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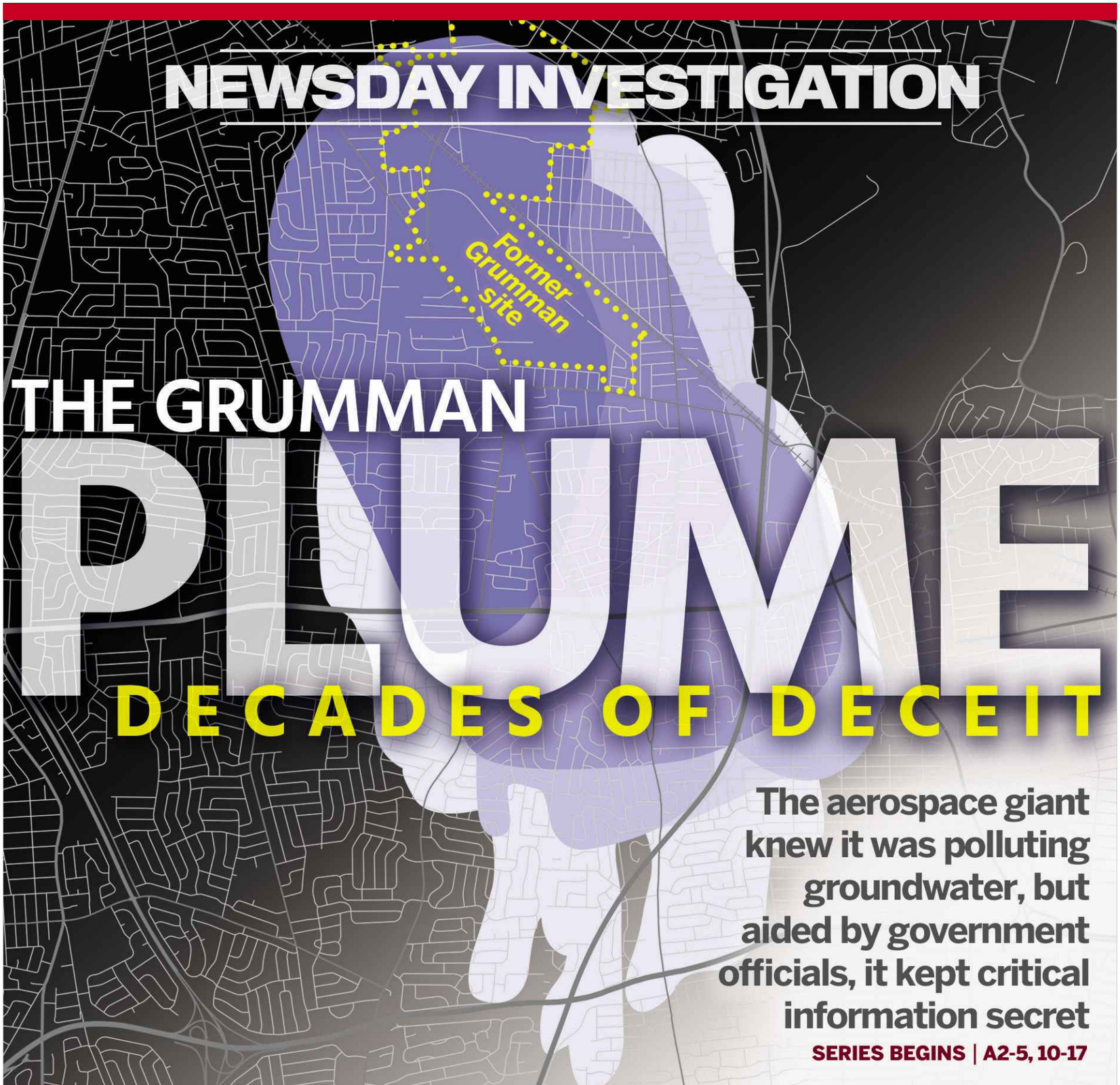

THE GRUMMAN PLUME

DECADES OF DECEIT

The aerospace giant knew it was polluting groundwater, but aided by government officials, it kept critical information secret

SERIES BEGINS | A2-5, 10-17

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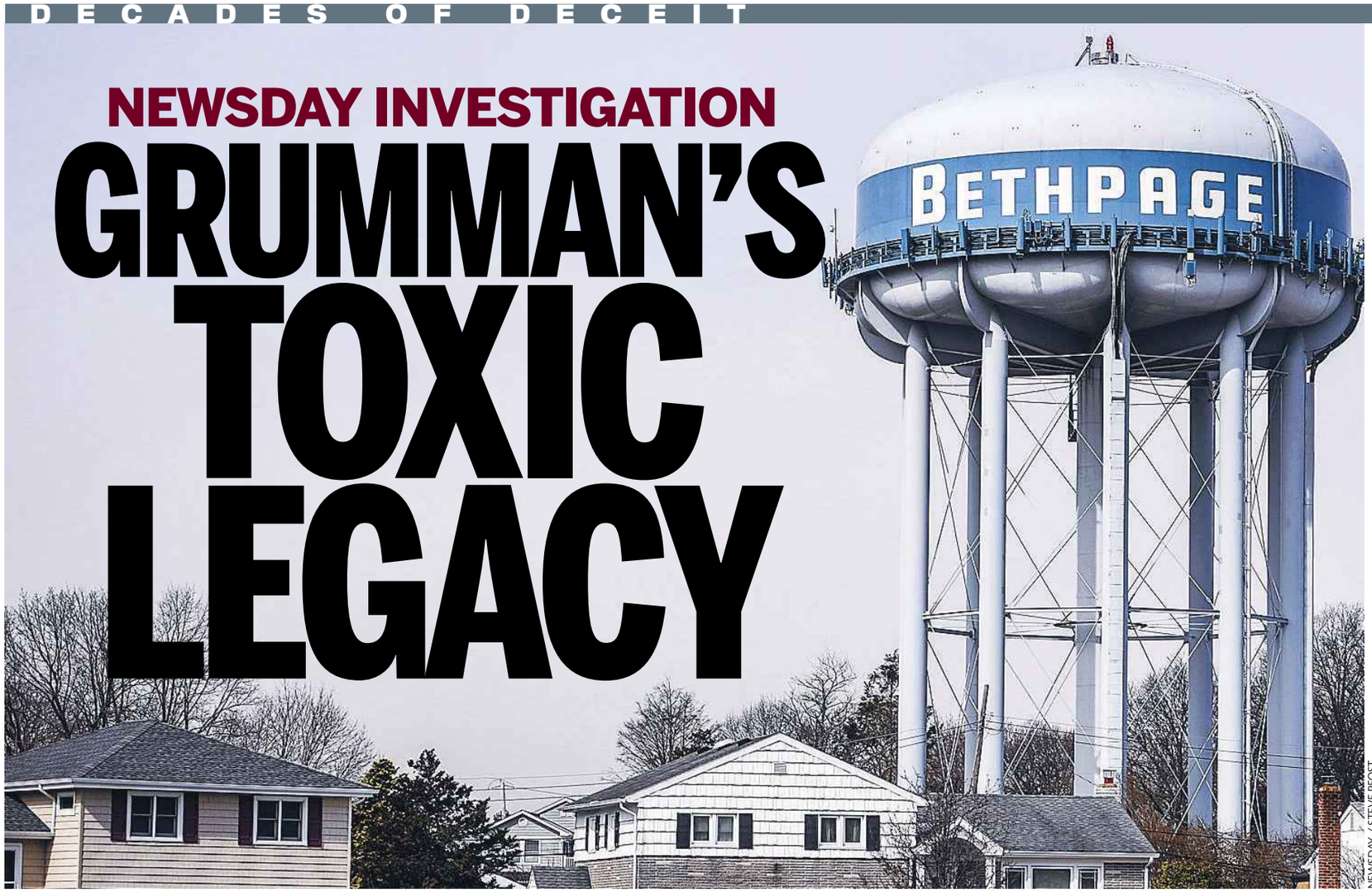
NEWSDAY INVESTIGATION

GRUMMAN'S TOXIC LEGACY



NEWSDAY / STEVE PFOST

BY PAUL LAROCCO AND DAVID M. SCHWARTZ
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Grumman, the Bethpage aerospace giant, knew as far back as the mid-1970s that its toxic chemicals were contaminating area groundwater, but it kept secret crucial information that could have helped stop what is now Long Island's most intractable environmental crisis, a Newsday investigation found.

