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ON March 25, 1945—about three years after Buffalo Niagara's industries began producing uranium for the world's first atomic bomb—at 6:30 a.m., Ebb Cade, his two brothers and a co-worker pulled away from the guard shack at the head of the road that led to the federal government's new, top secret Oak Ridge, Tennessee nuclear facility. All four men worked for a North Carolina construction company that had been contracted to build a plant where uranium was created and enriched.

Ten minutes later the driver tried to pull around a government truck stalled in his lane, and ran head-on into a dumptruck speeding the other way.

The four men in the car were taken to the Oak Ridge Army Hospital, built two years earlier, where Ebb Cade was told his kneecap, right forearm and left femur were broken. Cade was a somewhat elderly black man, according to doctors' records, who suffered from cataracts in both eyes, tooth decay and gum disease.

No one knows which, if any, of those characteristics made the doctors at Oak Ridge choose Cade; maybe it was simply a matter of timing. The night before the accident doctors in the Medical Section of the Manhattan Engineer District (MED, more commonly called the Manhattan Project) had met in Los Alamos, New Mexico and decided to expand the scope of their investigations into radiation and its effect on human health. Previously their information had been limited to that gathered from lab animals and from workers in the numerous labs and factories contributing to the development of the atomic bomb.

On April 10 that changed, when doctors injected 4.7 micrograms of plutonium into Cade's left arm. He was code named HP-12 (HP stood for "human product"). The doctors wanted to see how the lethal

THE HUMAN RADIATION EXPERIMENTS

FROM THE LABORATORY TO THE
WORKPLACE TO YOUR OWN BACKYARD

substance would circulate in the human body, how it would deposit itself in the liver and the bones. Five days after the injection Cade's bones—broken three weeks earlier—were set, but not before bone samples were taken from his body. Doctors also pulled 15 of his teeth. The teeth and the bone sample were hot with radioactivity.

Cade was the first, but many more patients would be subjected to injections of a variety of radioactive isotopes at institutions around the country. In *The Plutonium Files*, Pulitzer Prize-winning journalist Eileen Welsome describes the human radiation experiments conducted by the MED and later the Atomic Energy Commission (AEC). The subjects were sometimes told the injections were a special new therapy, according to Welsome; sometimes they were offered no explanation at all. The injections were sometimes called "the U medication" and represented as a kind of cure.

The scientists who designed the human radiation experiments knew already, perhaps better than anyone else, the dangers of radiation exposure. They knew that the first scientists to play with radioactive substances had suffered terrible health effects. They knew that X-ray machine operators (and subjects) often manifested gruesome radiation burns and illnesses. They had already begun to chronicle the effects of exposure to factory workers handling radium, uranium and plutonium.

The dangers of internal exposure were no mystery either. The whole country remembered the story of the "radium girls," a group of New Jersey factory workers in the 1920s who painted watch hands and dials with glow-in-the-dark paint that contained a tiny amount of radium. The radium girls would often lick their brushes as they worked to keep the point fine. Over time they ingested lethal quantities of radium. Their gums would bleed, their jaws would rot, their bones would become brittle and break, their organs would hemorrhage. They developed cancers and anemias. They died.

But apparently knowing the likely outcomes of radiation exposure—heart disease, cancer, kidney damage, a host of other ailments—was not enough for MED scientists. They wanted to know how it did what it did. Why? For the sake

of science, certainly. Some documents suggest they were concerned about lawsuits that might be filed down the road by nuclear workers and so wanted as much information as they could gather to prepare for that eventuality.

ROCHESTER'S MANHATTAN ANNEX

In September 1945 a program of plutonium injections began at a secret research facility at the University of Rochester called the Manhattan Annex. The Annex, with Army guards posted at its entrances, was across the street from the medical school and connected to it by a tunnel. Colonel Stafford Warren, the head of the Manhattan Project's Medical Section, Experimental Division, had been a professor of radiology at the University of Rochester before being tapped for the Manhattan Project and catapulted to the rank of colonel. So it was perhaps natural that he should choose Rochester as a site for human radiation experiments.

