Spring Valley: At Risk from WWI Poisons?

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Study finds diseases in 1918 test area

■ **Health survey:** Yearlong review focused on 345-house section

By CHARLES BERMPOHL
Current Staff Writer

Bill Petros/The Current

The Army Corps of Engineers will soon resume an extensive dig at Lot 18, at the southern end of American University. Above is an example of the laboratory glassware found there.

A yearlong survey of health problems in a 345-house section of Spring Valley has turned up 160 cases of chronic, often life-threatening and rare diseases — roughly one in every six homes — in the epicenter of the U.S. Army's World War I chemical warfare testing grounds.

The survey, coordinated through The Current, showed 131 individuals afflicted with 56 separate diseases of which more than half — 30 — can be linked to arsenic and other lethal agents that were developed, tested and then buried in the neighborhood during and after the war that ended in 1918.

Most of the victims of these diseases, which include 58 cancers and 27 autoimmune disorders, no longer live in Spring Valley. Fifty are dead.

The purpose of the immune system is to recognize invading microorganisms and destroy them. An autoimmune disorder occurs when the immune system mistakenly identifies the body's own cells and tissues as alien invaders and attacks them, producing a variety of disorders. The American Medical Association says an autoimmune disorder can be caused by bacteria, viruses or drugs in a person who already has a genetic predisposition.

Multiplicity is a characteristic of the disease picture in the area.

Geza Teleki, for example, is afflicted with hypothyroidism, diabetes, kidney disease, a colon disorder so serious that his doctors have advised that the organ be removed, and a growing heart problem. Teleki, who now resides in Maryland, lived in the same house on 48th Street in Spring Valley for 31 years.

A variety of ailments have affected the Bohlen family, which has lived in the same house on Quebec Street for the past 46 years. Janet Bohlen has non-Hodgkin lymphoma and hypothyroidism. Her oldest daughter suffers from severe mercury poisoning, and her youngest daughter has hypothyroidism.

Sometimes a house itself can appear to be sick.

In one house on the 5000 block of Sedgwick Street, a man died of complications from aplastic anemia in 1966. The autoimmune disease, which destroys all three types of blood cells, is the rarest of the diseases found in The Current's survey, infecting 300 to 1,000 people in the United States every year.

But more than 10 years after the man died, a young girl living in the same house but unrelated to the previous occupant was also afflicted with aplastic anemia and died from it.

In another Spring Valley house, a man died of esophageal cancer, one of his daughters contracted the thyroid disorder Graves' disease, a second daughter suffers from irritable bowel syndrome, and a tenant who rented a room in the house for less than a year developed multiple sclerosis, another autoimmune disorder.

Family pets can also be included on the casualty list. A young dog that lived in the house where the cancer, Graves, irritable bowel syndrome and multiple sclerosis occurred died of a blood disease in 2002. The Telekis' dog died at age 6 of hypothyroidism, and the son's two pet mice died and were found to have high amounts of arsenic on their fur. One of the Bohlens' dogs died of bone marrow cancer at an early age, and another, also young, went blind.

The Current's survey does not establish an irrefutable link between the chronic diseases and the toxic chemicals buried in the area some 85 years ago. And health-care professionals contacted by the newspaper have been quick to point that out.

But the survey raises the possibility of such a link when additional factors are considered:

■ Deadly chemicals in vintage military ord-

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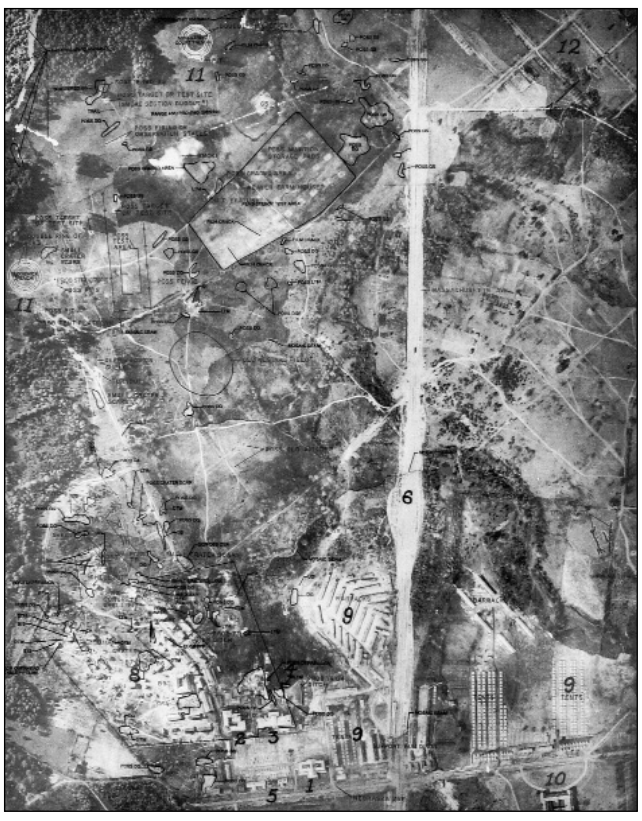

Courtesy of the U.S. Army Corps of Engineers

This 1918 aerial photo of the American University area provided clues to where chemical weapons were buried. Investigators used landmarks to identify sites.

Conflict overseas brought camp to American U.

■ **The history:** Army Corps general warned of future dangers to neighborhood from chemical investigation

By CHARLES BERMPOHL
Current Staff Writer

Courtesy of the U.S. Army Corps of Engineers

A smoke cloud emanates from a "Livin's Drum" during one of the tests of chemical munitions on and around the American University campus.

On the night of April 2, 1917, President Woodrow Wilson delivered a 36-minute speech to a joint session of Congress. He said Germany had committed acts of aggression against the United States, mainly through the unrestricted use of submarines in the Atlantic, and that American lives had been lost. The country, he said, "will not choose the path of submission and suffer the most sacred rights of our nation and our people to be ignored or violated."

He went on to ask the Congress to declare war. On Wednesday, April 4, the Senate complied, with a vote of 82 to 6. The House followed, after 17 straight hours of oratory, at a little after 3 in the morning of April 6 — a stormy Good Friday — by a vote of 373 to 50.

Shortly after he finished his lunch later that day, Wilson, with his wife, Edith, standing just behind him, signed the joint resolution in the White House.

The nation was officially at war, joining a conflict for which it was ill-prepared.

On the Western Front in Europe — from the North Sea at Flanders in Belgium southeast in a loopy arc through France to the Alps at the Swiss border, a distance of some 340 miles — more than 6 million men were locked in combat.

The United States had little more than 200,000 men in uniform — about the size of the British Army at the start of the war two years and seven months before. What America had to do, it had to do in a hurry.

In the feverish buildup that followed, the nation's colleges and universities offered their campuses and buildings for the Army's use. On April 30, American University joined the

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SPRING VALLEY:
AT RISK FROM WWI POISONS?

A Bush autoimmune link to area?

■ **Health issues:** Former President, wife, youngest son all suffered diseases

By CHARLES BERMPOHL
Current Staff Writer

Courtesy of the George Bush Presidential Library

At left, George and Barbara Bush dance at the Inaugural Ball in 1988. Above, the family poses in front of the U.S. Capitol upon George Bush's election to Congress in 1966 and their move to Spring Valley. From left are Jeb, Marvin, Doro, Neil and George W. in the front; George and Barbara are in the rear.

In December 1993, former President George H.W. Bush, his wife, Barbara, and their dog, Millie, checked into Tulane University Medical Center in New Orleans for blood tests to discover why all three of them suffered from autoimmune diseases.

The husband and wife both had a thyroid disorder called Graves' disease. Millie had lupus.

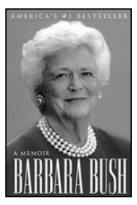
Barbara Bush, in the first of her two autobiographies, "A Memoir," wrote in 1994 that the Tulane doctors were looking for "a possible common virus that might be responsible for autoimmune diseases. If such a virus is found and proved to be the cause, it will be an important breakthrough."

No breakthrough was made because no common virus was found.

And it probably would have been no different had the Bushes taken with them their youngest son, Marvin, instead of their springer spaniel. But that scenario looks more intriguing.

Marvin Bush also had an autoimmune disease, ulcerative colitis, which almost killed him. And all three Bushes lived in Spring Valley before contracting the diseases. Millie did not.

George and Barbara Bush and their three youngest children, 12-year-old Neil, 10-year-old Marvin and 7-year-old Dorothy (Doro), moved to Washington from Texas after the former president was elected to Congress in 1966. Future President George W. Bush was at Yale University, and future Florida Gov. Jeb Bush remained in Texas, where he was attending a preparatory school in Houston.



"George bought it over the phone, sight unseen."
— Barbara Bush in her autobiography 'A Memoir'

A 3-year-old daughter, Robin, had suffered from leukemia and died in Texas in 1953.

"We bought a house in Spring Valley, a lovely section of Washington with lots of trees and houses built in the 1920s and 1930s," Barbara wrote in her autobiography. "George bought it over the phone, sight unseen," from a Republican senator from Wyoming.