On numerous occasions, particularly during a critical 15-year period, the company made public statements that directly contradicted the alarming evidence it held, as it avoided culpability and millions in costs.

This behavior was long enabled by government officials who downplayed the pollution and did little to contain its spread from Grumman's once-600-acre site, through Bethpage and into neighboring communities.

The nine-month Newsday investigation, built on thousands of pages of records and scores of interviews, charts a largely hidden history, one that emerges, most strikingly, in confidential Grumman and government documents revealed for the first time.

They show that the problem could have been addressed more aggressively at many points over the past 45 years. But instead, foot-dragging, resistance and grossly inaccurate projections took hold — not only on the part of the company but also for decades by the state Department of Environmental Conservation, the lead regulatory agency.

The U.S. Navy, which owned a sixth of the Grumman-operated facility, has also often objected to the costliest, most-comprehensive cleanup plans.

NOW ONLINE
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Though 4.3 miles long, 2.1 miles wide and as much as 900 feet deep, the plume's significance is defined by more than size. Unlike most similar masses, it sits in an aquifer that is the only drinking water source for a densely populated region.

As one of the most complex in the nation, it is composed of two dozen contaminants, including multiple carcinogens. Most significant is the potent metal degreaser trichloroethylene, or TCE, which is present in pretreated water at levels thousands of times above state drinking standards.

Grumman relied on TCE to clean aircraft parts for 40 years, but as the chemical was discovered to be spreading from its property, it obscured or outright denied its use. The company released so much of it into the earth that one of its environmental managers later wrote to a colleague, in a newly revealed email, that the thought "caused my insides to start churnin' somethin' fierce!!"

A growing number of expensive treatment systems remove TCE and other contaminants from public wells within the plume, including ones serving not only Bethpage, but Plainedge, South Farmingdale, North Massapequa and parts of Levittown, Seaford, Wantagh and Massapequa Park. State and local authorities consistently certify the treated drinking water as safe, but cases of bottled water fly off supermarket shelves and residents' health concerns, particularly about cancer, are numerous.

The pollution that originated from Grumman is classified as a "significant threat to public health or the environment" under the state's Superfund program, which aims to clean hazardous waste sites.

"Everyone involved should be ashamed to admit that this plume has been known about since the 1970s, and 40 years later, it is bigger, deeper and worse than ever," Michael Boufis, superintendent of the Bethpage Water District, told state lawmakers at a 2016 hearing. "A complete and utter failure of the system."

When Nassau County and the U.S. Geological Survey in 1986 first identified the migrating contaminants as a plume, it was two miles long, one mile wide, up to 500 feet deep and yet to cross Hempstead Turnpike. In doubling in size, it has crossed the Southern State Parkway and moves, at a foot a day, toward the Great South Bay, the centerpiece of Long Island's estuaries.

Local taxpayers have paid more than $50 million for a portion of the public water treat-

See GRUMMAN on A4

WHAT THEY SAID VS. WHAT THEY KNEW

USE OF TCE

Grumman in the mid-1970s flatly denied using the chemical that would become the plume's primary contaminant, at a time when it heavily relied on it.

A spokesman for Grumman said that no TCE is used in its operations on Long Island.

Newsday, Oct. 15, 1975

Groundwater at south end of complex has contained TCE for a long time. TCE has been used there since 1949.

Confidential summary of Grumman insurance meeting, Aug. 16, 1989

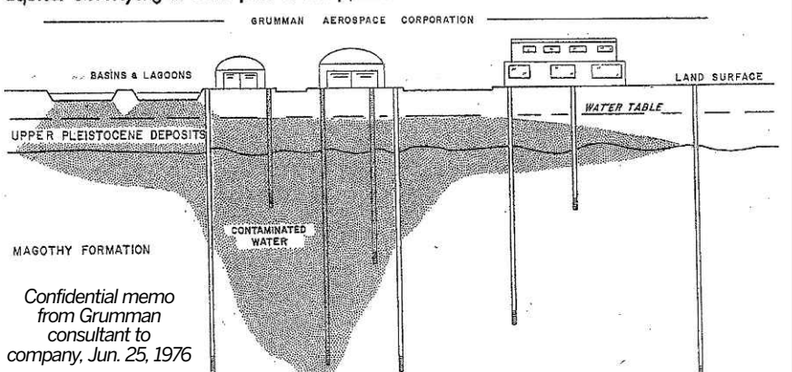
EARLY DENIAL

When pollution of Grumman wells became public in 1976, the company said it wasn't responsible – although a consultant told it privately that there were sources on-site for the contamination.

A Grumman spokesman denied that the company's own operations were responsible for the contamination.

Newsday, Nov. 28, 1976

sources of contamination consisting of basins, lagoons, spills, etc. have created a slug of contaminated ground water in the shallow aquifer underlying at least part of the plant.



Confidential memo from Grumman consultant to company, Jun. 25, 1976

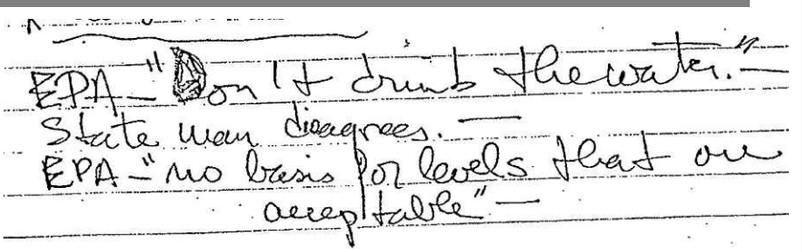
UNDISCLOSED WARNING

On the same day in 1976 that federal environmental officials expressed private worry over contaminated drinking water, a county health official issued a public assurance.

The County Health Department said there was no cause for alarm, and Health Commissioner Dr. John Dowling said, "If I lived in the area, I would continue to drink the water.

"We don't have any information that the chemicals are harmful in drinking water," Dowling said, although he acknowledged that breathing or eating the chemicals has caused cancer in humans and laboratory animals.

Newsday, Dec. 3, 1976



Confidential notes to Grumman summarizing Dec. 2, 1976, meeting of company, government officials

SHIFTING BLAME

The Bethpage Water District privately accused Grumman of polluting its well with TCE but publicly blamed Hooker Chemical Co.

Sabino agreed to share district records of its two-year struggle to force Hooker to pay up to one million dollars for replacement costs of Bethpage Water District Well 6-1.

Bethpage Tribune, Oct. 8-14, 1981

On November 22, 1977, the BWD wrote a letter to Grumman that stated, "Currently available evidence indicates that . . . contamination has arisen by virtue of discharge of waste products from your company into the ground water supply."

Summary of 1977 district letter to Grumman, included in a 2014 federal court order

CHERRYPICKED DATA

When presenting wastewater readings to the public in 1982, Grumman highlighted a page from a previous consultant report. It showed moderate levels of TCE being pumped from and put back into the ground at off-peak plant hours.

Trichloroethylene	5.49	2.79	5.37	4.29	5.31	2.51

Grumman didn't include the previous page from the same report, showing one eye-popping TCE figure from a peak plant operation time, which it later called an anomaly.

Trichloroethylene	1.58	1.31	1.66	17.17	0.71	0.42

Mar. 18, 1982 Grumman groundwater protection presentation; Jan. 5, 1978 confidential consultant report to Grumman on plant wastewater sampling

READ THE FULL DOCUMENTS AT NEWSDAY.COM/PLUME

GRUMMAN from A2

ments and a seven-acre soil cleanup by the Town of Oyster Bay, of which Bethpage is a part. The Navy, which is also responsible for remediation under the Superfund decisions, says it has spent more than $130 million in total, including for some of the public treatments.

Grumman's successor, Northrop Grumman, says it has spent $200 million, but unlike the Navy it has declined to break down those costs. Critics question whether that figure includes payments to lawyers and consultants, but the company has completed a substantial system of groundwater contaminant extraction wells along its former properties.