A variety of ailments brought the subjects into the hospital, from hemophilia to heart attack to cancer. The experimenters tended to choose patients who might stay in the hospital for a while, or who returned there frequently, so that the effects of the plutonium injections could be tracked. Some patients lived for decades after being injected, and others died within days. Autopsies were performed on all the patients. Their bones and organs were harvested and studied so scientists could determine the rate at which plutonium deposited itself in the human body.

In some cases it is easy to suppose that the plutonium directly contributed to their deaths: you come to the hospital with a chronic but not life-threatening illness, you are injected with plutonium and six days later you die. In other cases it is difficult to prove what effect the plutonium might have had. A subject who dies ten years later of heart disease? Well, radiation causes heart disease, but so does smoking, and maybe the subject was predisposed to heart disease before the plutonium began wreaking havoc on his body.

In December 1946, over a year after the war had ended and just five months after the last plutonium injection was administered in Rochester (though not the last in the country), 23 Nazi scientists were tried at Nuremberg for murder and torture performed in the name of medical science. The American Medical Association published a three-part code of ethics governing human experimenta-

tion—informed consent, previous animal experimentation and appropriate medical supervision—and an editorial suggesting that in the US military it was "well established that human beings, even under military conditions, are not ordered to submit to procedures that violate the sanctity of their own persons."

Eleven patients were injected with plutonium at Rochester's Manhattan Annex, all

without giving informed consent, the last in July 1946. Numerous others were injected with radioactive isotopes of other substances, again without informed consent. Boys at the Walter E. Fernald State School in Waltham, Mass. were fed oatmeal laced with radioactive iron and calcium—the boys were all members of the Science Club. Soldiers watched atomic weapons tests with sunglasses as their only protection, and then were studied by scientists who wished to ascertain the effects of radioactive fallout from the explosions. And, as we will see, nuclear workers in plants around the country were exposed to dangerous levels of radioactive material and the effects of that exposure studied.

EXPERIMENTS OUTSIDE THE LABORATORY

The boys at the Fernald State School were fed radioactive calcium, and subjects at the Rochester laboratories were injected with it. Coincidentally, the ElectroMet division of Union Carbide in Niagara Falls produced calcium metal for the government laboratories in Los Alamos, New Mexico, the headquarters of the Manhattan Project. Perhaps it is not coincidence—the experiments conducted by the Manhattan Project's Medical Section were generally designed to understand the dangers posed to workers by the substances with which they worked. So perhaps it was natural that the doctors in Rochester would want to test a substance manufactured 70 miles away in Niagara Falls.

But ElectroMet's principle contribution to the Manhattan Project, and later to the AEC, was uranium refining. MED activity at ElectroMet all took place in one wood and brick building. That building is no longer on the site, demolished in 1957, but if it was like MED buildings at other companies it would have been tucked away in a corner and the windows would have been blacked out. The compounds would have been well guarded by armed soldiers.

The men who worked there would have been a tight clique, proud to be working on a project the secrecy of which was evidence of its importance. During wartime and after, in Cold War days, workers were happy to take on extra shifts at higher pay. They were told not to speak about their work, and for the most part they didn't. A widow whose husband worked at one local MED facility said he never spoke about what went on at the plant, and would sometimes be sent away for a

BY GEOFF KELLY • LOUIS RICHIOU

few weeks and wouldn't tell her where.

The pay was considered good, but the price was high. At ElectroMet workers were exposed to dangerous levels of radiation and inhalation of potentially lethal uranium dust. Memos regarding readings taken at ElectroMet characterized exposure to uranium dust as "severe," and radiation exposure as "moderately severe." ElectroMet workers breathed up to 17 times the amount of uranium dust that MED doctors considered "tolerance" level.

Considering that MED's "tolerance" levels were astronomically high by today's standards, and prone to fluctuation depending on the Project's production needs, those early memos describe a poisonous atmosphere at ElectroMet. Today's standards allow nuclear workers a maximum radiation exposure of five rem a year. A dose of 1,000 rem is considered to cause a 100% increase in the subject's chances of developing cancer. According to Dr. Arjun Makhijani, the president of the Institute for Energy and Environmental Research, some workers at ElectroMet were exposed to 6,000 rem. Statistics suggest that is a virtual death sentence. Exposures that MED doctors deemed acceptable were extremely dangerous; exposures they considered "severe" or even "moderately severe" are unthinkable.