The house was on Hillbrook Lane. Barbara Bush described it as "a really old house."

The Bushes lived there for only five months, from January to May of 1967. They then moved to a "wonderful new, four-story house" not far from Sibley Memorial Hospital on the 5100 block of Palisade Lane in the neighborhood of Kent, just a few blocks from Spring Valley.

The Bushes evidently liked the Palisade Lane house. Over the course of George H.W. Bush's varied political career — in which he served as U.S. ambassador to the United Nations, chairman of the Republican National Committee, ambassador to China and then director of the Central Intelligence Agency — the Bushes returned to the house two more times, from April 1973 to October 1974 and from December 1975 to February 1977.

The Bushes also lived on the 4400 block of Cathedral Avenue and the 4400 block of Lowell Street, according to information supplied by the Bush Presidential Library.

Marvin Bush was diagnosed with colitis in 1986, while his father was vice president, and at one point, when he was hospitalized and had lost 45 pounds, he believed he was going to die, according to one biography. He survived after his colon was surgically removed and replaced with a bag that acts as a bowel.

Also, as a boy living in Texas, Neil Bush was diagnosed with dyslexia after teachers discovered he could not spell. He later moved to Spring Valley.

According to "Barbara Bush: A Biography," written by Pamela Kilian, both Barbara and George H.W. Bush developed

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Diseases show possible link to arsenic, other poisons tested at AU

The following is a list of the diseases found in the 161 homes in the 345-house area of Spring Valley. The diseases are ranked in order of how often they occurred.

If a disease has been linked to a chemical by the National Institutes of Health, the federal Institute of Medicine or some other official source, that disease is marked with an (A) for arsenic, (C) for chemicals, (L) for Lewisite or (M) for mustard agent. If a disease is considered an autoimmune disorder, that is noted also.

Being linked to a chemical means only that a chemical can be a cause, not that it is a cause. There is no evidence that any of the chronic diseases that turned up in the survey were caused by chemicals.

■ Breast cancer, 10 cases, five fatal.
■ Cancer not otherwise identified, seven cases, all fatal.
■ Leukemia (A, M), seven cases, three fatal.

There were 30,600 cases diagnosed in the United States in 2003.
■ Memory problems, seven cases.
■ Peripheral neuropathy (A), seven cases.
■ Prostate cancer, seven cases, six fatal.
■ Brain cancer, five cases, all fatal.
■ Myelodyplastic Syndrome (C), five cases, one fatal.

There are 20,000 to 50,000 cases in the United States every year.
■ Parkinson's disease, five cases.
■ Autoimmune disorder not otherwise identified, four cases.
■ Bipolar disorder (M), four cases.
■ Dyslexia, four cases.
■ Kidney disease not otherwise identified (A), four cases.
■ Lung cancer (A, M), four cases, all fatal.
■ Lupus, four cases.

An autoimmune disorder, it strikes one in 2,000 people in the United States every year.
■ Multiple myeloma (C), four cases, three fatal.

In the United States in 2003, 14,600 people were diagnosed with this disease.
■ Non-Hodgkin lymphoma (C), four cases, one fatal.

In the United States in 2003, 53,400 people were diagnosed with this disease.
■ Skin cancer (A, M), four cases.
■ Anemia not otherwise identified (A, L, M), three cases, one fatal.
■ Aplastic anemia (C, M), three cases, two fatal.
■ Graves' disease (A), three cases.

This is an autoimmune disorder.
■ Hypothyroidism (A), three cases.
■ Learning disability, three cases.
■ Pernicious anemia (A), three cases.

This is an autoimmune disorder.
■ Thyroid disease not otherwise identified (A), three cases.

This can be an autoimmune disorder.
■ Blood disorder not otherwise identified (A, L, M), two cases, both fatal.
■ Bone cancer not otherwise identified (L, M), two cases, both fatal.
■ Bone marrow lymphoma (C, L, M), two cases, one fatal.
■ Brain tumor, two cases.
■ Crohn's disease-Colitis (A), two cases.

An autoimmune disorder, it affects one in 500 people in the United States every year.
■ Diabetes (A), two cases.

All non-Type 2 diabetes cases are considered autoimmune disorders. The information given to The Current did not identify the type.
■ Esophageal cancer, two cases, one death.
■ Fibromialgia, two cases.

This is an autoimmune disorder.
■ Irritable bowel syndrome, two cases.
■ Keratosis (A), two cases.
■ Liver hamangioma (A), two cases.
■ Liver disease not otherwise identified, two cases.
■ Abdominal cancer, one case.
■ Alzheimer's disease, one case.
■ Asthma (M), one case, fatal.
■ Bladder cancer (A), one case.
■ Chronic fatigue syndrome, one case.

This is an autoimmune disorder.
■ Colon cancer (A), one case.
■ Elevated white blood cell count (C), one case.
■ Hydroencephalitis, one case.
■ Idiopathic Thrombocytopenia Purpura, one case.
■ Liver cancer (A), one case, fatal.
■ Loss of hand, foot sensation (A), one case.
■ Melanoma (A), one case, fatal.
■ Multiple sclerosis, one case.

An autoimmune disease, one in 700 people are diagnosed with it in the United States every year.
■ Myasthenia gravis, one case.

This is an autoimmune disease.
■ Pancreatic cancer, one case, fatal.
■ Rheumatic heart disease, one case, fatal.
■ Rheumatoid arthritis, one case, fatal.

An autoimmune disease, it affects two in 100 people in the United States every year.
■ Skin disease (Duhring's disease) (A), one case.
■ Stomach cancer, one case.

— Charles Bermpohl

SPRING VALLEY:
AT RISK FROM WWI POISONS?

Experts question results without 'cause and effect'

■ **Criticism:** Science hasn't linked disease, buried poisons

By CHARLES BERMPOHL
Current Staff Writer

Three health experts who have studied the possibility that disease and other ailments would follow in the wake of toxic chemicals being buried in Spring Valley 85 years ago challenged the results of The Current's health survey, claiming the survey lacks scientific credibility.

Dr. Bailus Walker, who chairs the Mayor's Spring Valley Scientific Advisory Panel; Dr. Steven Lamm, a pediatrician who is a recognized expert on arsenic and wrote a report on the arsenic levels found in Spring Valley; and Greg Beumel, a toxicologist who serves on the Spring Valley Restoration Advisory Board, all questioned the results, saying, basically, that they proved nothing.

Walker, who, like the others, received a packet of survey material from The Current, replied in an e-mail, "No cause-and-effect conclusions can be drawn from your inventory [of health problems]. The number of specific diseases is far too small to discern a specific pattern or to hint at an etiologic [assigning a cause to a disease] hypothesis."

Lamm said in a telephone interview that the information in the survey is nothing more than "a collection of anecdotes without confirmation of diagnosis."

Lamm's 2001 report on Spring Valley, which proved to be controversial, said in general that the arsenic levels found in the soil did not represent a threat to human health.

Beumel said the survey showed an absence of scientific discipline — a controlled marshaling of facts that are then subjected to rigorous analysis. He was also critical of the seeming haphazardness of the selection process by which subjects were chosen for the survey, which was without regard to how long they lived in the neighborhood and what health problems they may have had prior to moving into Spring Valley.

But that touched upon the reason behind The Current's initiative: the decided absence of any comparable survey done by a doctor or scientist or science-based agency.

Despite numerous anecdotal and well-publicized reports of chronic or long-term serious illnesses in Spring Valley that have persisted through the years, neither the D.C. Health Department, the U.S. Environmental Protection Agency nor the Federal Agency for Toxic Substances and Disease Registry has followed up with an expansive scientific investigation.

That does not mean that official health-related investigations were not done. Two years ago, the D.C. Health Department compared several kinds of cancer deaths that could have been linked to arsenic exposure that occurred over a period of years in Spring Valley to a community with a similar socioeconomic makeup in Potomac, Md. Its verdict: Spring Valley did not show unusually high numbers of cancer deaths.

But Dr. Jeffrey Kraskin, an optometrist who serves with Walker on the Mayor's Scientific Advisory Panel, said in an e-mail around that time that the Health

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Bill Petros/The Current

Geza Teleki, left, testifies at a city council hearing last year. Teleki believes buried World War I chemicals caused his health breakdown. At right is Curtis Bohlen, whose family also has diseases.

Hopkins doctor eyes link to resident's illness

There is a rare instance of a doctor actually treating a longtime Spring Valley resident for a host of life-threatening health problems. And that report represents a difference in kind rather than degree from the others — even as it yields no conclusion.

Dr. Virginia Marie Weaver, an occupational health specialist at the Johns Hopkins Medical School, reported in a five-page clinic note last January that her patient, Geza Teleki, represented a puzzle for any health professional.

Teleki, who in 2003 moved to Maryland after living in his family home on the 3800 block of 48th Street in Spring Valley for more than 30 years, suffers from diabetes, hypothyroidism, advancing kidney disease, colon disease and a heart ailment that may require surgery.

