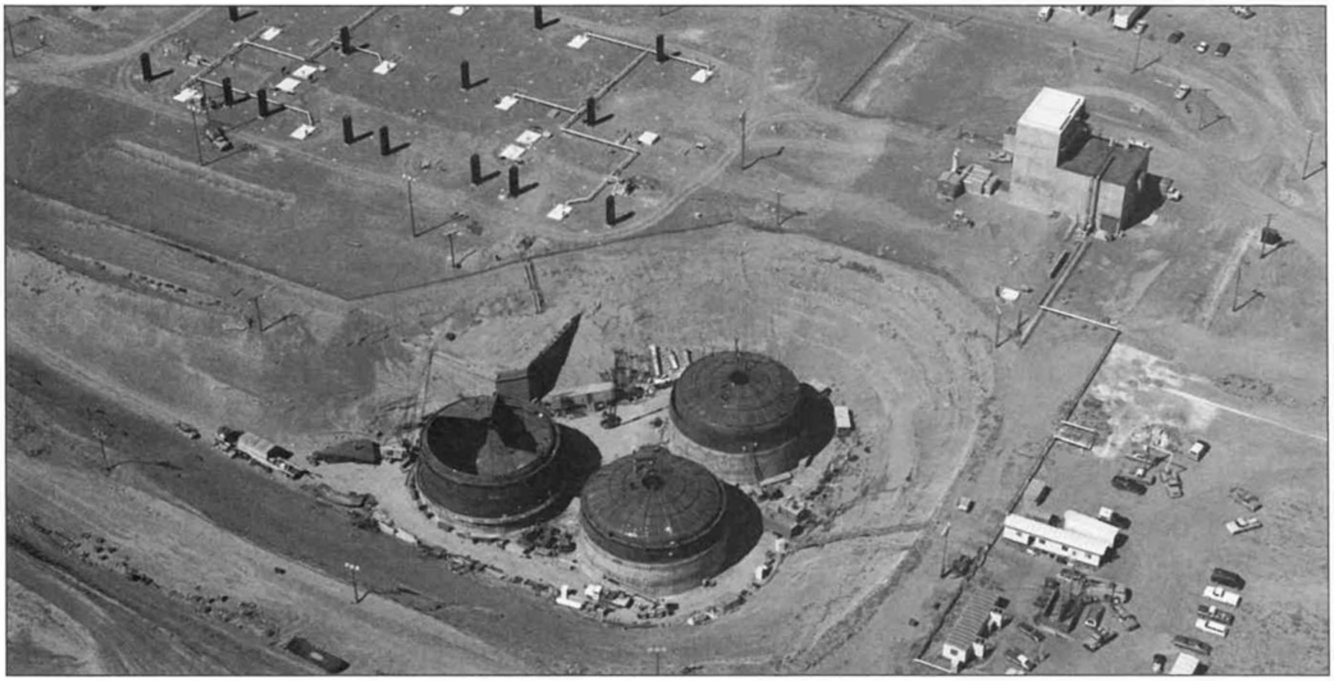
ferrocyanide in 24 (known) tanks from the U-Plant mission constitutes a difficult clean-up challenge at the Hanford site.

The initial operations of the REDOX Plant brought the first self-boiling wastes to Hanford's S Tank Farm in mid 1952. Radioactive wastes will "self-boil" when the decay process of the radionuclides generates enough thermal heat to cause the entire liquid volume to reach the boiling point. The new SX Tank Farm, then under construction, was fitted with air-lift circulators and mechanical augers, thermocouples and interconnected condensers to accommodate self-boiling wastes. This 15-tank farm, in addition to the 6-SST A Tank Farm, was built during the 1953-55 Eisenhower Expansion years. These and all subsequent SSTs and DSTs (double-shell tanks) at the site have been constructed to accommodate self-boiling wastes. The last four SSTs were built in 1963-64 in AX Tank Farm. Since that time 28 DSTs have been constructed and four new DSTs currently are planned.

Over the years at the Hanford site, tank waste minimization has been an important goal. Evaporators 242-B and 242-T began operations in 1951. Larger, more efficient evaporators, 242-S and 242-A, opened in 1974 and 1976, respectively. All are currently shut down, but 242-A is undergoing upgrades in preparation for reopening.