Dr. Makhijani says that ElectroMet was probably the worst commercial facility in the nation in regard to worker safety. Conditions did not improve there after the war, nor after 1947 when authority over atomic weapon and energy production was transferred from the Army Corps of Engineers to the newly formed AEC. A 1949 AEC memo describes the hazardous conditions at ElectroMet and then guesses at the cost of improving safety precautions and providing workers a cleaner environment. Weighing the cost against the likelihood that ElectroMet's uranium processing operations would probably shut down in a few years anyway, the memo's author suggests the investment would be a waste of money.

The horrible conditions at ElectroMet were not without a silver lining, at least not for scientists studying the effects of radiation on humans. By that point the AEC had already recognized what MED scientists—many of whom made the jump to AEC in 1947—had understood as early as 1942. A November 28, 1947 memo from the Industrial Safety and Health Advisory Board of the AEC says that conditions in plants such as ElectroMet had produced "a reservoir of individuals who have had considerable exposure to uranium dust, both soluble and insoluble. This large reservoir of potential human damage should, if possible, be followed carefully in the future."

In other words, the workers ought to be tracked like subjects in an experiment. Manhattan Project doctors had started measuring the effects of exposure on ElectroMet workers. There is a letter from Lt. Richard A. Tybourn of the Army Corps of Engineers Medical Division to the Corps Tonawanda chief dated November 9, 1944. Copies were sent to executives at ElectroMet and to Col. Stafford Warren, the head, of the

Manhattan Project's Medical Section, Experimental Division. In the letter Tybourn describes the results of urine tests taken from workers at ElectroMet between July and September 1944 "in connection with a medical research program that is being conducted by the Rochester group." The analysts were checking the urine for concentrations of F and X ions—code names for thorium and uranium respectively.

The concentrations of F ions were not deemed hazardous, although again it should be noted that the tolerance levels set by MED doctors are considered outrageously dangerous by today's standards. Though the MED had not yet established a "safe" level, X ion concentrations, according to the memo, were comparable to levels recorded in other plants—which suggests that this sort of information was being gathered at numerous facilities that the Manhattan Project had pressed into service during the war.

A memo from that same month to Col. Stafford Warren indicates that the collection of urine samples from ElectroMet employees would continue on a monthly basis, and the samples would be analyzed by a Dr. Eugene Roberts, who was examining kidney damage caused by exposure to radiation. In other words, these urine samples were not taken simply in the interest of worker safety. The physicians working for the MED took advantage of the workers' massive exposure to radiation and uranium dust to explore the effects of that exposure on the human body. ElectroMet workers were used as guinea pigs—during the Manhattan Project and apparently long after the war under the supervision of the AEC.

What about "informed consent"? Workers at Niagara Falls plants like ElectroMet were given letters assuring them that their work was entirely safe, that the minute quantities of radioactivity emanating from the materials they handled was too slight to harm them. So slight is the radioactivity, the letter assures, "that specialized instruments are required to detect it." Presumably the writer of the letter was referring to Geiger counters—which are needed to detect any level of radiation.

The wife of a Niagara Falls atomic worker says her husband, a draftsman, was a vigorous man when he started working on the Manhattan Project. Two years later, at the age of 35, he had his first heart attack. He began to break out in boils, two inches across, which oozed infection when opened. As his illnesses multiplied and grew worse, his desk was moved into an isolated corner of the plant and he was gradually cut out of the everyday business of the company.

He was forced into retirement at age 56. Eventually he died of heart disease. At the funeral his supervisor avoided eye contact with his widow.

Most of the men the couple knew from the plant had died years ago, she says. There were lots of illnesses, lots of cancers. "They died like flies over a period of 15 years," she says.