This multi-organ breakdown occurred in a two-year period after more than a decade of robust good health.

Weaver wrote that, prior to the 1990s, Teleki suffered from a variety of tropical infectious diseases that occurred during his work as an anthropologist in Africa. After treatment, he showed every sign of being in good health.

But his recent ailments came suddenly and without warning.

Teleki's wife, Heather, suffers from peripheral neuropathy, poor circulation in her hands and feet and hair loss. Their son, Aidan, has been suffering from severe headaches and stomach problems.

While there is no scientific proof of cause and effect, peripheral neuropathy, Heather Teleki's symptoms and the symptoms of the Telekis' son are known to be produced by exposure to arsenic.

After the son's pet mouse died at the 48th Street house, the Environmental Protection Agency's lab report stated there was arsenic in all the animal's internal organs, and a high concentration of arsenic was found in its fur, Teleki said.

"Basically," Teleki said in an interview, "there was arsenic all over the mouse."

Weaver was aware of the Army's World War I

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Scientific limits: *Love Canal's pollution never proven to be cause of diseases*

The difficulty in tying chronic diseases to whatever poisons remain in the ground —-all at low levels of toxicity, according to an Army Corps of Engineers study — is no surprise to people who are familiar with the history of contaminated sites in the United States.

Love Canal, a suburban housing development outside Niagara Falls, N.Y., became a metaphor for the toxic cleanup movement in 1978 after investigators found toxic chemicals seeping into basements and doctors discovered a high incidence of residents suffering from chromosomal damage.

The Love Canal site, on an abandoned waterway that had been a chemical waste dumping ground for 20 years, quickly drew protest marches, lawsuits and enormous media coverage.

President Jimmy Carter declared a health emergency. Residents were evacuated and many were included in a $20 million settlement from the dumping company and the city. The incident spawned passage of the Superfund Act of 1980, which requires polluters to fund cleanup costs.

In the summer of 2003, 25 years after the Love Canal contamination was discovered, tests showed that a Buffalo, N.Y., suburb called Hickory Woods had high levels of arsenic, lead and polynuclear aromatic hydrocarbons in the soil. Many thought they could explain the high incidence of breast cancer, respiratory problems and elevated blood arsenic levels in the community.

It was soon learned that the neighborhood sat across the street from buried toxic waste from an old steel-making plant.

The state Health Department acknowledged the contamination at Hickory Woods but said it posed "no immediate health risk." How could the Health Department make that assessment? Because the scientists the agency relied on could not come up with a connection between the waste and the health problems.

The same thing happened at Love Canal. Despite the litany of health problems and the site's history as a toxic-waste dump, science did not make a conclusive connection.

According to a 2003 Newsweek article on the Hickory Woods case, "Linking contamination to health problems has always been controversial. Scientists never made definitive connections at Love Canal either."

Last year, the families of 12 brain tumor victims, all of whom worked in the Philadelphia-based research laboratories of Rohm & Hass Co., the nation's sixth-largest chemical maker, learned that experts could not prove a link between the tumors and the job site.

And this came in spite of the fact, according to an article in The Philadelphia Inquirer, that "physicians estimated the number of cases to be about twice what could be expected, given the rate of brain tumors in the general U.S. population."

The newspaper's reporter contacted an epidemiology professor at the University of Texas' M.D. Anderson Cancer Center in Houston. The professor, Melissa Bondy, was quoted as saying, "We don't ... know what causes brain tumors. We just haven't found it."

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Spring Valley: At Risk from WWI Poisons?

Acute effects of buried toxins dramatic

■ **Harrowing tales:** Area residents, workers overcome suddenly by fumes

By CHARLES BERMPOHL
Current Staff Writer

Bill Petros/The Current

This home on Glenbrook Road sits vacant, its mortgage payments covered by the government, until the cash-strapped Army, burdened by new projects, can clean up ordnance buried on the property. At left is some of the labware unearthed nearby.

The idea that deadly chemicals buried in the ground 85 years ago can rise like an army of vampires to strike at the living remains a controversial — and, to some, bitterly resented — notion in Spring Valley.

The controversy follows anecdotal reports of chronic diseases and uncommon deaths. Without irrefutable evidence linking the illnesses to lethal concoctions from Army labs at American University during World War I, the scenario looks like a set of awful but random occurrences that can happen in any neighborhood anywhere.

But there are also the acute effects, the sudden, silent occurrence that can overwhelm a victim just as dramatically as a chronic disease. The acute cases may be the bridge between the buried chemicals and the chronic diseases.

Digging in the garden

One such incident was described by Stuart Umpleby, who announced at a public meeting set up by the Army Corps of Engineers at the Sibley Memorial Hospital auditorium on Aug. 5, 2003, "I experienced Lewisite while digging in my garden."

The incident happened in mid-May of 2002 at Umpleby's home in the 4000 block of 49th Street.

Umpleby said he did not fear the arsenic he'd heard so much about because he'd been told by the Corps at an earlier presentation that arsenic "was a powder or dust in the soil" that you would have to ingest in order to get it into your body. Besides that, arsenic, he said he had been told, "didn't accumulate in the body; the body eliminated it."

Then, on that day in May 2002, when he was working in his garden, "I smelled something," he said. The Corps' minutes of the public meeting quote him as describing it as "a musty and slightly sweet smell coming from the disturbed earth."

"I started sneezing [and] my eyes were burning," he said.

In the Corps' written version of its interview with Umpleby, the incident included "a slight burning in his lungs," and, later, "a headache that dissipated the next day."

Umpleby went to his computer and researched Lewisite, the deadly arsenic-based chemical developed at Catholic University and tested at American University in 1918. A liquid that turns into a vapor when it is exposed to air, Lewisite "causes you to sneeze. It burns the eyes — basically, the same symptoms I had."

Umpleby was not the only one who had a problem with his yard. Several years before, he said, workers installing drainage pipes got sick and told him "there was something wrong with the soil."

Two cases, four years apart

Umpleby's incident resembles those described by Rick Feeney and Jeff Miskin, which occurred on the same Glenbrook Road property four years apart; Feeney's happened in 1992, Miskin's in 1996. Neither man knew the other.

Feeney's story was written by reporter Harry Jaffe and published in the Washingtonian magazine in December 2000. It began with Feeney's dog, Kerry, which was standing at a construction pit next door when she began yelping and whining and shaking her head back and forth. There was liquid coming out of her eyes and mouth. When Feeney went to help, his own eyes started to water, the skin on his arms began to sting and a bitter taste filled his mouth, according to the article.

Feeney hosed off Kerry and himself and that seemed to be the end of it. But whenever he came near the construction pit, he suffered the same affects.

Miskin suffered a similar but more intense fate at the same property, now the 4835 Glenbrook Road home of American University President Benjamin Ladner, in 1996. Miskin, a landscape contractor, was operating a truck-mounted device known as a tree spade, which is able to dig a hole big enough to allow a mature tree to be planted in it.

Once Miskin removed the plug of dirt, smoke began pouring out of the hole he had just created. He said he jumped into the hole to see what was causing the smoke and his eyes began watering, a bad taste filled his mouth and his head started pounding. Fellow workers saw his face swell up. He was rushed to a hospital emergency room, was treated by doctors who did not quite know what was ailing him and, he said, was forced to put up with a severe headache for the rest of the week.

Problems next door

The saga of five construction workers from West Virginia came in between the Feeney and Miskin incidents. They were hired to build a house next door to Ladner's, at 4825 Glenbrook, and were working there in 1995. The men, who were interviewed by Spring Valley filmmaker Ginny Durrin a year later, recalled being sickened daily by the smells from the soil.

On one day, they broke open a bottle and the escaping fumes caused severe pain in their eyes, their skin and their lungs. They, too, were rushed to a hospital. A year later, during their interview with Durrin, they still bore the signs of the exposure: water blisters, red splotches, brown spots, respiratory ailments and a very noticeable forgetfulness. "I don't remember things as good as I once did," said one. "My mind don't focus like it did. Sometimes I'd just be talking about one thing and forget what I was talking about and go to something else. My wife thinks I'm crazy."

Itching is another problem, said another worker, itching "from the top of my head

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Dartmouth study complicates arsenic's role in disease

A major criticism of The Current's Spring Valley health survey is that it groups diseases that have known links to arsenic exposure with diseases that have no such connection.

But a study done by the Dartmouth Medical School last year maintains that arsenic plays a much more complicated role in causing cancer than originally thought, perhaps not acting on its own to cause the deadly disease but working indirectly to enable other substances to do the carcinogenic dirty work.

The study, which focused on exposure to small amounts of arsenic in drinking water, found that arsenic can inhibit genes that perform critical housekeeping functions in the body that permit cells to repair damaged DNA.

The process is known as DNA repair and is looked on as a key biological defense against cancer.

"We were primarily interested in uncovering the mechanism to explain how arsenic causes cancer," Dr. Angeline Andrew, the lead author of the study, told Geoscience News, a publication of the Australian Institute of Geoscientists.