ABOVE: Hanford's best-known waste tank, 101-SY, is closest to the bottom of this 1974 photograph. It has received much attention in the past few years because of concerns that gases generated by and accumulated within the waste might be flammable. Solving this issue is the United States Department of Energy's top priority.

FACING PAGE: The basic design of Hanford's radioactive waste storage tanks has endured through decades—a single (through 1964) or double (since 1968) shell of carbon steel surrounded by reinforced concrete. Sizes varied from 55,000 gallons to 1 million gallons. This 1978 photograph shows 1-million-gallon double-shell tanks. These tanks are 75 feet in diameter and about 46 feet in height. Hanford has 28 of these.

BELOW: Because the tanks themselves are six to ten feet below ground, the only parts visible on the surface are access covers, monitoring equipment and ventilation systems. Hanford technicians use equipment inserted through the access pipes to take samples of the waste in each tank, an important step in the program to ultimately empty the tanks—which were not designed for permanent storage—and convert the waste into a form safe for permanent disposal.

In 1990 a division was created at the Hanford site to focus specifically on tank waste operations, safety and remediation. In 1992 its responsibilities were broadened to include waste disposal planning. Led by Dr. Harry Harmon, a Ph.D. chemist, this Tank Waste Remediation (TWR) Division is pioneering new sampling and investigative techniques to analyze the contents of each of the 177 Hanford site tanks. Based on the results of such analyses a technical remediation plan for each tank will be developed. Today, 66 SSTs are listed as "assumed" leakers, meaning that leaks have been detected near or between them. However, because the source of any given leak sometimes cannot be determined with precision, some of these "assumed" leakers actually may not be seeping. No DSTs at the Hanford site have leaked.

Michele S. Gerber and Eric Campbell are employees of Westinghouse Hanford Company.

(*continued from page 27*)
alone; and yes, Enrico Fermi had maintained control of the world's only self-sustaining atomic chain reaction achieved thus far. And the scientists assembled at the Met Lab were brilliant—they were aware of and working on the problems of protecting people from the effects of radiation.

All of those affirmatives stood in the Hanford site assets column. The hazards, however, were very large while the knowledge base was small and the Columbia Basin was deceptively complex. In this fragile place you did not slit and displace whole segments of the desert without causing the land to swirl up to punish and confound. You did not pump and dump huge volumes of liquids where only a few inches of water had entered or left in the past without causing the water table and the drainage patterns to shift. You did not bring in thousands of people and immense tonnage in materials and equipment onto this stark and lovely desert without changing, perhaps forever, the delicate balance of life.

Four Construction Booms

AS SOON AS the Manhattan District of the Army Corps of Engineers arrived en masse in the Columbia Basin in March 1943, it produced a huge construction boom. In just over two years it built the massive Hanford plutonium production complex and the new government-owned village of Richland.

Atomic policy drifted after World War II ended. In 1946 the General Electric Company (GE) relieved the DuPont Corporation as the prime operating contractor at Hanford. On January 1, 1947, the civilian Atomic Energy Commission (AEC) took over from the military MED. The AEC simplified the name Hanford Engineer Works (HEW) to the Hanford Works (HW).

IN AUGUST 1947 GE and the AEC announced plans for a gigantic expansion of Hanford's plutonium manufacturing capabilities. The new endeavors, the largest peacetime construction project in American history up to that time, cost more than the erection of the entire wartime Hanford complex. This building boom, which took place in the Columbia Basin from 1947 to 1949, had no sooner ended than two more growth surges occurred. Known as the first and second Korean War expansions, these latter swells took place in 1950-52 and 1953-55. The Korean War years (1950-53) witnessed a doubling of the plutonium production facilities at Hanford.

Following the hectic construction years of 1947-55, Cold War exigencies accelerated weapons production rates at Hanford and the other American atomic defense plants. Power levels and output at the Hanford complex remained high through at least 1964.

The Production Cycle

DURING WORLD WAR II three reactors (called piles) were built along the Columbia River at HEW to irradiate uranium fuel rods. Strung along 16 miles of the waterway's west bank, reactors B, D and F composed Hanford's "100 Areas." At the rear of each reactor sat large retention basins designed to hold effluent (cooling water exiting the piles) long enough for the short-lived radionuclides to "decay," or stabilize.