How much more will it cost to contain and eliminate the plume?

The state's comprehensive plan, announced last year, estimates it will take $585 million over the first 30 years alone. Near-total eradication of the contamination wouldn't come for 110 years.

The plan is a remarkable reversal of the state's far more cautious approach in decades past. It wants Northrop Grumman and the Navy to fund it or face litigation.

What Grumman knew

Grumman's role in the crisis contrasts with its paternal community presence in the era when it was Long Island's economic engine. It employed more than 20,000 people and was revered for building World War II fighters and the space module that landed Neil Armstrong and Buzz Aldrin on the moon.

Before its 1994 acquisition by Northrop Corp. greatly diminished its jobs and presence, Grumman all but defined Bethpage. One French restaurant got so much business from its executives it was dubbed "Grumman's annex." Schools would stagger dismissals to avoid the traffic crush from the plants' day shift letting out.

Virginia-based Northrop Grumman now occupies nine acres in Bethpage, employing about 500 people. Corporate offices, distribution centers and a movie soundstage fill the rest of the old site.

"A lot of people had a lot of pride working for Grumman," said Jeanne O'Connor, 49, a fourth-generation Bethpage resident and activist for a stronger cleanup whose mother and grandfather held jobs there. "Now it feels like that image has been severely tainted by the fact that they left this mess."

Many of the starkest examples of Grumman's private knowledge were found in a series of exhibits and decisions in sparsely covered federal lawsuits filed in 2012 and 2016. Grumman's insurer during the 1970s and '80s, The Travelers Cos., successfully argued that it had no duty to cover liabilities for the company's past practices in part because Grumman had not provided it with full or timely notice about its role in the pollution.

In her 2014 decision, U.S. District Court Judge Katherine B. Forrest wrote, "Grumman's own documents, and its admissions in reply to Travelers' [assertions] are clear that its long-term, historical practices created contamination."

She rattled off a number of pollution-causing practices that "Grumman knew" of in the period it publicly denied responsibility. They included using TCE in degreasing vats and spray guns, discharging TCE-contaminated water into basins that allowed it to leach into the ground, placing TCE-laden wastewaters in unlined "sludge drying beds" dug into the dirt and using a 4,000-gallon TCE storage tank that it was aware was leaking.

In a separate ruling last year, a second district court judge, Lorna G. Schofield, pinpointed when Grumman, through consultant and regulator warnings, should have known its liability: "No reasonable jury could conclude that in June 1976, Grumman lacked sufficient information" to reasonably know its pollution could leave it on the hook for damages.

The first case contained unintended revelations, as telling documents emerged that were never meant to be seen.

Nearly every exhibit submitted by Northrop Grumman and Travelers was filed under seal, meaning they were to be kept from public view, as were those submitted by another party, Century Indemnity, a successor company to Grumman's insurer during the 1950s and 1960s.

But Newsday discovered that 20 of the 39 exhibits Century offered in support of one motion — all marked "confidential" — had not been sealed as intended and were available on a court records website with the notation "FILING ERROR — DEFICIENT DOCKET ENTRY."

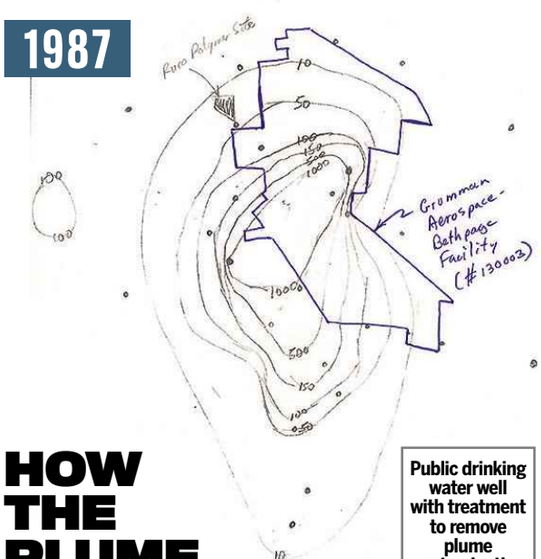
Together with historical news articles and decades of official correspondence Newsday obtained under state and federal Freedom of Information laws, the secret documents reveal what the company and regulators knew, when they knew it and what was withheld from the public.

The court records mistakenly left unshielded contain prophetic governmental concerns about Grumman's toxic wastes going back to the 1950s, profound warnings from a company consultant in the '70s and a confidential summary of a 1989 meeting that declared Grumman's unequivocal responsibility for pollution that had reached public drinking wells.

There is also urgent internal correspondence from a Northrop Grumman manager in 2000 alerting that the plume was spreading well beyond the contours predicted by company consultants.

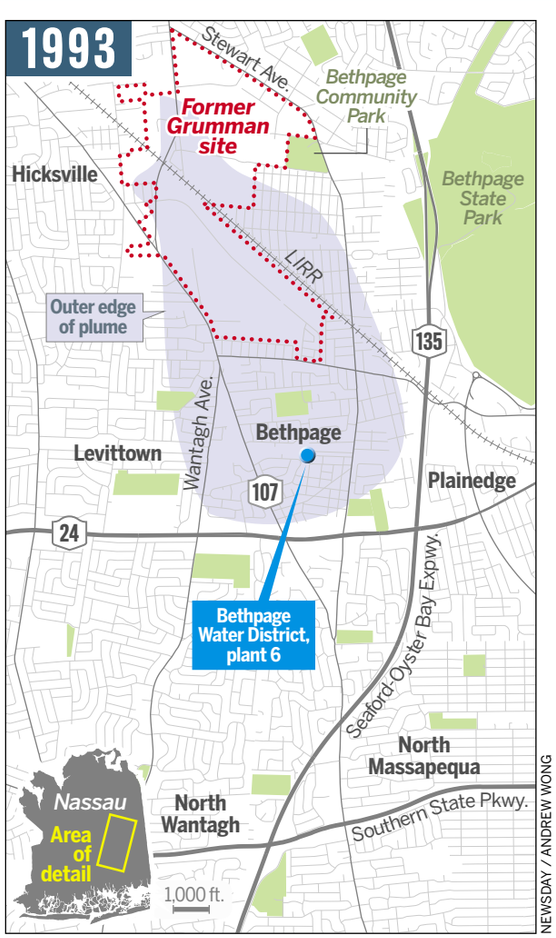
Several documents detail how state and county officials for years falsely blamed the bulk of the pollution on a neighboring manufacturer. They clung to this position even though, as Grumman's own consultants noted early on, at least one of its tainted wells was positioned north of the adjacent plant — in an area where groundwater contamination flowed south.

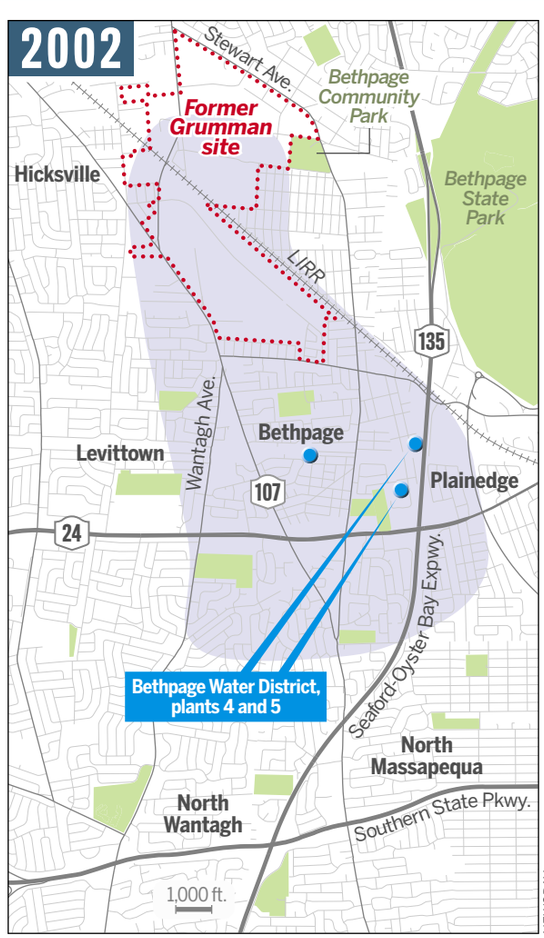
In her 2014 decision, Judge Forrest discredited Northrop Grum-



HOW THE PLUME HAS GROWN

In the beginning, regulators had only a limited understanding of the groundwater contamination spreading from Grumman's Bethpage facility. This is reflected in a hand-drawn map, released by the state in 1987, that contains no markers for scale or geography, beyond the distinct footprint of company operations. As the years progressed – and the pollution reliably spread – the plume models evolved.





man's argument that Grumman provided late notice to its insurer because it initially thought it wasn't responsible, writing: "a belief in non-liability was unreasonable based on the factual record."