Noting that arsenic is a well-established carcinogen, Andrew said the study "supports the hypothesis that arsenic may act as a co-carcinogen — not directly causing cancer, but allowing other substances, such as cigarette smoke or ultraviolet light, to cause mutations in DNA more effectively."

Separate studies have shown that exposure to arsenic can increase by six times a cigarette smoker's risk of getting lung cancer.

The housekeeping genes, according to the Dartmouth study, target DNA damage caused by environmental agents. The genes unwind the affected DNA, cut the damaged parts out, tape the repaired DNA back together and then figure out which cells are beyond repair and must die.

"It is often difficult to establish patterns in human studies, due to inter-individual variation," said Andrew, "but our findings are consistent with the hypothesis that inhibition of DNA repair capacity is a potential mechanism for the co-carcinogenic activity of arsenic."

Andrew said that the study involved only a small number of individuals and that a larger study was needed to verify the results.

Of the 56 separate diseases found in The Current's Spring Valley health survey, 20 can be linked to arsenic.

— Charles Bermpohl

Contributors

Contributors to The Current's coverage of the munitions work at the American University Expirmental Station during World War I and the ongoing project to clean up the remains have included present and former staff writers and interns: Charles Bermpohl, Jennifer Coderre, Chris Kain, Erik Linden, Hen Kennedy and Elizabeth Wiener. Editors involved in preparing this section were Beth Cope, Chris Kain, Davis Kennedy and Koko Wittenburg.

SPRING VALLEY:
AT RISK FROM WWI POISONS?

Individuals, families, homes seem plagued

■ **Chronic conditions:** Multiplicity of afflictions seen throughout health-survey area in Spring Valley

By CHARLES BERMPOHL
Current Staff Writer

A characteristic of the diseases found in Spring Valley is their terrible multiplicity in hitting individuals and families like the proverbial ton of bricks.

In 1975, Dr. Wallace Mason Yater collapsed while vacationing at Delaware's Rehoboth Beach. Surgeons discovered that he had widespread polyposis of the colon that caused hemorrhaging into the bowel.

As awful as it sounds, that wasn't what killed him. Nor was it the agent that caused him so much pain in the year he had remaining to him.

Yater, who lived in a large, Tudor-style house on Indian Lane in Spring Valley, was the former head of the Department of Medicine at the Georgetown University School of Medicine, had been the secretary general of the American College of Physicians, was the author of numerous papers on cardiology and diseases of the blood vessels and ran a clinic that bore his name.

He was 80 years old in 1975. He had lived in the house on Indian Lane since 1939. Those two facts might lead to the not unreasonable conclusion that whatever World War I chemicals were buried in the ground near his house would have little or nothing to do with his approaching death.

Bill Petros/The Current

Frances Hansen, shown at a city council hearing last year, said toxic fumes threatened the health of her son at a house she rented from the university. The house abuts Lot 18.

But Yater suffered from a variety of ailments that are typical in Spring Valley, whether or not they are linked to the toxic chemicals the Army buried in the soil after World War I.

According to a biography of the man written in 1982 by a friend and fellow doctor, Edward Parker Luongo, Yater suffered from the autoimmune disease of rheumatoid arthritis, along with a severe heart condition and anemia.

"I found him particularly disturbed over progressive secondary anemia of unexplained origin," wrote Luongo. "Neither he nor I offered any explanation for persistence of the condition."

Yater, whose mother was a victim of rheumatic heart disease, died in May of 1976 of what Luongo surmised was acute ventricular fibrillation.

Autoimmune disorders and blood diseases, along with ventricular fibrillation, are found throughout the 61 houses in Spring Valley that form the basis for these articles.

Nancy Hanger is perhaps the most dramatic example of someone who was raised in Spring Valley and went on to suffer from a variety of diseases that are some of the worst that can be found anywhere: pernicious anemia and lupus, both autoimmune diseases, and autonomic neuropathy of the bowels.

Hanger, a freelance writer and editor who now lives in New Hampshire, was raised in a house on the 4700 block of Sedgwick Street. She was 8 years old in 1968 when she began having gastric problems that put her in a hospital for a year.

In 1972, Hanger's mother was diagnosed with ovarian cancer. Not long after that, her father developed lymphatic leukemia. Her mother eventually died of adult-onset multiple sclerosis at the age of 53. Her father survived the leukemia, but still had it when he died last year.

Sick almost all of her life, but vigorous enough to be professionally successful, Hanger said she must take 13 separate medications daily to stimulate the digestive acids in her stomach to break down her food to turn it into nourishment.

Pernicious anemia strikes four in every 100,000 individuals in the United States every year. Lupus affects one of every 250 women. And leukemia strikes 13 of every 100,000 people.

The U.S. Environmental Protection Agency reported that chronic oral exposure to arsenic "has resulted in gastrointestinal effects, anemia" and a host of other disorders.

The landmark study on the health effects of the 1991 Gulf War, "Veterans at Risk," published by the federal Institute of Medicine, states that Lewisite, when ingested with food, can produce "severe gastrointestinal irritation."

Also, mustard gas was found to impair concentration and lead to cognitive and memory problems. Hanger said she also suffers from a poor memory.

Bill Petros/The Current

Camille Saum, above, and her sister, Beth Junium, were brought up in Spring Valley and have suffered from a variety of lifelong afflictions.

Another victim of a poor memory is Beth Junium, who was brought up in a house on the 5000 block of Sedgwick Street but who now lives in Maryland. "It's like I was in a fog all the time," she said.

Junium has also had most of her thyroid gland removed, and she has lesions on her bladder and red blotches on her skin.

What puts her into that special category of multiple ailments in the same family is that she is the sister of Camille Saum. Saum developed pernicious anemia when she was 5 years old, shortly after moving into the Sedgwick Street house.

She was sick all the time, she recalled. "We'd go away on vacation and I'd be sick in a dark room." She became so weak that she could not walk and often crawled along the floor. Plagued with "massive headaches," she, too, had difficulty with learning and remembering.

A successful interior decorator, Saum just recently was

See **Chronic**/Page B8

Federal study 'Veterans at Risk' documents links to similar diseases

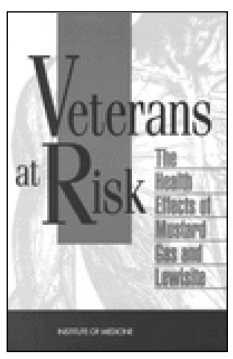
The only federal study of the health effects of exposure to two of the most widely used lethal chemicals developed and tested by the U.S. Army at American University in World War I — mustard gas and Lewisite — show some of the same chronic diseases that appear in The Current's health survey.

The 1993 study, initiated by the Department of Veterans Affairs and carried out by a committee convened by the federal Institute of Medicine, focused on the estimated 60,000 U.S. servicemen used as guinea pigs in a secret World War II chemical weapons testing program.

Many of the survivors of that program were, by the late 1980s, seeking compensation for the health problems they believed were caused by their exposures to mustard agents or Lewisite, which, although prepared for use in the war, were never used in combat.

The Institute of Medicine committee, in its study, published as a book in 1993 called "Veterans at Risk: the Health Effects of Mustard Gas and Lewisite," found "a causal relationship" between exposure to mustard agents and:

- bone marrow depression and the resulting immunosuppression;
- respiratory cancers, especially nasopharyngeal, laryngeal and lung;
- skin cancer;
- leukemia (typically acute nonlymphocytic type associated with exposure to nitrogen mustard); and
- such psychological disorders as mood and anxiety disorders.



These health problems were also found in The Current's survey.

What was also found in the Institute of Medicine's study but not in The Current's survey were pigmentation abnormalities of the skin; chronic skin ulceration and scar formation; such chronic respiratory diseases as chronic bronchitis, emphysema, chronic obstructive pulmonary disease and chronic laryngitis; recurrent corneal ulcerative disease; delayed recurrent keratitis of the eye; chronic conjunctivitis; and sexual dysfunction.

The evidence turned up by the Institute of Medicine also found a suggested causal relationship between such health conditions as leukemia of the acute nonlymphocytic type and sulfur mustard and such reproductive dysfunction as genotoxicity and multagenicity and mustard agents.

The authors of "Veterans at Risk" said there was not enough evidence found to demonstrate a beyond-a-doubt cause-and-effect relationship between exposure to mustard agents and Lewisite and such health problems as blood diseases, gastrointestinal diseases, reproductive dysfunction related to Lewisite, and cardiovascular diseases.

The authors, who included Dr. Bailus Walker, who chairs the Mayor's Spring Valley Scientific Advisory Panel and who questioned the scientific basis of The Current's health survey, said they were hindered by a lack of follow-up health assessments of the human subjects used in the World War II gas chamber and field tests.

That limitation "severely diminished the amount and quality of information that could be applied in the assessment of long-term consequences of exposure to mustard agents and Lewisite," according to the Institute of Medicine.