After the uranium fuel slugs were irradiated they were "pushed" out the rear of the HEW reactors and dropped into thickly shielded casks filled with 20 feet of water. Here, and at special "cooling" areas about five miles away, the rods sat while their radioactivity partially decayed. Then they were transported by rail to Hanford's "200 Areas," two chemical separations buildings, officially termed cell buildings but dubbed "canyons" or "Queen Marys" by Hanford workers, that were 800 feet long, 65 feet wide and 80 feet high. Each contained a row of 40 thickly shielded concrete cells. Each

LEFT: Colonel Franklin T. Matthias (left) and two top-level Hanford engineers review press coverage of the Manhattan Project just after the secret was released on August 6, 1945.

FACING PAGE: Newspaper headlines in Richland, Washington, the day that the world learned the purpose and mission of the Hanford Engineer Works and other Manhattan Project sites. Prior to this day less than one-half of one percent of Hanford's workers knew of the site's ultimate product.

EXTRA **The Villager** EXTRA

VOLUME 1 — Richland, Washington, Monday, August 6, 1945 — NUMBER 22—A

IT'S ATOMIC BOMBS

President Truman Releases Secret of Hanford Product

Information Is Made Public This Morning

SPECIAL—Today President Truman, in an offical White House release, broke the biggest secret of World War II—and perhaps the greatest secret of any war—when he informed Americans that the U. S. Army Air Forces had released on the Japanese an Atomic bomb containing more power than 20,000 tons of TNT—and that the Hanford Engineer Works is one of three plants in the country manufacturing the new bombs.

The bomb, made in the Hanford Engineer Works, in Oak Ridge, near Knoxville, Tennessee, and an unnamed installation near Santa Fe, New Mexico, produces more than 2,000 times the blast of the largest bomb ever used before.

The bombs blast even the landscape out of sight. Nothing is impossible. The first bomb was dropped on Hiroshima a few hours ago. Observers report that the explosion was thousands of times greater than an earthquake and may change the course of civilization.

Atomic power was released against the Japs in answer to their refusal to the ultimatum issued last week. Source of the power is said to be coal, oil and power produced by the great dams in the Northwest and Tennessee.

In making the announcement, President Truman said that the bomb has added new and revolutionary increase in destruction on the Japanese. Mr. Truman went on that "it is an Atomic bomb. A harnessing of the basic power of the universe, the force from which the sun draws its power."

News Spreads Slowly, Surprises Everyone Here

Jubilation And Satisfaction Follows Revelation Of Product Manufactured Here

Richland was about the last place in the country to hear the news of the atomic bomb. As in other parts of the country it was the housewives who first heard the news over their radios, and broke it to their husbands in a flurry of telephone calls which kept the switchboards humming.

In town, the stores were all closed until noon and few people were on the street. It was THE VILLAGER reporter who spread the word to most of those encountered. Disbelief was soon followed by enthusiasm. Everyone felt the same reaction—"It's nice to know what this project is all about" and "Maybe the war will end promptly."

To nearly everyone the news of what Richland was helping to make came as a complete surprise. Even those who may have been in the know would not admit it. The old habit of secrecy was strong upon them.

Said J. T. Minard who was downtown doing some shopping: "They did the most marvelous job of keeping a secret. I just didn't think it would be possible."

Patrolman W. N. Gasway, who was enjoying a day off with a stroll through the village, had no idea what was being made. "I didn't want to know," he explained. "If a person knew too much he might land in jail. I don't care what it is as long as it smashes the Japs."

Kenneth E. Jensen who's been on the project almost two years heard the news first from a hotel porter and was on his way to check with Military Authorities to see whether there was anything to it. "I'm sure glad it's out," he said. "If you don't get in the Army, you can hope to help win on the job here." Said his companion who refused to give his name, "I still don't believe it. I'd like to find out for sure."

Mrs. S. F. Schlecht of Kennewick was in Richland waiting for the hardware store to open. Said she when told that a bomb had been dropped on Japan: "Good! I've never seen a job where things were kept so secret. My husband works here, but he didn't know anything about it."

James Fagg was one of the few encountered in the streets who had heard it on the radio: "I felt it must be important for them to interrupt a broadcast. I hope this means the war will be over in a hurry.