EXPERIMENTS OUTSIDE THE EXPERIMENTS

In the 1920s the radium girls would delight their friends and families after

work by turning out the lights and spinning around in their work clothes, which glowed with radium paint. No doubt workers at places like ElectroMet brought a little bit of their work home with them at the end of each shift.

Dust permeates everything in an environment like that—the clothes, the hair, the shoes, even the treads of car tires in the parking lot. Workers were supposed to take precautions, but regulations were loosely enforced. One MED memo describes a study done on the gloves the workers there wore—apparently they were trying to determine the protective qualities of leather as opposed to canvas, while simultaneously getting an idea of how much radioactive dust workers in different jobs were dealing with.

Lots of radioactivity was recorded on the canvas gloves of L. Carberry, who mixed the uranium tetrafluoride, or green salt, that was refined at ElectroMet. The leather gloves of J. Costingo, a remelt operator, were also hot. The leather gloves of H. Williams, who packed billets, or bars, of the metal were pretty clean. But the memo notes that Williams did his job bare-handed most of the time.

So Williams' gloves were clean but his hands were not. At lunch Williams might have eaten a sandwich with those bare hands, or wiped his lips. After his shift he may have picked up his daughter or tumbled her hair. One could argue that Williams' imprudence was his own fault, but one must remember that no one told him honestly how dangerous were the materials he handled.

Every day workers carried home the dangers of the workplace, and the dangers of the workplace came to their neighborhoods as well. Many of the sites in this region that handled radioactive materials were adjacent to the neighborhoods in which workers lived and died. Controls of emissions and waste outside the factories were no better than the controls inside. The by-products were buried haphazardly, everywhere and anywhere, contaminating the air, the soil, and the streams. For 28 years a tremendous waste pile of radium-226 sat in uncovered silos on the Army's Lake Ontario Ordnance Works (LOOW) site in Lewiston, emitting lethal radon gas into the air.


An area businessman recalls asking a scientist about the danger posed by that plume of radon gas. The scientist replied, "Which way is the wind blowing? 'Cause I'm getting out of this town."

THE EXPERIMENT CONTINUES

That radium-226 was moved from the silos to a clay-capped containment area in 1988. Other radioactive materials that had been dumped throughout the region and elsewhere on the LOOW site have been consolidated to the Niagara Falls Storage Site (NFSS) as well.

Over a dozen members of the National Academy of Sciences have testified that radium-226 should not be stored anywhere near human beings. The NFSS is just 7,000 feet from the Lewiston-Porter Schools, with 2,500 students in attendance. A storm sewer that runs through the NFSS passes through school property on its way to its outlet on the Niagara River.

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There is a site on the old LOOW property called the Rochester Burial Site where medical wastes were dumped—presumably medical wastes from the MED Medical Section's activities in Rochester. Hundreds of dogs and monkeys and thousands of lab rats that were injected with radioactive isotopes were buried there in wooden crates. It is not unreasonable to think that human body parts—the pieces of bones and organs recovered from the bodies of subjects—might be buried there as well.

It is reported that the equipment used in the Rochester Manhattan Annex experiments was also buried at the Rochester Burial Site. That equipment would include such things as syringes and vials that contained plutonium. The equipment, like the animal carcasses, was buried in wooden crates that decay quickly and that have no capacity for containing plutonium or its radiation.

Different plutonium isotopes have half lives ranging from 6,500 to over 300,000 years. The smallest amount can be lethal. And the LOOW site where these medical wastes are buried is a swamp, crisscrossed by drainage ditches. There is no telling how or where the contamination from poorly contained wastes might travel.

When the MED ElectroMet building was razed in 1957, contaminated waste and debris were dumped at the LOOW and at the old Union Carbide dump north of Pine Avenue in Niagara Falls, then operated by Newco and later by CECOS International Inc. Judging by available

reports, that contaminated material has never been addressed, remediated or recovered—it's still there, and it's still radioactive.

The region is pockmarked with toxic waste dumps and radioactive hot spots. At Ferro Electronics, formerly TAM Ceramics and before that Titanium Alloy Manufacturing, barrels of barium remain buried in the back of the property. The site is contaminated with uranium-238, radium-226 and thorium-232, according to the New York State Department of Environmental Conservation (DEC). Radiation levels around the contaminated areas are 50 times background level. Ferro is located less than a quarter mile from Niagara University. Yet no action is forthcoming, according to DEC reports.

