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THE LEGACY OF THE MANHATTAN PROJECT IN NIAGARA FALLS

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That the two men quoted below should make reference to Niagara Falls on the morning of the world's first atomic explosion may shed some light on the important role this region's industry played in the creation of the atomic bomb. The two men who directed the Manhattan Project, whose names are most inextricably linked with the dawn of the atomic age, both evoked Niagara Falls in

metaphors describing the experience. Why? Perhaps because, in many respects, Niagara Falls was the birthplace of the bomb.

"A Niagara of white light flooded the bunker through an open back door. A few tense seconds later came a resounding, teeth-rattling roar."

—J. R. Oppenheimer, 5:30 a.m., July 16, 1945, Alamogordo, New Mexico, describing the world's first atomic explosion.

"Doctors Conant and Bush and myself were struck by an even stronger feeling that the faith of those who had been responsible for the initiation and the carrying on of this Herculean project had been justified. I personally thought of Blondin crossing Niagara Falls on his tight rope, only to me this tight rope had lasted for almost three years..."

—General Leslie Groves, head of the Manhattan Project, recounting the same blast.

When the United States turned in earnest to developing the atomic bomb in 1942, the government did not possess the facilities to fast-track the project. So the Army Corps of Engineers enlisted private industries that did possess those facilities and that were, in some cases, already engaged in the kind of work the Manhattan Project would require. With its abundant

supply of energy and water, its close concentration of companies with experience in creating and refining exotic chemicals, metals and ceramics, no region was better equipped to abet the effort than Niagara Falls. Fueled by cheap, plentiful electricity, the region

had become the nation's center of chemical, metal alloy and ceramics manufacturing.

Many companies in Niagara Falls already had experience working with uranium. Some of the processes and materials that would be required to develop the atomic bomb were invented here. The uranium and graphite of physicist Enrico Fermi's graphite-pile reactor under the bleachers at Stagg Field at the University of Chicago (site of the first manmade sustained nuclear reaction and a crucial first step in the development of the bomb) were almost certainly fabricated in the furnaces of Niagara Falls.

By the end of World War II the Manhattan Project had employed 200,000 people nationwide and cost \$2.2 billion. Gigantic research and production installations were eventually developed at Oak Ridge, Tennessee, Hanford, Washington and Los Alamos, New Mexico. But in the beginning, and in fact throughout the Manhattan Project and continuing through the Cold War, commercial industries in Niagara Falls, Tonawanda, Buffalo, Lackawanna, Lockport and elsewhere in the country would provide many of the materials that the larger facilities required to produce atomic, and later, thermonuclear weapons. This region's industries were among the first to step into the atomic era.

The Captains of the Industry

Just a few of the many local companies that handled radioactive materials for the Manhattan Project—or the Manhattan Engineering District (MED) as it is more properly called—and subsequently for the Atomic Energy Commission and the

Department of Energy:

The Linde Air Products division of Union Carbide in Tonawanda converted lethal uranium oxides mined in the western United States, Canada and Africa into uranium tetrafluoride, also called green salt. The green salt was turned into uranium metal ingots and billets in the furnaces of ElectroMet (another division of Union Carbide), which was on the cutting edge of the industry and producing new metals and materials virtually every day.

ElectroMet also reprocessed uranium filings from Simonds Saw & Steel in Lockport, which cut and rolled the uranium into fuel rods for reactors. ElectroMet also produced thorium. U.S. Vanadium in Niagara Falls, another Union Carbide division, also processed uranium ore.

The cooperative program involving Union Carbide's numerous metallurgical divisions and the Manhattan Engineering District was code-named "The Babbitt 65 Project." There were lots of code names used during the Manhattan Project for substances, plant sites, and processes. Secretive measures were considered necessary, given that the country was at war and our enemies were also experimenting with atomic energy. But code names also served to hide the dangerous nature of the work from the men who performed it and the communities in which they lived.

Hooker Chemical brewed many of the chemicals these processes required, and also facilitated recycling and disposal of uranium waste products. Titanium Alloys Manufacturing (later called TAM Ceramics and today called Ferro Electronics) recycled uranium and thorium metals, and in following years produced zirconium, which was used in military and industrial reactors, for the Manhattan Project, for the Atomic Energy Commission and for commercial use. Ferro Electronics, which is next door to Niagara University, currently manufactures electronic instruments using radioactive zirconium sand of uranium content sufficient to be refined into bomb-grade material.

Bethlehem Steel in Lackawanna, like nearly every facility in the country that had a blast furnace, experimented with

methods of processing uranium and possibly thorium metals.

At What Price?