The night clerk in the Transient Quarters, Dell, refused to give anymore of his name or discuss the matter at all. Said he, "I've been secretive for two years. Why should I change now?" John Ferns was encountered at the hotel desk. It was his day off. He has worked on the project two years in October, but said he knew little of what they were doing out there. "I thought they were making some awful explosive," he said. "Now I'm glad to know for sure and especially glad to know that I've been doing some good for the war."

Jack Wilson, assistant manager of the bank, heard it like most of the men, from his wife. Every customer to enter the bank after it opened at noon came in with the

(Continued on Page 2)

Development Of Bomb Traced

Begun In 1939; Plant Expanded In June, 1942

The energy of the atom has been harnessed to produce the deadliest weapon ever devised, the atomic bomb, the War Department today announced shortly after the first of the aerial missles cascaded upon a Japanese military target.

The initial combat use of the bomb culminated three years of intensive effort on the part of science and industry, working in cooperation with the military. It is heralded as the greatest achievement of the combined efforts of science, industry, labor and the military in all history.

President Truman and Secretary of War Henry L. Stimson made the first announcements of the new weapon, declaring that the atomic bomb has an explosive force such as to stagger the imagination. Improvements were revealed as forthcoming which will increase several fold the present effectiveness.

While the use in combat has permitted a slight relaxation in the security that has cloaked the project, the War Department declined for security reasons to disclose the exact methods by which the bombs are produced or the nature of their action and requested that the press and radio refrain from disclosing other information as well as all those connected with the Project, other than that information released.

In broad outline, the War Department made the following disclosures:

Late in 1939 the possibility of using atomic energy for military purposes was brought to the attention of the President, who appointed a committee to survey the problem;

In June 1942 sufficient progress had been made to warrant a great expansion of the project and the assumption of its direction by the

(Continued on Page 2)

What is Atomic Bomb?

The details have not yet been released, but information reveals that it contains more power than 20,000 tons of TNT. It produces more than 2,000 times the blast of the largest bomb ever used before. It is the greatest force ever harnessed—and may change the entire course of civilization.

How Much Damage?

How much damage was done by the bomb dropped this morning on Japan was a question in everyone's mind today in Richland.

Japanese news sources, while admitting the raid, did not reveal the extent of the damage.

THE HANFORD ENGINEERING WORKS Bring V-J DAY CLOSER!

Richland Gets Ready To Entertain Press

Richland, the quiet, the secret, was getting ready today to entertain the Press. In the former dining room of the Transient Quarters, forty typewriters were in place on 29 desks and the lunch counter.

A switchboardwas being installed with eight phone booths to go with it. Couches for weary newshawks took up every square inch of floor space. Closed dormitories were open to house the expected influx of newsmen.

To the last, the cloak of secrecy hung about preparation. Miss Kelma Kennedy, manager of the Transient Quarters, didn't know until this morning that the press was expected. "They told me," she said, "that the government was going to move in. You know we're not supposed to ask questions."

Dave Haley, who had spent 3 busy days, scouting for typewriters and installing them, had no inkling of why. "I heard something was going to break. What is it? They told me we needed 40 typewriters. We haven't had much explanation for a couple of years."

Two operators brought in from Kennewick to help handle the switchboards, were equally surprised. Mrs. Helena Evett and Mrs. A. Westermeyer said they had heard plenty of rumors, as to what had been going on in Rich-

(Continued on Page 2)

separations area, 200 East and 200 West, also contained a network of underground tanks ("tank farms") and test wells for storing and monitoring high-level wastes. Sixty-four such tanks were built during World War II. Less concentrated liquid wastes were at first poured on low spots on the ground and later entered the ground through open-bottomed structures called cribs. In 200 West Area one plutonium finishing building refined the final HEW product, a wet plutonium nitrate paste, for shipment to Los Alamos.

THE HANFORD COMPLEX also contained a smaller "300 Area." It contained fuel and equipment fabrication shops, repair and maintenance buildings, and "process improvement" (research and development) structures. A fuel element jacketing process conducted in this area, located only six to eight miles north of Richland, discharged wastes bearing uranium and heavy metals into the groundwater and the Columbia River.