The sites that require investigation and remediation are too numerous to mention—there are far more than the half dozen currently being considered for cleanup by the Army Corps of Engineers. They are not at all inaccessible, either—a curious kid or a teenager looking for a place to hang out can take a walk through the old ElectroMet site, or slip through a section of turned-back fence and explore the old LOOW property. The LOOW has been popular with teenagers for decades—kids even used to climb on top of the silos filled with radium-226, and swim in tanks that had been used to treat and store chemical and radioactive wastes.

As in the case of H. Williams, the barehanded ElectroMet worker, one can argue that these kids—or the people who

buy houses next to some old dump site—are their own worst enemies. But, again, residents of Erie and Niagara Counties have been lied to again and again about what is buried in their backyards and the danger it poses. When government officials do acknowledge the presence of radioactive waste they tell residents it is "low-level" waste.

They don't say that "low-level" waste is, by definition, any radioactive substance other than weapons- or fuel-grade material. That's how substances as dangerous as radium-226 or thorium-232 get classified as "low-level" waste.

Government officials will tell residents that the exposure risk is minimal, and that the level of exposure is "safe." But more and more health physicists dismiss the idea that there is a "safe" dose of radiation. Every dose at any level is a crap shoot—you might get cancer, you might not. It's not like arsenic, of which your body can absorb a certain amount before you die. Higher doses of radiation are worse, but any dose is dangerous.

"There is no safe dose," says Dr. John Gofman, a pioneer in the study of radiation and human health and himself an original member of the scientific team assembled for the Manhattan Project and later the AEC.

WHAT TO DO ABOUT IT?

In March 1951—nine years after ElectroMet and other Niagara Falls companies began processing uranium for the military—the government built a uranium refinery in Fernald, Ohio. Although

Buffalo Niagara industries began earlier and were more numerous, the history of Fernald is a mirror image of our own. The AEC told citizens that no hazardous work would be performed at the new plant, which then proceeded over the next 30 years to leak hundreds of thousands of pounds of uranium dust into the environment through equipment failure and carelessness.

In Fernald, as in Niagara Falls, radioactive waste was dumped in uncapped pits. Radon gas leaked from uncovered silos filled with radium-226—just like the silos in Lewiston on the LOOW site. The ground and water were contaminated with uranium, thorium and other radioactive residue—just like Niagara Falls.

The difference are these: First, Niagara Falls is worse. The contamination in this area outstrips that in Fernald.

Second, Fernald neighbors initiated a class-action law suit against the federal government and won. Fernald's is a cautionary tale—the cleanup, which is funded by taxpayers, has not gone smoothly and there are questions about the competency and honesty of the contractors. But such a lawsuit may be the next logical step for Niagara activists and concerned citizens.

This is the second 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 NiagaraNei@aol.com or editorial@artvoice.com.

av

WHATASHAPPENED



— left —

Photographer Milton Rogovin reviewed the first press run of his forthcoming book, *The Bonds Between Us*, at Partners' Press on May 31st. The book, celebrating forty years of documenting parents, guardians and children, will be released in July. Milton (center) is pictured with his wife & chief booster Anne Rogovin, and Larry Licata, Partners' press supervisor.



Buffalo's annual Gay Pride Parade happened on June 3rd with hundreds festively meandering down Elmwood and ending on Bidwell Parkway.



— i & r —
Kenan Center in Lockport held their superb 100 American Craftsman show from June 1-3. Seen, and heard, in the arena on the final day: Sue and Joe Rozler (left), performing amid the creations; and O.P. basket maker Kathleen Currie (right), holding one of her Nantucket models.



Out & proud: members of H.A.G. Theatre Company (above); Pride Buffalo reps Shaun Doyle and Lorrie Mattar sold t-shirts in the park (left); and AIDS Community Services' Guy Tomassi (right), having a rainbow day.



photos & words: Nancy J. Parisi