From denial to dodging

Little in this trove of confidential documents has been known publicly, making their language and findings all the more extraordinary.

In 1955, for example, the Nassau County Health Department determined that Grumman's toxic wastes, then believed to be limited to chromium and other heavy metals, could "concentrate as slugs or ribbons which might eventually contaminate the water in public supply wells at a considerable distance."

That assessment, seven years after chromium first reached a public drinking water well beyond Grumman's plant, is the earliest known forewarning that a plume could develop.

In June 1976 — after TCE had been found in a private Grumman well at a level 100 times today's drinking water standard — the company's environmental consultant concluded that "sources of contamination consisting of basins, lagoons, spills, etc. have created a slug of contaminated ground water in the shallow aquifer underlying at least part of the plant."

That is the first known instance of contamination being identified by Grumman's own experts as likely caused by its own practices.

Even after that, the company consistently stated that it was not to blame.

"A Grumman spokesman denied that the company's own operations were responsible for the contamination," Newsday reported in November 1976.

More recently, the company, with the state's help, moved from denial to persistently minimizing the problem and dodging costs.

Beginning in 1990, the record becomes visible through voluminous Superfund documents, including long-overlooked technical reports and correspondence obtained through the public records requests. Among the most important threads that emerge is Northrop Grumman's development of a computer model that substantially underestimated how much the plume would grow.

The modeling was particularly important because it was used by the state as a basis for developing limited, less-expensive cleanup plans that failed to stop the spread.

In 2000, it predicted that the toxic contamination wouldn't reach public water supply wells beyond Bethpage in at least the next 30 years. Within a decade three additional wells required treatment.

A Bethpage well that it predicted would virtually be rid of TCE now treats contamination nearly 70 times the drinking water standard.

As it relied heavily on Grumman analyses like this, the state, at its most extreme, dismissed early calls to tackle the off-site groundwater pollution, remarking in 1990 that it "would be a waste of time and money."

Basil Seggos, appointed the state's environmental conservation commissioner in 2015, called the plume's growth during the first quarter century of Superfund oversight "unacceptable." The state in 2017 spent $6 million to conduct its own analysis, leading to a new model that informed the current $585 million cleanup plan.

"We've certainly put in place a much more aggressive and advanced and ambitious look into this," he said in an interview.

200,000 pounds removed

Northrop Grumman declined multiple requests for sit-down interviews made between last June and earlier this month.

Tim Paynter, a Northrop Grumman spokesman, issued this statement: "For over two decades of environmental remediation efforts in Bethpage, Northrop Grumman has worked closely and extensively with New York State Department of Environmental Conservation, the United States Navy, the New York State Department of Health, and other federal, state and local regulatory authorities to develop and implement scientifically sound remediation strategies that protect human health and the environment. Northrop Grumman's commitment to remediation in Bethpage is an important aspect of its ongoing legacy; one which honors its exemplary service to the country since before World War II, during the space race, and today, as our Bethpage team continues to work on critical national security programs.

"Northrop Grumman remains committed to working with all stakeholders to provide for fact-based, scientifically-sound remediation efforts that advance the cleanup and help protect the community without unnecessary disruption and potential harm."

The company has repeatedly defended its waste disposal practices as legal at the time, although the Superfund process holds polluters responsible for costs nonetheless.

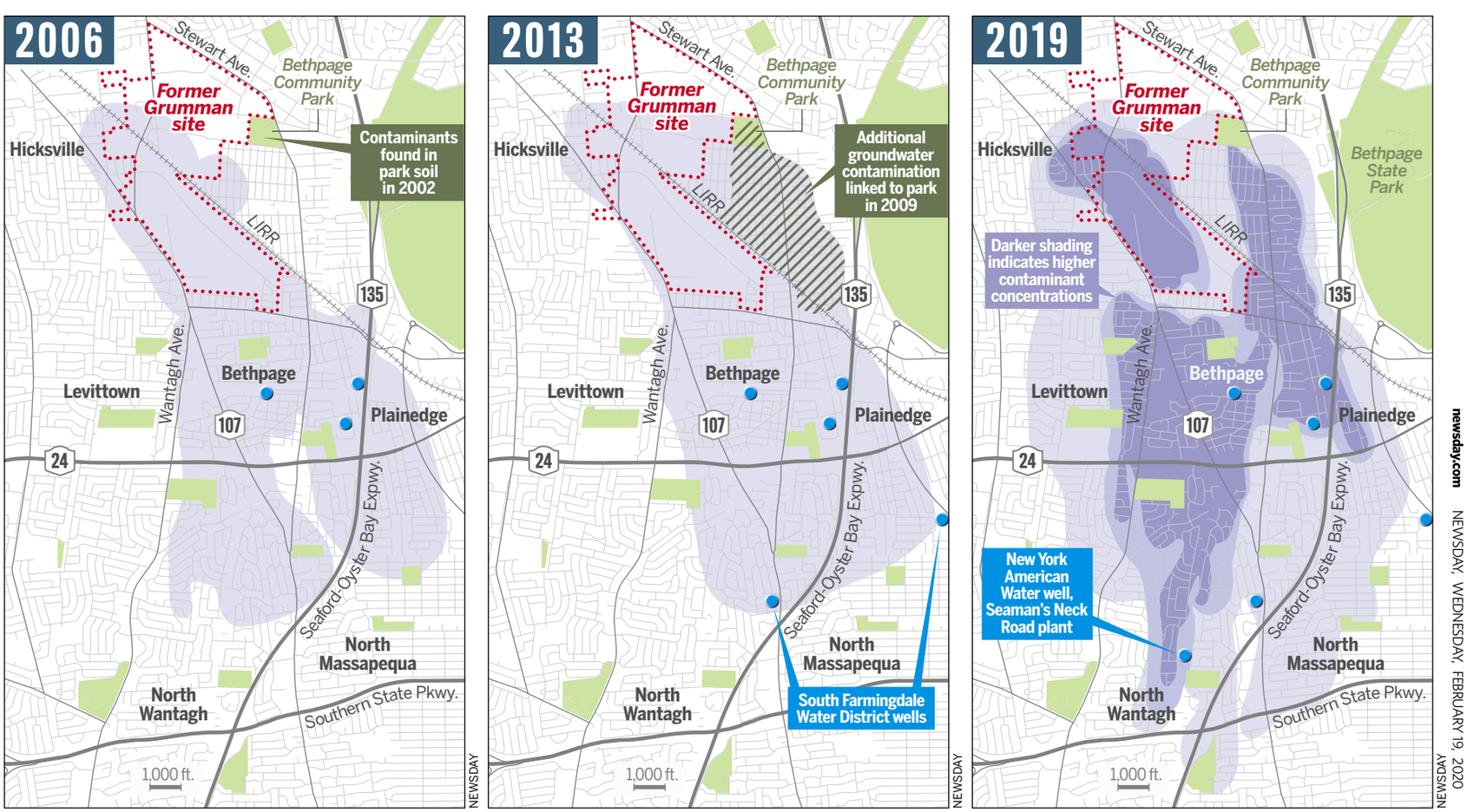
In terms of cleanup, Northrop Grumman especially touts its system of five containment wells along the southern boundary of the old 600-acre property. The state estimates it has extracted nearly 200,000 pounds, or 18,000 gallons, of groundwater contaminants in the more than two decades it has operated.