In 1948 a traditional Labor Day weekend community celebration in Richland, formerly known as Richland Days, was renamed Atomic Frontier Days. It symbolized the town's optimistic view that atomic energy was the bright promise of the future.

Special Collections, Washington State Historical Society

The Rush to Produce

PRODUCTION OF THE first batches of plutonium at Hanford were rushed. The principal shortcut taken in the initial nine months of operations was that of cooling the irradiated fuel slugs for very brief periods before dissolving them in the chemical separations facilities. (Cooling, or decay, time is a prime determinant in the amount of off-gases, particularly iodine 131, that are generated by fuel dissolving.) Cooling times for irradiated slugs were continually shortened between February 1945 and the end of World War II, as the three reactors operated at top capacity.

In June and early July 1945 production sped up for the world's first bomb test, "Trinity," conducted in New Mexico. Another "accelerated" manufacturing push occurred in late July to ready the material for the Nagasaki bomb. The exact amount of cooling time during this period is unknown or classified, but it was less than 30 days.

After the Japanese surrender the production rate in Hanford reactors was cut nearly in half. Still the manufacture of plutonium went forward, and cooling times for the hot fuel rods were kept at under 50 days. For the Columbia Basin the unfortunate legacy of the rapid and intensive production rate of 1945 was a total of over 340,000 curies of radioiodine released into the atmosphere in that year alone. In 1946, with a somewhat slower manufacturing schedule but still inadequate cooling periods, at least 76,000 curies of I-131 were discharged from Hanford.

Secrecy

SECRECY WAS AN extremely important constant in the conduct of affairs at early Hanford. In Washington, D.C., the original Hanford project was so strictly classified that even the Joint Chiefs of Staff, the State Department, prominent senators and Vice President Harry S Truman were not informed. News coverage about Hanford was censored tightly, and everything was placed within the restricted classes of the wartime Code of Fair Practices. Newspaper editors throughout the Northwest were contacted during 1943 and asked to "cooperate . . . by not asking questions . . . or speculating" in print about the huge and mysterious structures being erected in the south central Washington desert.

The real purposes of the Hanford endeavor also were hidden from most of the engineers and all of the construction and support personnel who worked there. Colonel Matthias's wife Reva recalled that even among the few high-level officials who did understand the plant's mission the "famous HEW line was 'I can't tell you,' or 'Don't say anything to anyone.'"

Diaries and private notes were forbidden, and recruiting firms scouring the country for the understaffed enterprise were directed by the MED to word their advertisements in ways that were vague as to location and job description. On-site work was kept compartmentalized to disclose as little as possible. When prominent scientists came to Hanford to consult on problems of engineering and physics they used code names. Enrico Fermi was Mr. Farmer, Arthur Compton was Mr. Comas, and Eugene Wigner was Mr. Winger. Activities and goals at wartime Hanford also were kept secret from local and state Selective Service boards, courts, other government agencies, civic leaders, and from the stockholders and some officials of the subcontractor companies involved.

Noisy but Quiet

BY EARLY 1956 EIGHT reactors and four massive separations facilities stood on the Hanford site. Through 1963 the exigencies of the Cold War competition with the Soviet Union pushed plutonium manufacturing even higher, and a ninth defense production reactor was built. The facilities that the MED had conceived as temporary and expedient grew and became entrenched.

Hanford was busy and noisy and industrious; yet to the outside world it was silent. Policies of strict secrecy prevailed throughout the period, just as they had during wartime. Of the thousands of workers that streamed into and out of the plant every day, many did not know much about their work except that it was important to follow some rigid and basic procedures. They were proud of their work and excited about the enormous buzz of activity in their region. Those who chose to come and stay in the Columbia Basin, like many newcomers before them, often fell in love with the windy, isolated place. They did not question the secrecy, and they came to trust that the complicated operations of the plant would not hurt them. As the years went by more and more people filled the neighborhood.

Richland Population Unique

AMONG THE MANY people who came to the Columbia Basin in the two decades beginning in 1943, Richlanders most defined the region's "new image." Richland residents on the whole were well-educated, prosperous, healthy and relatively young. They led the nation in average birth rate and displayed an optimistic, active and outgoing community spirit. They came to symbolize the huge atomic complex itself. Richlanders were proud of their role in national defense and believed that their work contributed to world peace.