Moreover, a "lack of records documenting individual participation in the experiments, and uncertainty as to which health problems were in fact the result of these exposures" complicated the Institute's mission.

The Institute also noted, "There were no epidemiologic studies done of mustard-agent exposed U.S. chemical weapons productions workers, war gas handlers and trainers or combat casualties from WWII."

— Charles Bermpohl

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SURVEY
From Page B1

nance and bottles from the 1917-1918 period, including mustard gas and the arsenic-based Lewisite, have been unearthed in Spring Valley by the U.S. Army Corps of Engineers during the ongoing cleanup project. The Army also found high levels of arsenic in the soil of more than 10 percent of the neighborhood's properties.

■ Many of those chemical agents, according to such health-care organizations as the National Institutes of Health, are linked to the kinds of diseases found in the Spring Valley survey.

■ Many of the poisonous concoctions developed and tested in the neighborhood during World War I were so experimental — one-of-a-kind mixtures that were later discarded — that almost nothing is known about them and their potential impact on human health.

■ A number of people, including at least more than a dozen local residents or visiting construction or landscaping workers, have been the victims of sudden accidental exposures to buried chemicals.

■ The only federal study of the health effects of mustard gas and Lewisite revealed some of the same diseases that show up in The Current's survey.

Also complicating the possibility of tying the diseases to the buried chemicals is the unknown itself.

A well-regarded study done by the Dartmouth Medical School last year suggested that exposure to arsenic can permit other potentially harmful agents — cigarette smoke and sunlight were mentioned — to damage the body in a way that would not have occurred without the arsenic connection or with arsenic working alone.

The yearlong Current survey included the work of more than a dozen contributors who either reported about their own or their family's health problems or about neighbors who were victims of disease.

Because of the purely anecdotal nature of the latter information, corroborating sources were required. If such sources could not be found, the information was discarded. More than half of the information initially collected was eliminated from the survey.

Also eliminated from the survey were 11 cases of fatal heart attacks in the study area. Although chemicals can be a factor in heart attacks and in heart disease, heart attacks seemed far too common and tied to more traditional, classic causes to be included in an article about poisonous chemicals and their impact on health.

Most of those who spoke about their ailments, or the illness of loved ones, did not want their names used, and The Current respected those wishes.

The survey area was not selected in advance. It came out after the survey was concluded that the area in which individuals had been questioned included 345 homes, about a quarter of all the homes in the affluent neighborhood in Upper Northwest D.C. Other areas in Spring Valley were not included in the health survey only because The Current did not have sources in those places.

DOCTOR
From Page B3

chemical warfare program and the fact that Teleki's 48th Street house sits on top of one of the two 1918 parallel trenches identified by the Environmental Protection Agency in an aerial analysis as possibly having been chemical test trenches.

The Army, in discovering trace amounts of chemicals on Teleki's property, said the concentrations of the chemicals were too small to represent a threat to human health.

Weaver wrote that her patient "could have had exposure to volatile chemicals from soil evaporation or water leaking into his basement. He could have had exposure to particulates and metals through gardening. The extent of the exposure remains unknown due to the absence of extensive sampling during the time he was in the home."

She further wrote that the nature of the chemicals still in the ground "is unclear since they were experimental — and the byproducts that could have formed over the 80 years are even more unclear."

The same point was made by the city Health Department in a report issued in February 2003. It said an Army soil-sampling program revealed the presence of upward of 102 chemicals and compounds in the soil of four Spring Valley properties in which "many of these compounds are unknown in modern industry and do not have Risk Based Concentrations established," making it impossible to do an accurate assessment of their danger to human health.

What was also impossible to know, the Health Department report stated, was the "synergistic and combinative effects" of so many unknown chemicals on the human body.

Teleki, a fierce critic of the Army Corps as a member of the Spring Valley Restoration Advisory Board, cited "suddenly and rapidly escalating health problems" as a reason for his resignation from the board in 2003.

Wrote Dr. Weaver of Geza Teleki's former home, "The exact nature of exposures at the site are still unclear and will likely remain so due to the large number of chemicals, their experimental nature and the lack of toxicity information on those chemicals, as well as the fact that they have been stored for over 80 years and there is the potential for a variety of intermediate byproducts to have been formed."

— Charles Bermpohl

CHRONIC
From Page B5

diagnosed with lupus.

Janet Bohlen has lived in the same house on the 4700 block of Quebec Street for the past 46 years. She raised her daughter there. She has non-Hodgkin lymphoma, which is diagnosed yearly in eight of every 100,000 people in the United States, and her daughter has a thyroid problem so severe that it led to a "terrible fatigue" that kept her out of work for years.

Bohlen said her daughter's doctor discovered that the young woman had "massive mercury poisoning."

Buried under a tree on the Bohlen property are the remains of a detonator shed from the Army's World War I use of the land, something the Bohlens only learned of earlier this year. Because mercury was used in the making of detonators, the Bohlens — Curtis and Janet — want the Army Corps of Engineers to investigate.

Geza Teleki, who earlier this year moved to Maryland after living in the family home on the 3800 block of 48th Street for many years, has diabetes, kidney failure, hypothyroidism and anemia. His wife, Heather, has peripheral neuropathy and suffered from hair loss. The couple's son, Aden, suffers from violent headaches and stomach pains. After the son's pet mouse died at the 48th Street house, Teleki said a high concentration of arsenic was found on its fur.

The National Institutes of Health has reported that arsenic can contribute to the formation of diabetes. Peripheral neuropathy is also a common result of exposure to arsenic.

The above cases are only a sampling of the multiplicity of diseases in Spring Valley that strike individuals, families and even homes. A problem in reporting on these cases is the reluctance of individuals to see their names and addresses on the pages of a newspaper.

In one home, the husband died of esophageal cancer, the older daughter has irritable bowel syndrome, the youngest daughter has Graves' disease, a tenant who lived in the same house for less than a year suffered later from multiple sclerosis and the dog died of a blood disease.

Bill Petros/Current File Photo

This March 2003 scene, just west of the university campus, shows where mortars fired chemical shells in 1918.

In another house, an elderly man died of aplastic anemia and, more than 20 years later, a young girl who had no relation to the man died of the same disease. The Aplastic Anemia & MDS International Foundation reported that there are only 300 to 1,000 cases of aplastic anemia diagnosed in the United States every year.

Furthermore, the bone marrow damage caused by aplastic anemia can be the result of "exposure to toxins, chemicals, viruses or drugs," the foundation reported.

On Dec. 7, 2001, the D.C. Health Department reported that Spring Valley cancer rates, when compared to a community with a similar socioeconomic makeup in Potomac, Md., showed no unusual numbers.

Dr. Kenneth Cantor, an epidemiologist with the National Cancer Institute, called the results "reassuring," in that it indicated "nothing very bad is going on there." He also said that given the small number of cancer cases used in the study, the results were "kind of tentative."

Dr. John Davies-Cole, who headed up the study, said that because of the small numbers of participants used in the comparison, the study did not show Spring Valley to be risk-free.

EXPERTS
From Page B3

Department study was largely based on information found in death certificates that, in turn, generally show a cause of death to be heart failure rather than the disease or ailment that put a lethal pressure on the heart.

And Kent Slowinski, who is a member of the Spring Valley Restoration Advisory Board, said the Health Department's study failed to note that Potomac was adjacent to World War I chemical test sites and "might well share some of the same contaminants of concern as Spring Valley."

But other studies failed to turn up elevated arsenic levels even among individuals who frequented areas with soil contamination.

The federal government's Agency for Toxic Substance and Disease Registry did arsenic exposure investigations at American University's Child Development Center in January and February 2001, examining hair samples from 28 children and four adults. Tests at the Child Development Center had turned up extremely high levels of arsenic in the ground.

The results, the agency reported, "did not indicate elevated arsenic exposure ... ."

From July to November 2002, another 40 individuals, all of them living in 19 Spring Valley homes where the yards showed elevated levels of arsenic, had their urine sampled by the Agency of Toxic Substance and Disease Registry.

"In summary, the urine arsenic levels in this exposure investigation shows low levels of exposure, consistent with what might be found in the general population. These levels would not be expected to cause any health problems," a resulting study said.

On Feb. 10 and 15, 2001, Washington Occupational Health Associates Inc. collected hair and urine samples from 66 persons, students and staff at American University. The conclusion: "No elevated levels of arsenic in the population tested."

What is missing in all of these exposure investigations is the length of time an individual spent on the property, which is a criticism leveled against The Current's health survey. Whether a person lived for six months or 30 years in a particular house or building played no part in the investigations, according to the information in the accompanying reports.

That means the investigations are limited to very recent exposures and to the acute effects of arsenic exposure, not to the long-term impact on health. The chronic effects of arsenic, or any other toxic chemical tested by the Army 85 years ago and sealed in a deteriorating container several feet below the surface of Spring Valley soil, will remain a mystery unless more thorough investigations are done.