"We cut off that offsite migration," Ed Hannon, a Northrop Grumman project manager, told residents at a January public hearing.

But approximately 200,000 more pounds of TCE still await removal, according to the state. After seven years of planning and construction, the company is still completing its first comprehensive off-site system of wells to remove plume contaminants before they reach drinking supplies, joining one that the Navy operates and another it is planning.

The Navy since 1995 has contributed more than $45 million for five public water supply treat-

See GRUMMAN on A11



WHAT THEY SAID VS. WHAT THEY KNEW

DENYING RISK

State environmental officials reclassified Grumman as a high-risk hazardous waste disposal site in late 1987. Then-company spokesman Weyman Jones reacted a few months later by saying:

"We don't agree with their reclassification and we have no evidence of any risk to the environment,"

Newsday, Mar. 3, 1988

The state's handwritten report describing the reclassification noted the discovery of a concentrated groundwater contamination plume spreading from the facility.

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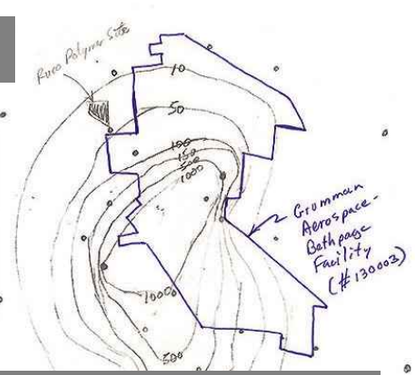


State Department of Environmental Conservation report, Dec. 16, 1987

DENYING LIABILITY

Grumman officials in 1990 publicly denied a role in polluting a second Bethpage public well, not long after internally acknowledging their part.

BETHPAGE WATER AMONG THE SAFEST

Rumors of Grumman Contamination Pose No Threat

Grumman doesn't admit liability on the issue of contaminating Bethpage wells, however Grumman acknowledges that wells on their Bethpage site exceed Nassau County Board of Health standards.

Bethpage Tribune, May 10-16, 1990

Data is conclusive that it is Grumman plume which is contaminating the Water Districts well

No question regarding liability

Confidential summary of Grumman insurance meeting, Aug. 16, 1989

REVISING HISTORY

After Bethpage Community Park was found to be the source of another spreading plume, a Northrop Grumman consultant said the site's past was vaguely known. A few years earlier, another consultant had laid out a detailed history.

- The Park history and apparent historical activities are not well understood or documented.

Source: 2008 draft report from Northrop Grumman consultant on Bethpage Community Park contamination

- Wastewater treatment sludge generated at the Grumman Aircraft Engineering Corporation Plant 2 Industrial Wastewater Treatment Facility was transported to the Park property and placed in one of two sludge drying beds. The wastewater treated at the Plant 2 Industrial Wastewater Treatment Facility resulted from metal finishing operations conducted at both Plant 2 and Plant 3 at the Naval Weapons Industrial Reserve Plant.
- The area where the sludge drying beds were located was enclosed by a chain-link fence, which was secured by a locked gate. This fenced area is visible in available aerial photographs dated between the 1950s and 1962, when the property was transferred to the Town of Oyster Bay.
- Spent rags generated during the wipe-down of a paint booth water curtain located in Plant 2 were transported to the fenced-in area of the Park property where they were emptied into a pit located on the property. In addition, used oil may have been discarded in this pit.
- The southeastern portion of the current park property was utilized as a fire training area where waste oil and jet fuel were ignited and extinguished. The requirement to develop, operate and maintain an on-site fire fighting force ("Crash Crew"), including a fire training program, was imposed on Grumman Aircraft Engineering Corporation by the U.S. Navy.

Source: 2003 report from prior Northrop Grumman consultant on Bethpage Community Park contamination

READ THE FULL DOCUMENTS AT NEWSDAY.COM/PLUME

GRUMMAN from A5

SHOCK OVER TCE RELEASE

Decades after Grumman's practices caused large amounts of TCE to seep into the groundwater, a Northrop Grumman employee was astounded by the sheer volume.

From: Smith, Kent A (AS)
Sent: Tuesday, March 15, 2011 8:09 PM
To: Cofman, John (AS)
Subject: RE: How Much TCE Spilled? Perspective

Perspective? How's this for perspective? The fact that there might have been a total release of 40,000 gallons of TCE just caused my insides to start churnin' somethin' fierce!!

Man, oh man, that's a lot of material.

March 2011 email chain between two Northrop Grumman employees

ments installed by the Bethpage and South Farmingdale water districts and New York American Water, which serves thousands of customers nearby. Northrop Grumman, in comparison, has paid about $5.4 million in construction and maintenance costs for the first two systems built by Bethpage in the early 1990s, according to a company attorney's demand to Travelers for coverage.

"The Navy is focused on fulfilling its responsibility to protect human health and the environment, and we take our role in these cleanup efforts seriously," a Navy spokesman, J.C. Kreidel, said in a statement when asked about the difference in public treatment contributions.

Northrop Grumman has cited these existing treatments — and the reassurances from government officials that they make the area's drinking water safe — to argue that a more extensive cleanup is unnecessary. Water providers say that argument unfairly leaves the burden of continued monitoring and expense on them and their ratepayers — not on the polluters.

Experts also note that it's unknown how the various contaminants in the toxic mix react with each other, what new ones — like the solvent stabilizer 1,4-dioxane, a likely carcinogen — will emerge that can't be removed by traditional treatment and what happens if all of this hits the Great South Bay.

'Should we trust them?'

As recently as last summer, local officials publicly celebrated Grumman on the 50th anniversary of the moon landing. But some actions by the company and its successor are serving to break those strong bonds of community pride, residents say.

Northrop Grumman went to court successfully to fight paying more than $30 million in remediation and treatment costs borne by taxpayers. Newly discovered records show that Grumman once presented the public with cherry-picked data to paint a misleading picture of how much TCE it was putting into the ground.

And its donation of land to the Town of Oyster Bay turned into an environmental debacle.

The 18 acres, gifted in the early '60s, led to creation of Bethpage Community Park, a multigenerational centerpiece with a swimming pool, ice skating rink and ballfield.

It turned out that the gift included what had been a dumpsite for Grumman's toxic wastewater sludge and solvent soaked rags, a fact undisclosed to the public for 40 years.

In 2002, less than a decade after the state had summarily ruled out the park as a pollution concern, it was shut down because the soil was found to contain elevated levels of two carcinogens, the industrial compound polychlorinated biphenyl, or PCB, and chromium.

Most of the facility reopened within a year, but the park's ballfield, built directly over the three-plus acres that Grumman had once called an "open pit" for its wastes, remains closed.

In 2007, the Bethpage Water District discovered that the ballfield also was the source of some of the highest levels yet detected of TCE-tainted groundwater — several thousand parts per billion. The state would soon confirm it as a second plume, now commingled with the original mass from the Grumman plant.

The park saga is one of the better-known components of the Grumman pollution story. But the Newsday investigation has uncovered documents showing that the town knew from the start how the site had been used — though it believed the wastes were nontoxic. Once it became clear that its contamination had spawned another plume, Northrop Grumman consultants tried to obscure the detailed history of site dumping that another consultant had previously written.

Today, Bethpage residents are increasingly joining class action and personal injury lawsuits over the decades of contamination, mostly against Northrop Grumman but also against Oyster Bay. Many in the community have become consumed by suspicions that the cancers afflicting their family members, neighbors and themselves can be traced to the pollution, despite a lack of conclusive proof.

Pamela Carlucci, 68, a cancer survivor who has lived in Bethpage for 43 years, encapsulated the feelings that many in her community have of the polluters, regulators and even the water providers who have battled for a stronger plume offensive.

"Should we trust them?"

Moments of consequence

Underlying many of the missteps that forestalled a comprehensive cleanup was a failure to tell the public the truth when the problem was first emerging.

Below are a few of the numerous examples of private knowledge kept secret, some of it further shrouded by public statements to the contrary.

They have been culled from an extensive four-part history of how the contamination came to be — and how it grew. As much as they reveal on their own, these examples stand out even more in the context detailed in that chronicle of failure.