Pride in the atom became evident in Richland in August 1945, as soon as residents learned of the role of their city in producing the world's first atomic weapons. The Japanese surrender of August 14 produced rejoicing in Richland. The village newspaper enthused: "PEACE! OUR BOMB CLINCHED IT."

Richland's victory celebrations were covered in newspapers and on radio programs throughout the nation. The little city basked in the praise of the entire country. National reporters who came to cover the jubilation noted the "combination of confidence, efficiency, warmth and contentment" in the government town. Colonel Matthias expressed local feelings succinctly: "We of the Hanford Engineer Works are proud of our job. We are proud of our community."

AFTER THE DRAMATIC victory General Groves appeared in Richland and lauded the Hanford employees. At the close of the year the Associated Press, *Time* magazine and the Portland *Oregonian* named the "story of Richland and the making of the atomic bomb" the most newsworthy story of 1945. They said it was even more important than the German and Japanese surrenders. *Time* paid tribute to all Hanford workers: "To each and every man and woman who made the slightest contribution to the project in Richland, a SALUTE."

"The Atom-Bustin' Village of the West," Richland dubbed itself in 1947. The town began a "Tell 'em You're from Richland" campaign, and featured buttons emblazoned with a swirling atom and a mushroom cloud. The next year it named its annual community celebration "Atomic Frontier Days." General Electric's manager christened Richland as "Atom Town, U.S.A."

General Leslie R. Groves, head of the Manhattan Project.

Among Richland residents in the early years of the atomic age, few people, if any, doubted that the Columbia Basin was safe. In mid 1949 Richard Neuberger, a reporter for *The Nation*, visited Richland and questioned inhabitants about "rumors of pits of evil residue, many stories deep . . . so virulent it cannot even be dumped into the sea. Is it unstable? Might it blow up? . . . How dangerous is it?"

Instead of worry, Neuberger found confidence and optimism. "I thought the morale of people was high," he concluded. Later in 1949 the University of Michigan Survey Research Center conducted a study of "the attitudes of people toward the radiation hazards that exist, or are assumed to exist, in atomic energy developments."

Overall, the research project demonstrated, inhabitants near atomic sites, including Hanford, were "taking atomic energy in their stride. . . . They do not fear it more than people elsewhere. . . . [There is] no anxiety which could be attributed to fear of radiation or plant disaster." Residents were so confident, the researchers concluded, because they felt "reassured . . . [by the] care and precautions exercised by those in charge." Many others since have agreed that morale was excellent.

Veiled Warnings?

ALTHOUGH THEY WERE confident and content, there was much that Richlanders did not know about their community and region. Some scientists at the Hanford plants had access to disquieting information. In terms of what is known today, it may be pertinent to question some of the public statements that were made in those years and to ask whether they could have had double meanings.

For example, in classified memos written in mid 1945, health physicists at Hanford discussed experiments that suggested that "the administration of inert [stable] iodine prior to the giving of carrier-free radioiodine very significantly reduced the uptake of the latter by the thyroid." Herbert Parker, director of Health Instruments, the division at early Hanford responsible for environmental monitoring and radiation protection, secretly suggested the "promotion of the use of iodized salt through public education." At nearly the same time Richland's community newspaper announced: "Medical Department Recommends Use of Iodized Salt." Encouraging dietary intake of the salt as "merely a matter of good nutrition," GE physicians advised:

> *Inland regions with little rainfall [such as the Columbia Basin] tend to have lower iodine content in the water and soil. . . . The body needs a certain amount of iodine . . . we recommend that you use iodized salt.*

By mid 1947 Hanford chemists discovered that airborne radioactive contamination, particularly Pu-239, deposited more readily on sagebrush than on sand or other desert flora. They submitted these conclusions to the Health Instruments Division in secret on July 1. Five weeks later Richand's Public Health Section issued warnings to villagers to remove sagebrush plants from their yards. The spindly desert weed, GE officials explained, "aggravates allergies [and] . . . often harbors ticks" that could spread Rocky Mountain spotted fever. Soon afterward Hanford researchers discovered that the Russian thistle plant could present an "aerial radiation hazard" because of its pronounced ability to translocate subsurface contamination up through its bracts and stems. In Richland residents were asked to destroy these plants to decrease the pollen level.