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SCIENCE

From Page B3

The U.S. Army Corps of Engineers, in cooperation with its regulatory partners in Spring Valley — the U.S. Environmental Protection Agency and the D.C. Department of Health — have adopted arsenic as the primary chemical of concern in Spring Valley. It is the one chemical that, if it is discovered in overabundance on a property — above a 20-parts-per-million threshold — will put that property on the Army's "remediation" list.

There is no question that arsenic, a compound that enjoys eternal life in the pantheon of poisons, is deadly. The chemist Karl Vogel in 1928 wrote, "It is an uncanny thought that this lurking poison is everywhere about us, ready to gain unsuspected entrance to our bodies from the food we eat, the water we drink and the air we breathe."

But other chemicals used by the Army in Spring Valley can also be connected to the diseases that have shown up in the survey.

Nitrogen mustard, for example, can be tied to several of the diseases. According to the well-regarded study "Veterans at Risk: the Health Effects of Mustard Gas and Lewisite," by the federal Institute of Medicine in 1993, nitrogen mustard can be linked to bone-marrow cancers, leukemia and cancers of the lungs and skin. Mustard can also be tied to aplastic anemia.

Perchlorate, used as an explosive in hand grenades in World War I and found in 11 compounds on the list of chemicals used in Spring Valley, has been linked to thyroid disorders. There is evidence of high levels of perchlorates in the groundwater under Spring Valley.

— Charles Bermpohl

ACUTE

From Page B4

all the way down to my feet." When he scratches, he bleeds, he said.

The smashed bottle was one thing, but the dirt was another. The dirt, one of the interviewed workers said, "had a hot smell to it, like as if you would take an orange peel and stick it up your nostrils. That's what it smelled like."

The dirt smelled so bad that it was trucked to a landfill in Lorton, Va. But it was rejected because of the stench, the men said. The dirt was next taken to a newly built Metro station at Fort Totten in the District. But the fumes were so powerful that they sickened a bulldozer operator, and the National Park Service ordered the dirt removed. The whereabouts of the infamous Glenbrook Road dirt is a mystery today.

The 4825 Glenbrook Road house was sold to Thomas and Kathi Loughlin. Kathi Loughlin eventually developed a brain tumor, which was surgically removed and turned out to be benign. The nanny to the Loughlins' children, Patricia Gillum, developed a severe skin and nerve condition called keratosis. She said it forced her to give up her job. Taking advantage of a clause in their purchase contract, the Loughlins sold the house back to the builder and moved away.

A tortured history

The Loughlin-Gillum health problems developed over a period of time and do not have the same cause-and-effect obviousness as the Feeney-Miskin-West Virginia workers fumes from hell cases. But the fact that this all happened on two abutting properties suggests that they may be related.

And those are not just any abutting properties. Just east of the former Loughlin home, on the very next property, is the residence of the Republic of Korea's ambassador. The Army Corps of Engineers has spent millions of taxpayer dollars digging up and hauling away World War I munitions and lethal chemicals from the rolling, landscaped hills surrounding the ambassador's home, land that, before the remediation work was done, was contaminated by arsenic to the tune of 1,000 parts per million — 50 times the officially recognized safe level.

The property, in fact, was previously owned by a large family whose members seemed to have been the victims of more cancers, blood disorders and skin lesions than appear normal.

As for the former Loughlin house next door, the Army has acknowledged that similar vintage ordnance sits undisturbed under its front yard. The million-dollar-plus mansion is now empty, and there is no activity outside. It was once at the top of the Army's remediation priority list but has since been replaced by Lot 18, the big debris field loaded with laboratory glassware on the southern edge of the American University campus off Rockwood Parkway.

The question of whether there is a link between the acute problems suffered by Feeney, Miskin and the construction workers on one hand, and Loughlin and Gillum on the other, is at the heart of the mystery of Spring Valley.

Mark Baker, an Army Corps of Engineers historian who is a recognized expert on the American University Experiment Station — the World War I headquarters of the Army's then-new Chemical Warfare Service — once stepped up to a big map of Spring Valley and put his hand over the intersection of Glenbrook Road and Rockwood Parkway. He said that this was where many of the anecdotal reports of rare and deadly diseases were centered.

'Rockwood Six'

From that intersection, Rockwood Parkway goes northeast, past the "Rockwood Six," brick Colonials evacuated by the Army in 2001 while laboratory glassware and other debris were dug out of what the Army called the Small Disposal Area, located behind the homes.

Today, those homes lie in front of Lot 18, a likely continuation of the Small Disposal Area. Army Corps contractors were removing glassware, military ordnance and tons of contaminated soil from Lot 18 until money ran out this past August, though the project was scheduled to resume this week.

Bill Petros/Current File Photo

A 2003 view shows the 4600 block of Rockwood Parkway, just south of Lot 18, a debris field filled with laboratory glassway and contaminated soil. One of the houses, now owned by American University, has a history of health problems among its residents.

In August 2002, Ryan Mitchell and Frances Hansen and her son Nicholas rented one of those homes, at 4625 Rockwood, which was owned by American University. Not long after they moved in, they began experiencing rashes, nosebleeds, headaches, hair loss and tingling sensations in their hands and around their mouths.

It turned out that Nicholas Hansen was suffering from carbon monoxide poisoning.

Workers from the Potomac Electric Power Co. repaired a leaking furnace valve. The nosebleeds and the headaches went away, but the rashes all over Ryan Mitchell's body remained. So did the tingling, said Frances Hansen.

According to the father of the family that had lived in the house before it was owned by American University, his children, including an infant, suffered from severe respiratory and gastrointestinal problems that required them to be hospitalized for five months in 1997.

"The kids were sick all the time," said the man, who asked not to be identified. But his wife was also plagued with health problems, including rashes in which the skin peeled away as if from "a chemical burn." The wife also suffered from cardiac arrhythmia that eventually forced her to wear a pacemaker to regulate her heartbeat. She and her husband also suffered from powerful headaches. And she had a tingling sensation in her hands and feet, something shared with Mitchell and Hansen and a number of other people in Spring Valley.

While some of those ailments could have been the result of the same carbon monoxide poisoning that struck Nicholas Hansen, the National Institutes of Health lists cardiac arrhythmia, tingling in the extremities, damage to the respiratory system and gastrointestinal disorders as having possible links to arsenic exposure.

What is notable about the health problems at 4625 Rockwood Parkway is their suddenness — coming weeks or a month or two after those affected had moved into the house. And that smudges the line between the acute and the chronic, raising the question of what distinguishes the two.

Sudden facial blisters

Mary Bresnaham's ailment is as frighteningly acute as is likely to be found anywhere. But Bresnaham, one of the newest members of the Spring Valley Restoration Advisory Board, who lives on the 4700 block of Massachusetts Ave., cannot identify the site of the incident that gave her blisters all over her face and made it swell to twice its size.

"I can't pinpoint where it was," she said, although she suspects it happened in one of two places where construction was taking place: at the Katzen Arts Center at the corner of Massachusetts and Nebraska avenues, which was on her regular morning walking route, or at an underground construction site in Crystal City, near where she worked on a consulting contract. The dirt in both places was disturbed because of construction, Bresnaham noted.

She believes the initial incident happened in November last year, although it wasn't something that she suddenly became aware of. "I knew that something was happening to my face," but that was all, she said. By the first week of January, the contract that took her to Crystal City had ended. And that's when the blisters and the itching started showing up.

"It was only on my face," she said. "That's the one area that was uncovered."

It went on for three weeks of agony. A battery of tests eventually showed that she had been infected by an industrial chemical called Bronopol, which was developed in China and is used in insecticides and fungicides, in fertilizers, as a preservative for cosmetics and in milk production.

"It wasn't invented in World War I, so it has nothing to do with buried chemicals," she said.

But Bronopol, which is a brand name, may well have been developed at the Spring Valley experiment station years ago, eventually making its way to China and back to this country as a lawn-care product.

The blisters on Bresnaham's face were likely caused by a visicant, or blister-causing chemical concoction like Lewisite. Various visicants were developed by the Army as part of its work at American University.

But like so much else about Spring Valley, the answer to Bresnaham's malady remains unanswerable.

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HISTORY
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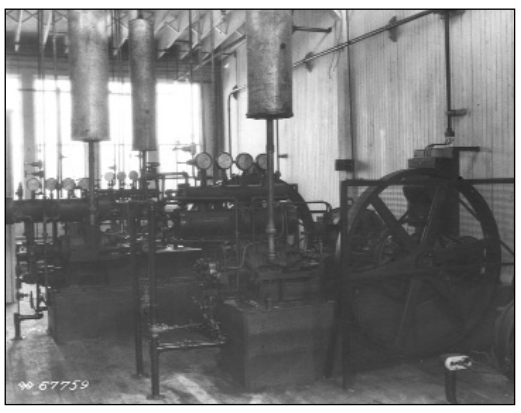
wave. The president of its board of trustees wrote a letter to President Wilson informing him that the school's 92-acre campus was at his disposal, rent-free, for use in the war effort.