1. 'CONTAMINATION MAY SPREAD'

In June 1976, Grumman's environmental consultants, Geraghty & Miller, presented the company with the confidential memo that pointed to the "basins, lagoons, spills, etc." as the cause of the "slug" of pollution below ground. In an attached rendering, they labeled this source as part of Grumman's facility.

In prescient terms, the memo also warned that the groundwater contamination, which had already shut several Grumman wells, "may spread both laterally and vertically beneath the property." It cautioned that "neighboring wells may become contaminated over the long term" and that "further contamination may take place from sources presently not detected."

All those projections came to pass. Officials today believe that the failure to acknowledge and act on them came at a big price.

"If they had done their job in the '70s – '76 – when they knew about the polluted wells; if they would have done their job then, we wouldn't be here today," said John Sullivan, chairman of Bethpage Water District's board of commissioners.

Grumman didn't tell employees or the public these findings, which were concluded with a call for the company to further investigate as it switched its drinking water supply to Bethpage wells to "eliminate the problem of potential adverse health effects."

The general problem of groundwater contamination at the site only surfaced a half-year later when an alarmed state official with access to water sampling results called an Albany newspaper.

But the consultant's precise analysis of what the future could hold didn't emerge until now.

2. 'I'D DRINK THE WATER'

On Dec. 2, 1976, the Bethpage Water District received the first results showing that one of its public wells was contaminated with TCE. Readings would reach as high as 60 parts per billion, above the soon-to-be-approved state limit of 50.

The well had only been intermittently used in the months before, but Bethpage residents had still been drinking its untreated water for years. That morning, state, local and federal officials, including Nassau County Health Commissioner John Dowling, met with Grumman representatives to discuss the pollution's spread from the company grounds into the community.

The meeting and its attendees were documented in confidential handwritten notes to Grumman by Geraghty & Miller, another of the Century Insurance documents.

It recorded a sharp disagreement between representatives of the federal Environmental Protection Agency and those of the state environmental department:

EPA — "Don't drink the water"
State [illegible] disagrees
EPA — "no basis for levels that are acceptable"

Dowling, who is now deceased, told Newsday later that day: "If I lived in the area, I would continue to drink the water. We don't have any information that the chemicals are harmful in drinking water."

It was only last year that the New York Department of Health stated for the first time that levels of TCE in Bethpage public water before 1976 were high enough to harm people's health.

3. 'NO QUESTION REGARDING LIABILITY'

By August 1989, the Bethpage Water District had privately notified Grumman that a second of its public wells had been polluted with TCE. A company executive, along with an engineer, a lawyer and an insurance manager, huddled with Travelers representatives to discuss a possible settlement.

Another memo that was meant to be sealed offered a blunt summary of the closed-door discussion: "Data is conclusive that it is Grumman plume which is contaminating the [Bethpage] Water Districts [sic] well."

It later underscored the point: "No question regarding liability as there are no other direct parties [that] appear to have contributed to contamination yet."

Grumman didn't come out of the meeting and acknowledge its role.

In fact, a few months later it did the opposite. One of the executives who attended the meeting was among a group of top Grumman officials that spoke to a community newspaper. They told it the company didn't admit liability for the contamination.

The headline on the May 1990 story: "Bethpage Water Among the Safest: Rumors of Grumman Contamination Pose No Threat."

Emerging in Newsday's investigation, document by document and incident by incident, is the secret history of an environmental disaster that could have been contained long ago and a public that should have known more.

READ MORE Decades of fear take toll NEXT PAGE

FROM GROUND TO TAP

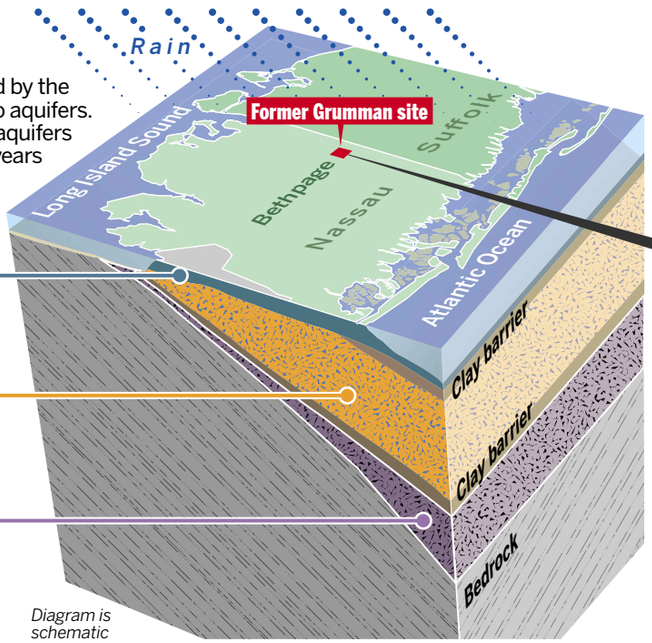
Like all of Long Island, Bethpage and surrounding communities impacted by the plume get their drinking water from the aquifer system, water-filled layers of rock, gravel and sand that stretch hundreds of feet below the surface. Here's how it gets to the tap.

1 GROUNDWATER
Rainwater is absorbed by the ground and seeps into aquifers. Some of the water in aquifers can be thousands of years old. The water stored there is referred to as "groundwater."

UPPER GLACIAL AQUIFER
A source of Long Island's water

MAGOTHY AQUIFER
Where majority of Long Island's water is drawn

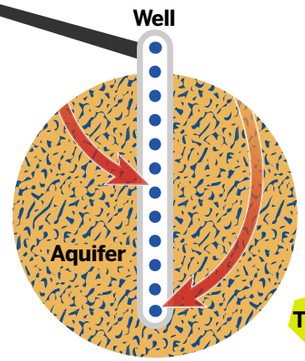
LLOYD AQUIFER
The deepest, oldest and cleanest layer



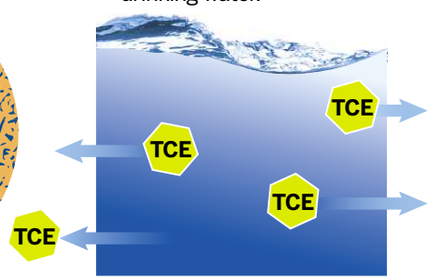
NEWSDAY / ROD EYER AND ANDREW WONG

Diagram is schematic

2 DRAWING FROM WELLS
Water providers drill wells hundreds of feet deep to access water in the aquifers. The Grumman plume of pollution has been found in the groundwater in the Upper Glacial and Magothy aquifers.



3 READY FOR THE TAP
Groundwater from the plume is pumped up through wells and treated with various processes that remove contaminants such as trichloroethylene, or TCE, the primary contaminant of concern. Treated water that meets current state and federal safety standards is pumped to taps and termed "drinking water."



SOURCE: USGS, STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, BETHPAGE WATER DISTRICT

WHAT'S IN THE PLUME?

BY DAVID M. SCHWARTZ AND PAUL LAROCCO
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Long Island's largest and most complex mass of groundwater pollution begins as two contaminant concentrations 50 feet below ground in Bethpage.

One starts from the western portion of the old Grumman Aerospace and U.S. Navy complex. The other originates from the east beneath Bethpage Community Park, once a Grumman waste site. They commingle beneath the southern portion of the former 600-acre manufacturing site to form a single plume.

Indistinguishable in taste, texture or smell from uncontaminated water, the plume spreads roughly south or southeast at about a foot per day between the grains of sand and gravel bits that make up the region's aquifer system. The flow is influenced by the makeup of the soil and the action of wells that pump drinking water and treat the pollution.

It now extends south 4.3 miles from the former Grumman site, with its leading edge past the Southern State Parkway. It stretches 2.1 miles wide toward Levittown and Bethpage Parkway, and goes as much as 900 feet deep until it runs into a layer of clay that separates it from the Lloyd aquifer, Long Island's deepest and cleanest source of water.

The contamination was first identified in the groundwater in the 1940s. It has required treatment at 11 wells that provide drinking water for Bethpage, Plainedge, South Farmingdale, North Massapequa and parts of Levittown, Seaford, Wantagh and Massapequa Park. It threatens another 16 public drinking water wells. In all, 250,000 Nassau residents get water from affected wells or those in the plume's path.