Before World War II Niagara Falls and surrounding municipalities already were coping with hazardous wastes generated by the burgeoning chemical and metallurgical industries that had seen the city grow from a village of 3,000 to a city of 75,000 in 40 years. Hooker Chemical and several other companies, for example, probably had been dumping in Love Canal since at least the mid 1930s.

Those industries worked double-time for the war effort, including the Manhattan Project, leading to astronomical increases in the amount of hazardous waste produced. Waste materials generated in the creation and processing of uranium—both radioactive and toxic chemical waste—often were disposed of haphazardly, expedience taking precedence over caution. Industrial waste was left in the open, thrown into pits and lagoons, discharged directly into waterways. Uranium and other radioactive sludges were dumped on the ground at the sites known as Ashland 1 and Ashland 2, two mounds, still visible, that tower over both sides of the I-290 just before the South Grand Island Bridge.

Some of the radioactive waste was eventually moved to storage facilities elsewhere in the country, or consolidated at the Niagara Falls Storage Site in Lewiston on the former Lake Ontario Ordnance Works (LOOW), but much remains. The secrecy that continues to surround the project prevents an accurate public accounting of waste materials, as does the often expedient manner of its disposal. Though the MED and its successors kept careful track of the amount of waste produced in each stage of uranium processing, even the companies that created the waste probably could not say for certain where it all went. The pollutants and contaminants emanating from these facilities did not respect property lines, fence lines or human lives.

During the war hundreds of local workers were exposed to dangerous levels of radiation—levels that even then the Project's managers understood were unsafe. Studies of the

effects of radioactivity were later conducted in the larger government facilities, and appropriate (if not entirely satisfactory) safety precautions instituted, but in commercial industries like those in and surrounding Niagara Falls such studies were never done, and safety measures for workers were cursory or nonexistent. This, despite ample evidence available before the war suggesting that radioactivity could kill.

Most scientists understood that radiation could be deadly before the Manhattan Project began, but the scientists working on the MED recommended "acceptable" levels of exposure for factory workers—and therefore perhaps surrounding neighborhoods—that some scientists today would consider virtual death sentences. Those dose levels proved to be arbitrary and malleable anyway—if production demands spiked one week then the "acceptable" dosage levels might rise that week as well.

Postwar letters between executives at ElectroMet and the Atomic Energy Commission (recently posted to various websites) suggest that employees were falsely assured regarding the hazardous nature of the materials they were handling. In these letters the correspondents weigh the value of studying the effects of exposure on workers, and it appears that some monitoring of radiation levels did take place. Many plants had on-site medical facilities that would take urine and blood samples from workers. But if the information gathered at places like Linde and ElectroMet—apparently without informed consent of the workers there—was ever collated and studied, the results of that study were never made public.

As a result, workers employed by plants working with hazardous materials were exposed to extremely dangerous levels of radiation without knowing it was happening—in some cases thousands of times the dose the Manhattan Project scientists had decided was "acceptable." Workers often brought those risks home in the form of radiation on their clothes and hands.

There may have been negative economic repercussions as well, blows to the economic viability of the region that may outweigh and outlast—at least from the perspective of the average citizen—the immense profits made by private corporations. In 1962 Union Carbide closed down about half its operations in and around Niagara Falls. Much of the work that Union Carbide's divisions had performed for the federal government had been transferred to government-

owned facilities by that point, and more would soon follow. In some cases Union Carbide managed those facilities for the government, a much more financially rewarding situation than owning its own plants.

So Union Carbide was left with superfluous industrial real estate, much of which had been badly contaminated—both the buildings and the grounds. It seems reasonable that Union Carbide would have responded to the situation the same way companies like LTV Steel responded to its heavily contaminated, superfluous plants in Lackawanna and South Buffalo. It was cheaper to close down operations and leave than to face the price of remediation and cleanup.

What They Left Behind

In a letter dated March 29, 1944, a Linde superintendent, A. R. Holmes, wrote to the area Army Engineer, Captain Emery L. Van Horn, about disposing of liquid caustic wastes contaminated by radiation.

law department advises that it is considered impossible to determine the course of subterranean streams and therefore, the responsibility for contamination could not be fixed."

The MED recommended the second option, and over the next two years Linde pumped nearly 50 million gallons of radioactive effluent into shallow wells on its property. (That's equivalent to nearly 13 seconds of full flow over the American Falls.) The wells would regularly become congested with silt and overflow onto the ground, but, at MED's insistence, Linde continued to pump the effluent into the ground. The Army Corps of Engineers continues to remediate the Linde site in Tonawanda, but that effluent is long gone—into the ground, into the aquifer, into the Niagara River (from which comes much of the area's drinking water) and over the Falls. However, it is not too late to determine where exactly that caustic, radioactive waste went, or what ill effects it may have caused the environment and the health of the population. The radioactive contaminants are heavy



The radiation symbols chart some of the sites in Niagara Falls on which radioactive materials were manufactured, recycled, stored, handled or dumped. The squares represent industrial sites.