The White House forwarded the letter to the War Department. From there, the letter was passed on to the Army Corps of Engineers. The Corps' commanding officer, Maj. Gen. William M. Black, recommended that Secretary of War Newton D. Baker accept the offer. Baker did, giving the Corps the right to use the campus, including the only completed building at the time, the College of History building (also known as Hurst Hall), to organize the 6th Regiment of Engineers.

Black was told, according to a memorandum he wrote just weeks before the war ended, that the unfinished Ohio Building (also known as the McKinley Memorial Ohio College of Government) was being used by the Bureau of Mines for the "making of some experiments," but that it "would not interfere with the use of the grounds by the Engineers, being confined to a small part of the unfinished building."



Courtesy of the U.S. Army Corps of Engineers

This is one of the chemical laboratories at American University in 1918. The labs were built flimsily to prevent serious buildup of force in the event of an explosion.

On May 28, after Wilson signed an appropriations bill, Gen. Black established Camp American University. The long and curious relationship between American University and the Army Corps of Engineers had begun.

The school was 21 years old and struggling to survive as a university when Black's soldiers began using Hurst Hall as a dormitory and office building. Members of the Methodist Episcopal Church had bought the land in 1890. Three years later, Congress granted the school a charter. And, in 1896, ground was broken for its first building, named after the most well-known of its founders, Bishop John F. Hurst.

But the first class was not admitted until 1914 and the first degrees were awarded the very year the Corps of Engineers appeared on campus.

The sprawl of woods and fields in Northwest Washington did have its advantages. Water, sewer and electric lines reached to the campus. An electric trolley ran right next to the school on a macadamized Massachusetts Avenue. And intersecting with Massachusetts was Loughboro Road, which had been straightened, paved with macadam and renamed Nebraska Avenue by 1917.

The Great War then thundering on the battlefields of Europe and North Africa was already famous for innovation in the use of airplanes, submarines, tanks, machine guns, flamethrowers and poison gas.

The Germans, breaking an international treaty, first used tear gas with little effect against the Russians on the Eastern Front. Then, on the balmy afternoon of April 22, 1915, they used a lethal gas against unsuspecting French soldiers crouched in miles of trenches outside the Belgium city of Ypres.

Winston Groom, in his 2002 history, "A Storm in Flanders: Tragedy and Triumph on the Western Front," wrote that the Germans began a massed artillery barrage on the French positions northeast of Ypres at about 5 p.m. Then, "A menacing-looking cloud, several miles long, rose up from the German lines and began rolling across no-man's land." Soldiers described it as "greyish-yellow" or "greenish-yellow," and as "two clouds ... which appeared to merge into each other."

In the April 27, 1915, edition of the New York Herald, reporter Will Irwin wrote: "The gaseous vapor which the Germans used against the French divisions near Ypres last Thursday, contrary to the rules of The Hague Convention, introduces a new element into warfare." Irwin wrote that no one but the Germans knew what the "greenish gray and iridescent" vapor was composed of, but it "settled to the ground like a swamp mist and drifted toward the French trenches on a brisk wind."

What happened next was as horrible as anything in the history of war. A Canadian artilleryman, Maj. Andrew McNaughton, said French troops "literally were coughing their lungs out. Glue was coming out of their mouths. It was a very disturbing, very disturbing sight."

Courtesy of the U.S. Army Corps of Engineers

This photograph, taken not long after World War I had ended, shows civilians looking at the extensive trench system built by the Army on or near American University. Chemical weapons may have been buried in trenches like these.

Groom wrote that men were "vomiting and turning blue from suffocation. The doctors and orderlies, having no training in treating gas victims, stood around helplessly" watching the terrified victims "coughing greenish-yellow froth and blood," drowning in their own liquids.

The Herald's account said the effect upon the French soldiers "was a violent nausea and faintness, followed by an utter collapse."

The Germans had used chlorine, which prevented the lungs from absorbing oxygen. And as awful as it was, it would not be the worst. Two years later, at Ypres on July 10, 1917, the Germans unleashed mustard gas.

"Unlike the earlier lung gases, ... mustard gas attacked the entire body, inside and out," Groom wrote. "The results were horrifying: it seeped through clothing and caused grotesque blistering and lesions actually peeling off layers of skin. Infection invariably set in," and the body would rot from the inside. Not only that, mustard persisted, hanging around for weeks, "contaminating anyone who came in contact with it."

The Americans were not to be outdone in developing modern weapons. In February 1917, two months before Wilson signed the declaration of war, secret preparations had begun to develop gas weapons and to come up with a defense against them. Once the war started for the Americans, a gas service was organized by the Interior Department's Bureau of Mines under the direction of Van H. Manning.

The bureau had extensive experience dealing with toxic and explosive mine gases and in developing and ordering the use of gas masks and other protective clothing. Manning offered his bureau's expertise to the War Department. Secretary Baker accepted the offer, eventually allowing Manning and his chemists to use the McKinley Building.

Then, in June of that year and with the nation fully involved in the war, the departments of the Army and the Navy agreed to spend $175,000 on converting classrooms into laboratories. On July 21, the Bureau of Mines formally established the American University Experiment Station.

The bureau's mission was to prepare and test compounds useful in gas warfare, develop methods for turning the compounds into weapons and create defenses against the very weapons it had made.

This was a massive undertaking. Buildings were built, tents went up, pipes were laid, wires were strung, trenches were dug, scientists and technical staff were recruited and more land was leased to field-test the chemicals and munitions being developed. Hundreds of acres of land privately owned by seven individuals, in addition to the land of the federally owned Girls Reform School, were leased. In all, 661 acres of land on and adjacent to the campus were used in the effort.

According to Army documents from the time, the Army spent $212,000 completing work on the McKinley Building and another $250,000 constructing what it called the New Chemical Research Building, now known as the Mary Graydon Center. It spent $52,000 on sewer, water and gas lines and $49,000 on electric wiring and lighting for the laboratories. It shelled out $25,000 on plumbing, $8,500 for a horse stable, $7,000 on an addition to a human-testing laboratory and $6,400 on ventilation systems. Separate latrines for white and black soldiers were built.

According to a history of the base written by Jonathan B. Tucker for the Bulletin of Atomic Scientists in 2001, these new grounds "were surrounded by high walls covered with barbed wire, with only one entry gate in the three-mile perimeter. The test site included a static fire area and a chemical persistency area 500 feet in diameter that was repeatedly covered with mustard gas."

Eventually, some 1,200 chemists and upward of 600 technicians were employed at the American University Experiment Station in the business of making poisons to kill German soldiers. Dogs, goats, horses, cats, rabbits and slugs were used in the experiments. So were men.

According to the Annual Report of the Chief of the Chemical Warfare Service, published on June 30, 1920, "out of 250 gases prepared by the [Service], very few were sufficiently valuable to pass all of these tests and thus the number of gases actually put into large scale production were less than a dozen."

One batch of documents from the Chemical Warfare Service chronicles results of tests on 498

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variations of mustard gas alone. Other gases developed or tested included Lewisite, ricin, cyanogen chloride, Adamsite, phosgene, chlorine, chloropicrin, arsenic chloride, cyanide, mercuric chloride. Diphenolchlor arsine, first developed by the Germans, was also extensively tested.

The soldiers dubbed the test sites "Death Valley."

Particularly dangerous was Lewisite. "The joke of the day," said Richard Albright, who heads the D.C. Department of Health's oversight of the Corps of Engineers' Spring Valley cleanup, "was that if you put three drops on the tongue of a dog, it would kill the owner."

According to historians Martin K. Gordon, Barry R. Sude, Ruth Ann Overbeck and Charles Hendricks in an article for "Washington History," Army planners "recognized that the field testing of gases and weapons clearly posed a threat not only to those conducting tests, but also to the surrounding community." Gases and weapons were developed in flimsy sheds, designed to prevent a serious buildup of force from an accidental explosion. And underground concrete pits were used for bomb testing.

Inevitably, there were accidents.

One of the soldiers at American University Experiment Station was George Temple. He recalled in a 1965 interview with the university's student newspaper, The Eagle, that, "One day, in the pitch black interior of a smoky lab, three men were burned by a deadly dose of gas. The bodies were hauled away on a cart, their flesh jiggling off their bones."

Temple said he saw other men die on the university grounds.

"More men were killed by gas on the experimental side," he said, "than in actual use" on the battlefield.

The most celebrated accident occurred in August 1918, when an explosion at a shed where Lewisite was being made caused gas to cross Nebraska Avenue to the home of retired U.S. Sen. Nathan B. Scott, R-W.Va. Scott, his wife and his sister were slightly gassed. They survived after receiving medical attention.

Dr. Winford Lee Lewis, who led the team that developed Lewisite at Catholic University in the winter of 1918, mentioned the Scott gassing in a speech he gave in 1921. He said it was his Lewisite production lab, "on a hill back of American University," that had blown up.

Gen. Black complained about the accidents. Every so often, he said, "clouds of gas are liberated which have produced sickness among the neighboring residents and has filled the Engineer camp with noxious odors which at least on one occasion during the recent influenza epidemic were seriously detrimental to the sick soldiers at the camp."