All drinking water pumped from the plume is treated to remove contaminants before it reaches people's faucets. Almost without fail, the water has met government standards for safety for more than 40 years. The one exception was in September 2007, when a relay switch failed for 11 days on a treatment system. The district found 10 times the drinking water standard for the carcinogen trichloroethylene, also known as TCE. The well, though, was only used intermittently for about 15 hours to meet high demand.

The state has said there's no risk to living or working above the polluted groundwater.

New York State's Department of Environmental Conservation first designated the site for cleanup in 1983 under the state's Superfund program, which identifies former hazardous waste sites and manages their cleanup. In 1987, the state elevated the Grumman facility to a "level 2" Superfund site, which means it presents a "significant threat to public health or the environment."

The state has listed two dozen "contaminants of concern" for cleanup within the plume. Thirteen chemicals and metals are designated by federal agencies as carcinogens, likely carcinogens or suspected carcinogens.

They include solvents used to clean and degrease airplane and lunar module parts, additives to make those solvents last longer and metals used in plating.

By far the most prevalent contaminant is TCE. It was used by Grumman as a solvent for parts. It has been found in untreated groundwater outside the former Grumman boundaries at levels of 13,700 parts per billion, 2,740 times higher than the drinking water standard of 5 parts per billion. (TCE levels of 58,000 parts per billion have been found in groundwater directly beneath former Grumman operations.)

The chemical is "known to be a human carcinogen," according to the federal Department of Health and Human Services. Scientists have linked exposure to kidney and liver cancers, malignant lymphoma, testicular cancer, immune system diseases and developmental effects such as spontaneous abortion, small birth weight and congenital heart and central nervous system defects.

TCE, which in its pure form has a sweet smell, had been stored in a leaky 4,000-gallon tank at one of the Grumman plants.

The contamination also was caused by Grumman's disposal and routine housekeeping practices. Chemicals have been found in old cesspools, dry wells and storage areas, as well as unlined pits where wastewater was dried into sludge and workers discarded dirty rags.

Besides TCE, the two most common plume contaminants are tetrachloroethene, also known as PCE or PERC, used as a solvent to clean aircraft parts; and cis-1,2-Dichloroethene, or cis-1,2-DCE, also found in solvents.

Discovered in soil at the former Grumman site has been one contaminant not found in the groundwater — the now banned industrial compound polychlorinated biphenyl, or PCB. Soil has also been contaminated with volatile organic compounds like TCE and chromium, which was a metal plating agent.

One chemical the district is still working to remove is the likely carcinogen 1,4-dioxane, used by Grumman as a solvent stabilizer. It has been found in Bethpage Water District drinking water wells at levels up to 15 times higher than the state's proposed standard. The district began operating in October a treatment system for 1,4-dioxane in the first of its six affected wells. State health officials say 1,4-dioxane poses a slightly elevated risk of cancer after long-term exposure.

Northrop Grumman, which acquired Grumman in 1994, has for more than 20 years operated treatment wells at its former facility to remove contamination and prevent it from spreading further. The state estimates 200,000 pounds of contaminants, or 18,000 gallons, have been removed from the plume. It also estimates that another 200,000 pounds of contaminants remain.

In December 2009, Northrop Grumman began operating another set of wells to contain pollution coming from the eastern plume at Bethpage Community Park. The state estimates it has removed approximately 2,200 pounds of contamination.

Since 2009, the Navy has operated the only groundwater treatment wells outside the former facility grounds aimed at removing an area of the plume with a high concentration of contaminants. The system treats about 1.4 million gallons of water per day and has removed more than 11,000 pounds of contamination.

Northrop Grumman and the Navy are each constructing other treatment systems in Bethpage at "hotspots" that have elevated contamination levels.

The state has approved a $585 million plan to use a series of 24 wells and treatment systems to stop the plume from spreading and clean the underground water. It would cost $241 million to construct, plus millions more each year to maintain and operate. It would take 110 years to clean the entire groundwater plume to 5 parts per billion of contamination or less.

The Navy and Northrop Grumman have opposed the plan, saying it's not feasible and that the public can be protected by treating water before it reaches faucets.

IN PROUD COMMUNITY, YEARS OF WORRY TAKE EMOTIONAL TOLL

BY DAVID M. SCHWARTZ AND PAUL LAROCCO
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Theirs is a community that once helped put men on the moon. Now Bethpage residents don't trust the water coming from their taps.

They wonder whether the tomatoes they grow are safe to eat.

For nearly two decades, their kids have not been able to use a baseball field on land donated by the Grumman Aerospace company, which utilized part of it as a toxic waste dump.

Real estate agents say some prospective buyers shy from this community of trim homes and honored schools because of the pollution's stigma.

Hovering behind all that, in conversations around dining room tables and in community meetings, are fears about whether the contamination has caused cancer.

There's no proof it has, but residents' wariness has caused them to question the validity of a state investigation that failed to establish a link.

Concern. Skepticism. Frustration. Beyond its other effects, the toxic legacy of Grumman's operation has taken an emotional toll on Bethpage and sown deep distrust of the company, the U.S. Navy, which owned part of its site, and government officials.

Amid an incomplete cleanup of a toxic mess that state officials and Grumman minimized and even denied for decades, what was long called the "Bethpage plume" has grown to be 4.3 miles long, 2.1 miles wide and as much as 900 feet deep.

Many residents are galled by the name itself, feeling it connotes that the community is responsible for its own misfortune and obscures the pollution's spread. Treatment is required not only at drinking water wells serving Bethpage, but also for Plainedge, South Farmingdale and North Massapequa, and parts of Levittown, Seaford, Wantagh and Massapequa Park.

JOHNNY MILANO

Longtime Bethpage resident Pamela Carlucci, 68, is a breast cancer survivor.

"This has nothing to do with our community and its people who are the victims of this environmental disaster," said Peter Schimmel, 51, a lifelong Bethpage resident.

The state, in official documents, now calls it "the Navy Grumman" plume.

The bitterness is particularly deep because of a sense of betrayal — the company was Bethpage's paternal corporate anchor and Long Island's largest employer. But its days hosting community picnics and making military fighters and the Apollo 11 lunar module are long gone.

In 1994, Grumman was acquired by rival defense contractor Northrop and became part of the Northrop Grumman Corp., now headquartered in Virginia. The former 600-acre Bethpage operation, which at its peak employed 20,000, has been reduced to nine acres and 500 workers.

"It's hard for people to understand you could put a man on the moon, you know, you can do all these things in space, and we're totally ineffective when it comes to cleaning up the contamination we make here on Earth," said Sandra D'Arcangelo, 76, a 40-year Bethpage resident and member of a Navy community advisory board. "My community has totally lost confidence in the effective remediation of this site. We have no confidence Grumman or the Navy would do the right thing."

The most common pollution concern in Bethpage is about drinking water, primarily the prevalence of trichloroethylene, or TCE, a carcinogenic solvent that Grumman used to degrease metal parts. But contamination has also been found in soil at Bethpage Community Park. Vapor pollution has seeped into basements, leading the Navy to install treatment systems. And there was enough toxic soil in one neighborhood for the state to order the dirt removed from 30 homes' yards. The Bethpage School District has spent $250,000 drilling its own wells to test groundwater and install vapor barriers around schools. It's found some elevated levels of radium in water around buildings and radon, the gas it breaks down into, in unoccupied school basements. The state for years maintained that the elevated levels are likely naturally occurring, but radium was also used in luminescent paint on aircraft dials and gauges.

Occasionally, heavy equipment will turn up in residential streets, drilling down thousands of feet for another sample of the plume.

Grumman and the Navy, which owned a sixth of Grumman's site, have spent extensively on contaminant extraction and testing and have joined government officials in trying to reassure the public of the water's safety. The Bethpage Water District has repeatedly certified that the water is safe to drink once it reaches the tap.

But they've been met with a lot of skepticism, and health experts say that's not unreasonable. The variety of contaminants in the plume and potential sources of exposure make it understandable that Bethpage residents ask questions. Drinking water standards continue to tighten as scientists learn more about chemicals' long-term effects. How multiple contaminants interact and impact human health is poorly understood.