He wrote that the options were to discharge the material into a storm sewer, which empties into Two Mile Creek, which runs past a public park and eventually into the Niagara River; or to discharge the material into a well on Linde's Tonawanda factory property, which was already contaminated by other materials. The Linde official wrote, "Plan 1 is objectionable because of probable future complications in the event of claims of contamination against us. Plan 2 is favored because our

metals with long half-lives that may still exist along whatever pathway they were carried. Wherever they are, they are still radioactive.

In any case, Linde's actions seem illustrative of the prevailing attitude toward waste disposal during that era and suggests that similar, or worse, episodes may have occurred elsewhere in the region.

There are more documented incidents

to substantiate that notion. At the LOOW 20,489 tons of radioactive waste were stored. Eight thousand tons were dumped on the ground, according to declassified government documents. The rest was left in the open or stored in concrete silos, where it remained for decades.

After the war, five thousand drums of waste from places like ElectroMet and Linde and Simonds Saw sat in barrels along railroad tracks and adjacent to public roads on the LOOW, waiting to be disposed of properly. While the barrels waited they were exposed to the elements, and 1,500 barrels deteriorated to such a degree that the materials had to be transferred to new barrels before they could be moved.

Not all of the radioactive waste material in and around Niagara Falls dates back to the 1940s and 1950s. According to Department of Energy documents, between 1965 and 1972 Union Carbide companies located on 47th and Royal Avenue in Niagara Falls, just off Niagara Falls Boulevard, produced 505 tons of waste carrying 9,212 pounds of uranium oxide and 1,293 pounds of thorium oxide. The waste was placed in 55-gallon drums and buried in a ditch 20 feet deep with four to five feet of soil on top. The ditch is somewhere in that complex of plants on property that may or may not still belong to Union Carbide.

Presumably, like the barrels that sat deteriorating and perhaps leaking along the railroad tracks on the LOOW site, those barrels buried on Union Carbide's property will not last forever—if they are still there. It's been 29 years, and nobody seems to know exactly where they were buried, and there is no account of them ever having been removed. Within 1,000 feet of where those barrels are buried is a baseball diamond that is used every summer.

There may be as many as 35 sites in the Buffalo Niagara region on which radioactive materials were manufactured, recycled, stored, handled or dumped. Many may prove to be harmless, but all demand investigation. Only a few—Linde, Simonds Saw & Steel; B&L Steel; Ashland 1 and 2 dump sites; the LOOW; and the Niagara Falls Storage Site—are slated for scrutiny by the Army Corps of Engineers. Only the Linde site is in the process of being remediated.

LOOW and the Niagara Falls Storage Site

Most mysterious and perhaps most contaminated is the former LOOW site, which lies in the townships of Lewiston and Porter just north of the Tuscarora Indian Reservation. Originally it occupied approximately 7,500 acres, which were purchased by the US Army in 1942. Some of the farmers who owned the property sold voluntarily; those who didn't sell were served a 30-day eviction notice. The Army built a TNT manufacturing plant on part of the site, but that plant ceased operations after less than a year. Gradually the property was transferred to other government agencies or sold piecemeal to private citizens, businesses and municipalities.

Currently 800 acres north of Balmer Road are owned by the Department of Defense. South of Balmer are 1500-plus acres dedicated to hazardous chemical and municipal wastes, including two commercial dump sites and the Niagara Falls Storage Site, a hazardous waste containment facility currently monitored by the Army Corps of Engineers. One of the commercial dumps, Chemical Waste Management, is one of the largest hazardous waste facilities still operating in the country. Twenty-five hundred acres now belong to homeowners and over 200 acres were sold to the Lewiston-Porter School District.

Even in 1942 it was clear that the site was poorly suited to the Army's original purpose. Much of the parcel is wet, practically swamp, with standing water everywhere. To build its TNT factory the Army had to drain the land with a network of sewers and ditches, some of which were also used for discharging waste into the Niagara River. The site was even less well suited to its subsequent uses: a dumping ground for radioactive and aggressive biological wastes, toxic chemicals, and nobody knows what else.

From 1944 to 1947, the MED used the LOOW to store uranium ore processing residues from Linde and ElectroMet, as well as a number of other facilities. By 1948 the MED had ended and 600 acres was transferred to the Atomic Energy Commission, which continued to use the site to store uranium ore processing residues. In the late 1940s and 1950s, additional residues and other radioac-

tive waste were transported to the site from eastern and midwestern states.