COULD OTHER OFFICIAL public statements made in Richland be taken at face value, or were they veiled warnings? Why were Richlanders told by GE in January 1948 that air samples were being collected in the village in order to study "pollen concentrations in the air to determine varieties, abundance and seasonal appearance of hay fever pollens in this locality?" At that same time Hanford scientists were establishing a network of air sampling stations and expanding the local air monitoring and animal assay programs. With radioiodine streaming out of the 200 Area stacks, falling on forage and raising the radioactivity levels in animal thyroids, was it a coincidence that no chickens or livestock were allowed in government-owned Richland? Or that no land within the town limits was available for pasture? Why was Richland's entire milk supply brought in from Ellensburg and Yakima areas under an exclusive contract?

Did the knowledge that radioactive contamination levels in the Columbia River were rising prompt a GE warning in the summer vacation season of 1947: "The wells throughout the desert region of the northwest are usually shallow . . . only water from known pure sources should be used." Why did Richland officials struggle with messy and problem-ridden well fields when they could have tapped the Columbia River, as did neighboring cities, for the domestic water supply?

History Unclear

FOR NEARLY TWO decades major plant expansions and other nearby construction endeavors went forward at Hanford. We can record the statistics and events of these giant enterprises. Also, we can record much about the early government town of Richland—the optimism, the vigor, the pride. However, there is a great deal that we can never know about that time and place. We do know that huge waste releases streamed by and through the little village. We know that the AEC promised safety and openness and that the people believed these pledges. We know that Hanford scientists maintained vigilant records of contamination levels in the Columbia Basin's air, water, fish, vegetation, wild game and other animals, and that they tried to protect public health to the extent that their technology and limited authority over production schedules allowed.

Possibly, veiled warnings were issued to guard Richlanders against hazards that could not be named. Possibly, cautions to village residents to use iodized salt, to cut down sagebrush and Russian thistle in the town, to drink only well water and imported milk, to hunt far from Hanford and to wash or discard local fruit actually were ways of telling residents to avoid contact with radioactive and chemical wastes. There is a large gray area that lies between the asking and the answering of questions about these matters. Amidst these questions and uncertainties the Columbia Basin, the rest of the United States and the world have lived Hanford's nuclear history.

Michele S. Gerber is a historian for Westinghouse Hanford Company. She has taught college-level American history, worked for public and private historical agencies and consulted on numerous historical projects.
This article is reprinted from her new book, On the Home Front: The Cold War Legacy of the Hanford Nuclear Site, *with permission of the University of Nebraska Press.*

COLUMBIA

THE MAGAZINE OF NORTHWEST HISTORY ▪ FALL 1993

COVER: Most famous for his photographs documenting the logging industry in the early part of the 20th century, Darius Kinsey was also an avid landscape photographer. He produced many scenic views such as this one, taken in 1928, of Table Mountain reflected in Terminal Lake at the end of the Mount Baker Highway. See related story beginning on page 7. (Courtesy of the Whatcom Museum of History and Art, #10299a, Darius Kinsey Collection)

COLUMBIA

The Magazine of Northwest History
A quarterly publication of the
Washington State Historical Society

VOLUME SEVEN, NUMBER THREE

▪

David L. Nicandri, *Executive Editor*

Christina Orange, *Managing Editor*
Robert C. Carriker, *Book Review Editor*
Carolyn Simonson, *Copy Editor*
Deborah Sage, *Editorial Assistant*
Christopher Lee, *Business Manager*
Marie De Long, *Circulation Manager*

CONTRIBUTING EDITORS
Elaine Miller
Edward Nolan
Joy Werlink

FOUNDING EDITOR
John McClelland, Jr.

▪

▪

Columbia (ISSN: 0892-3094) is published quarterly by the Washington State Historical Society, 315 N. Stadium Way, Tacoma, WA 98403; (206) 593-2830. *Editorial contributions:* All unsolicited manuscripts and photographs submitted must include return postage (in stamps) and suitable packaging to ensure their safe return. Although reasonable care will be taken with materials received, no responsibility can be assumed for unsolicited materials, including photographs. *Postmaster:* Please send address changes to ***Columbia***, 315 N. Stadium Way, Tacoma, WA 98403.

♲ PRINTED ON RECYCLED PAPER