Black, who had fought a nasty turf battle with the Bureau of Mines over use of the university's buildings and grounds, warned in his Oct. 25, 1918, memo that conducting the gas experiments "in one of the most beautiful suburbs of Washington and close to the city [would] permanently depreciate the value of the property."

His advice was that "the entire establishment should be removed to a reservation where its presence will not work injury and where experiments with gases can be made freely without danger to the neighboring community."

American University and its surrounding neighborhood was not the only place where chemical warfare work was happening. At Edgewood Arsenal, a 3,400-acre site 20 miles east of Baltimore, shells were being made and filled with poison gas for shipment to France. A large chemical warfare test range had recently opened up in Lakehurst, N.J. A large-scale production plant in Willoughby, Ohio, was starting to turn out tons of Lewisite. And labs at universities throughout the country were being used for chemical experiments.

The talk was that a major Allied offensive was to begin in the spring of 1919. Lewisite was supposed to have played a big part in it.

Then, on Nov. 9, 1918, the Germans officially accepted President Wilson's peace terms and, two days later, the guns went silent.

The armistice seems to have caught the chemical warfare establishment by surprise. The mustard gas plant at Edgewood Arsenal had made 286,000 pounds of the poison in the first 11 days of November, according to Army records. And 150 tons of Lewisite were already on a train from Willoughby bound for Baltimore.

At the experiment station at American University, cannon and mortar shells, 55-gallon metal drums and five-gallon jugs, many of them filled with deadly chemicals, were stacked at various locations, according to Army records. So were piles of already-used protective clothing and gas masks. And the wooden planks in the temporary buildings and the fans and ducts of ventilation systems were impregnated with the residue of chemicals that had been designed to kill and maim.

Courtesy of the U.S. Army Corps of Engineers

This view of Camp American University in 1918 shows the extensive network of buildings and sheds used in the Army's chemical warefare program. The school made a deal in 1920 that released the Army from its pledge to restore the grounds in return for the school getting to keep more than 30 buildings.

The Army would claim more than 60 years later that almost all of the ordnance had been shipped to Edgewood. And there exists some evidence in support of that. A sizable shipment of munitions — French 75-mm shells, Stokes and Livens mortar shells — was shipped from American University to Edgewood in March 1919.

Courtesy of the U.S. Army Corps of Engineers

This is a view of shells in one of the burial pits used to dispose of munitions tested during World War I.

A later order from the military told the experimental station not to ship additional items to the arsenels and to dispose of the materiels locally.

The evidence in the ground over the past 11 years shows that much of the deadly stuff remained right where it was when the Great War ended.

Multiple searches of Army records turned up no order to bury the chemicals.

Nothing in the leases, which had been negotiated by the Army quartermaster and the landowners in the spring and summer of 1917, permitted the burying of ordnance. In fact, just the opposite was true. The wording in the typical lease contained the following: "Upon termination of this lease the leasee will surrender the premises in as good condition, ordinary wear and tear and damage by the elements including fire excepted, as when taken by the United States."

By burying ordnance on that land, the Army Chemical Warfare Service seems to have breached its contracts.

But no such problem existed where American University was concerned.

On March 11, 1920, representatives of the school and the Army agreed that the Army would give the university $121,382.75 to remove buildings and restore the grounds. Under the agreement, the school would get to keep 21 of the Army's buildings and would hold the Army legally harmless for any damage that had resulted from its use of the property. The agreement was signed by the head of the Chemical Warfare Service, Lt. Col. Amos A. Fries, and the then president of American University, Benjamin F . Leighton.

Two months later, on May 22, 1920, both sides got together again in Leighton's office. The school was upping the ante. It wanted eight more buildings "in addition to the entire water and sewer system installed by the government on said grounds and in addition there to be barb wire fence, surrounding said grounds, or portion thereof, constructed by the government," the agreement said.

To get this, the school was willing to forgo the $121,000 payment, relying on the Army to "remove the buildings and structures" not covered by the transfer agreement. And it released the Army from its pledge to restore the grounds — or, in the contract's wording, the university "particularly releases and discharges the United States of America from any obligation to restore the grounds as provided in the contract of March 11, 1920 ... "

The university also agreed "to release and ... forever discharge the United States of America from any and all claims and demands arising out of the use and occupancy of the entire tract of land ... and agrees that it has no claims and will assent to claims against the United States for damages to the building or grounds of the university."

By the time the agreement was made official, on June 21, 1920, American University managed to get the Army to add two more buildings to the deal — 31 in all. Chemical warfare had enabled American University to be a competitor in the nation's higher education industry.

In 1926, W.C. and A.N. Miller, two canny developers who had bought up hundreds of acres lying outside the American University campus, ordered their bulldozers to level the land on which they planned to build homes that would be included in a brand-new subdivision called Spring Valley.

Spring Valley: At Risk from WWI Poisons?

Scenes from the cleanup

The Current/Bill Petros

Since the discovery of buried munitions in Spring Valley in early 1993, the Army Corps of Engineers has been a visible presence. The cleanup effort resumed in the late 1990s after the Corps had incorrectly declared the area free of danger. Above right is a recent view of what the Army calls an engineering control structure, which it is using as a base for its cleanup operations at Lot 18. Above, workers excavate the foundation of a Springdale Lane home as they search for signs of buried munitions. At right is a scene from March 2003.

BUSHES

From Page B2

Graves' disease during Bush's presidency.

Graves', a hyperthyroid condition, caused the first lady to lose 18 pounds in two weeks and gave her a vision problem common to victims of Graves' disease, puffy or protruding eyes.

President Bush developed a rapid heartbeat after jogging on May 4, 1991. A few days later, according to Barbara Bush, "George was diagnosed and treated for Graves' Disease. What a peculiar illness — it attacked my eyes and George's heart. It is unusual for a husband and wife to both have this problem, but it is not unheard of."

Herbert S. Parmet, in his book, "George Bush: The Life of a Lone Star Yankee," also noted the rarity. "The probability that George and Barbara would both have Graves', with Millie ill from lupus, could never be explained other than as a strange coincidence. Millie's condition was different, but it was also an autoimmune disease."

What Parmet did not mention, and may not have known, was that Marvin's ulcerative colitis or Crohn's disease, a similar disorder cited in the Bush biographies, is also an autoimmune disease.

Colitis, according to the American Medical Association, can be caused by a viral infection or by a bacterium that produces toxins that irritate the lining of the intestine. The medical association said the cause of Crohn's disease is unknown, but it can represent "an abnormal allergic reaction or may be an exaggerated response to an infectious agent, such as a bacterium or a virus."

The incidence of Crohn's "varies between three and six new cases per year per 100,000 population," the medical association states.

Graves' disease is caused by "inappropriate immune system activation that targets the thyroid gland," according to the Medifocus Library of Patient Research Guides. The guide calls it "an autoimmune disorder." The cause, the guide adds, "is not known, though research is focusing on the immune system and genetic issues."

According to a landmark work by the federal Institute of Medicine called "Veterans at Risk: The Health Effects of Mustard and Lewisite," mustard gases that were developed and tested in Spring Valley in 1918 can cause autoimmune disorders.

"Evidence that sulfur mustard causes autoimmune suppression in humans has emerged from several lines of investigation," according to the book, published by the National Institutes of Health in 1993. Also, "Evidence from animal experiments consistently confirms that mustard agents affect immune system functions."

The former president has also suffered from a rare skin disease known as actinic keratosis. On March 26, 1992, his press secretary, Marvin Fitzwater, acknowledged Bush had been treated for the disease with a "freeze" of liquid nitrogen.

"The president has had keratosis removed on previous occasions over the years," Fitzwater said.

According to a 1998 issue of the Journal of Emergency Medicine, arsenic, which is at so high a level in numerous Spring Valley yards and gardens that the Army Corps of Engineers has removed tons of dirt from many of them and has numerous yards yet to "remediate," can lead to hyperkeratosis "years after exposure."

Marvin Bush's Crohn's or ulcerative colitis disease can also have a Spring Valley link. According to Dr. Ronald Hoffman, writing for the National Digestive Diseases Information Clearinghouse, Crohn's and colitis can come from poor diets but also from "toxic chemicals in food or water."

Courtesy of the George Bush Presidential Library

A 1976 family photograph shows the Bushes at Christmastime. They lived on Palisade Lane, a few blocks from Spring Valley, at the time.

Barbara Bush was an active gardener, frequently growing vegetables. When The Current contacted Tom Frechette, the former president's chief of staff, for comment, he said that the former first lady could not remember whether she maintained a garden in either the Spring Valley or Kent home, but she said she did have gardens in most of the places where she lived.

Spring Valley residents have been warned by the D.C. Health Department to be careful when gardening, as arsenic-laced soil can come in contact with their hands.

The former president, said Frechette, did not wish to make any comment about any potential link between his family members' diseases and their residences in Spring Valley and Kent.