By 1975 the Niagara Falls Storage Site had been reduced to 191 acres, the size it remains today. The property includes a three-story building with three adjacent silos, an office building, a small storage shed, and a storage building. In the course of several partial remediations of the LOOW, various waste materials have been consolidated on the Niagara Falls Storage Site. In 1988 radioactive material was drained from the silos into a containment facility. The most highly radioactive material in the structure are residues which resulted from the processing of high grade African uranium pitchblende ores. The average concentrations of radium-226 and thorium-230 in the residues are 520,000 picocuries per gram and 54,000 picocuries per gram respectively.

That is a massive amount of radiation contained in a relatively small area. This waste, 4,000 cubic yards worth, represents the greatest concentration of radium-226 in the world. It is 2,500 yards from the Lewiston-Porter school system, which serves 2,500 students.

The Army Corps of Engineers says that the swampiness that characterizes the rest of the former LOOW does not exist at the Niagara Falls Storage Site. The Corps monitors the integrity of the clay cap, checking it for cracks and standing water, and takes radioactivity readings at the boundaries of the site, which they say fall well below permissible standards (1.09 picocuries per gram, as opposed to the maximum allowable 20 picocuries per gram). The Corps is beginning an investigation into the long-term feasibility of the containment facility.

Also stored somewhere on-site are the remains of animals used in radiation experiments at the University of Rochester. Many of the animals were injected with plutonium, which even in the smallest quantities can be lethal. The animal carcasses were apparently tossed in wooden crates and buried in the ground.

The same laboratory at the University of Rochester also performed radiation experiments on unsuspecting humans. Though there is no solid evidence to prove the assertion, it has been suggested that if animal remains from the

Rochester laboratory were buried on the former LOOW site then human remains may have been buried there as well. There are references to a "Rochester burial site" and to "medical wastes" in Department of Energy records pertaining to the LOOW.

Some suggest even more frightening possibilities. The Corps of Engineers reports finding empty canisters labeled phosgene, a type of nerve gas produced during World War II using compounds produced by Hooker Chemical. It is not certain whether substances such as phosgene were stored or produced at the former LOOW, or if the empty containers are simply garbage unrelated to past on-site activities. However, a 1981 New York State Assembly report on the LOOW found traces of a chemical that may indicate the presence of VX nerve gas. Some wonder if the existence of a "biological containment facility" indicates that biological weapons might have been dumped or developed on-site as well.

Remediation Efforts: 50 Years Later, Back to the Corps

No comprehensive health studies have ever been conducted anywhere in the region to determine the possible effects of radioactive waste on the well-being of residents. The closest was an animal survey performed by a Dr. Marvin Resnikoff. Dr. Resnikoff reported that 15 of 20 deer captured near dump sites manifested deformities. Some of the deer contained high levels of radium and cesium in their livers.

Information like that, coupled with anecdotal evidence that suggests high rates of heart disease, genetic disorders, respiratory ailments, lupus, childhood leukemia and other cancers, has frightened Niagara County residents.

Intermittent remediations of the LOOW site typically have been accompanied by new revelations of what might be buried there. Twenty years ago the Department of Energy identified the possibility of dangerous TNT residue on the former LOOW, which has just recently been cleaned up. But virtually no mention was made of the possibility of additional radioactive wastes at the time. Radioactive materials have generally been described as existing at safe levels and as being well contained. But readings taken in 1982 indicated unacceptably high levels of radon gas escaping from the silos on the site. Yet the silos were not emptied until 1988.

In 1998 the Department of Energy turned responsibility for many of these former MED sites to the Army Corps of Engineers—the outfit which had overseen much of the dumping in and around Niagara Falls, which had driven the Manhattan Project to a successful conclusion at a great environmental and health risk to the community.

It's little wonder that concerned residents throughout Buffalo Niagara are suspicious of what the Army Corps of Engineers tells them about chemical and radioactive wastes buried in the region. They've been misled before.

As if to confirm the doubts of local activists, the Corps submitted a remediation plan for the Linde site in Tonawanda which federal and state officials derided as the worst they'd ever seen. It called for post-remediation levels of radioactivity far exceeding any plan ever proposed in the US. The New York State Department of Health suggested that the Corps might have to apply for a waste-handling license for the Linde site—after the cleanup.

This is the first in a series of articles examining the effects of toxic chemical and radioactive wastes in Erie and Niagara Counties. The authors invite anyone who would like to learn more or offer information to contact NiagaraNet@aol.com or editorial@artvoice.com.

Next: The Human Radiation Experiments **av**