"It's certainly among the most significant community exposures that I've seen," said Dr. Ken Spaeth, division chief of occupational and environmental medicine at Northwell Health and Hofstra Northwell School of Medicine. "The combination, the range of different types of contaminants and the toxicological profile of many of them all add up to a very concerning situation.

"It's very reasonable for the community to want some answers regarding what may be happening to their health."

A suburb under a cloud

At the peak of Grumman's operations, Bethpage brimmed with patriotism. The company

See COMMUNITY on A14

COMMUNITY from A13

built the Apollo Lunar Module. Equipment sits on the moon stamped "Made in Bethpage, New York."

Grumman donated generously to the local Rotary Club and gave out turkeys at Christmas to employees. The roar of jet engine tests on Saturday mornings was a small price to pay — particularly when the company contributed up to $16 million a year in school property taxes.

Even without the company's massive presence, Bethpage and surrounding hamlets served by the local water district convey a quiet American success story. They make up an archetypal suburb of 33,000 residents spread over leafy neighborhoods of single-family homes, neat lawns and strip malls dotted with pizza places, hair salons and dry cleaners. Broadway serves as Main Street for Bethpage, the unincorporated area within the Town of Oyster Bay.

Neighbors know each other, crime is low, schools are strong. The U.S. Department of Education honored Bethpage High School in September for academic excellence, one of three schools cited on Long Island.

Even the water was once a source of pride. At state fairs and Long Island malls, the Bethpage Water District won multiple blind taste tests against other water providers. A sign entering town once announced, "Welcome to Bethpage, Home of New York State's Best Tasting Drinking Water."

But tucked into the residential neighborhoods are visual markers of Bethpage's problem.

At three water district well sites, metal "air stripping" towers that look like grain silos rise as high as 60 feet. Water from the plume trickles down over golf-ball-sized materials to disperse it into fine droplets, while air is forced upward to evaporate volatile organic compounds.

The sites also include storage tanks holding 20,000 pounds of crushed carbon to absorb contamination — acting like giant Brita filters.

At the district's Plant 6, where TCE contamination first closed a well in 1976, the water district has been constructing a $19.5 million building with an advanced system designed to remove 1,4-dioxane, a newly regulated contaminant once used to stabilize solvents like TCE.

Still, as far back as 1992, a Navy community relations plan reported that residents were concerned that contamination from the Navy and Grumman "may be a factor in the development of cancer."

YEONG-UNG YANG

Bethpage Water Commissioner John Coumatos says the water that comes from taps is safe.

The report noted that, "As a result of their concerns, many residents who were interviewed stated that they were drinking and/or cooking with bottled water rather than municipal water from groundwater sources."

'What is it then?'

After two breast cancer diagnoses and uterine cancer, Maryann Levtchenko, 68, got genetic testing to see if she was predisposed to the diseases. She wasn't.

"So maybe I do need to tell my story, because what is it then? It makes me question my whole life," said Levtchenko, who is part of a pending 2016 class-action lawsuit against Northrop Grumman.

Levtchenko and her husband moved to Bethpage in 1975 and raised two kids, spending summers at Bethpage Community Park.

She adored the community and still does, she said from her living room, where she handed visitors bottled water.

"The unfortunate thing — I love it here," Levtchenko said. "It's a safe neighborhood, everybody knows one another. Everybody's caring."

She and her husband are retired, she said. But they stayed.

Still, Levtchenko believes something in the tap water, which she drank until only recent years, made her sick. She counts cases of multiple myeloma on her street and thinks about four parents of her son's group of six friends who died of cancer when the kids were in school.

"It was like a Bethpage flare," she said.

Cancer, a generic term for more than 100 separate diseases, is frightfully common across New York. One of every two men and one of every three women will likely be diagnosed with a cancer during their lifetimes, according to the state Department of Health. New York's cancer rate is the fifth highest in the country, according to the state Department of Health.

Still, Bethpage residents feel that cancer cases are more prevalent here.

A few blocks away from Levtchenko, Pamela Carlucci, 68, a breast cancer survivor, took a photo of smiling neighbors off her refrigerator and started pointing.

"Cancer, cancer, cancer, cancer," Carlucci said.

She and neighbors sat around her dining room table, counting 15 families with cancer among 29 nearby houses. Some of those households have seen numerous cases. For instance, Carlucci's son, Philip, died of brain cancer at age 30 in 2007.

"It's our own Love Canal," Carlucci said, referring to the western New York neighborhood abandoned in the late 1970s after it was found to be inundated with industrial contamination.

"We all had gardens, my goodness. We grew eggplants, peppers, tomatoes, parsley," said Deanna Gianni, 79, whose husband, Joseph, a mechanic, died of stomach cancer at age 74 in 2011.

Edward Mangano, the former Nassau County legislator and county executive who lives a mile and a half from Bethpage Community Park, remembers growing concerns about Grumman pollution in the 1980s and 1990s.

The issue hit home when his brother was diagnosed with multiple myeloma at age 36.

"Can you eat tomatoes you grow in the backyard? That was the number one question at every meeting," said Mangano, who served as county executive from 2010 until 2017 and is appealing his 2019 conviction on federal corruption charges.

Homes are selling, but residents wonder if they'd get more if not for the pollution.

"I find it very difficult to show properties here," Barbara Ciminera, a real estate broker, wrote in comments to the state about its latest cleanup plan. "People just don't want to see anything here while this is going on."

Real estate agents will sometimes ask Bethpage Water District representatives to stop by open houses to reassure prospective buyers.

"They'll call the district and say, 'We're having an open house on Saturday. Do you think you can come by from 12 to 2 in case anyone has any questions?'" said district superintendent Michael Boufis.

Compounding residents' fears is that the water's taste,

Northrop Grumman contractors drill to install a monitoring well at William Street and Broadway in

BARRY SLOAN

Bethpage in February 2015.

CHRIS WARE

Peter Schimmel, senior water plant operator at Bethpage Water District, tests for hydrogen peroxide.

once a source of pride, has diminished, unrelated to the Grumman pollution.

In 2010, the state, citing bioterrorism concerns, removed the district's waiver that allowed it not to use chlorine.

District tries to reassure

In the foyers of some homes, delivery jugs of bottled water still pile up.

"I don't think I know anybody that drinks water out of the tap," said Carlucci's brother, Stephen Campagne, 65, a retired Con Edison worker who has lived in Bethpage since 1980.

Even the water district acknowledges that many residents haul cases of bottled water home.

"King Kullen, 3 for $9.99, they're on every cart that walks out," said district commissioner John Coumatos, a Bethpage restaurant owner.

At meetings, street fairs and festivals, the district repeats the mantra that it treats and tests plume water above drinking standards — and that tap water is more scrutinized than what is bottled.

"We try to tell the consumers the water's fine. We fight it every day. Fight it every day," Coumatos said.

It's an uphill battle.

"Grumman's caused that situation," Coumatos said about the distrust of public water. Rebuilding trust will take time, he said. "You can't pay enough money to take care of that."

Bethpage Water District has just 12 full-time employees.

With that small staff, the district has had to fight for more aggressive cleanup while reassuring the public. And the list of concerns has only grown to include 1,4-dioxane as well as radium. The discovery of radium at elevated levels in 2012 led to the district shutting down one of its nine public supply wells.

Experts said the mounting disclosure of potential risk factors in Bethpage adds to the inclination for residents to connect cancers to pollution.

"A person who already believes that chemicals which have leached into our groundwater cause cancer is very prone to seek out and favor stories and information which confirm this belief," said Dr. Curtis W. Reisinger, a clinical psychologist at Northwell Health.

Authors of the only state cancer study in Bethpage, which found in 2013 no evidence of higher rates, described their results as "scientifically appropriate and as informative as existing data will allow."

Yet, Reisinger asked, "Are we so wrong to think the causes are environmental?"

"From a certain sense we can't blame people for looking for external causes. And if you live on Long Island and you're programmed pretty much cognitively, psychologically to look for causes other than genetics, it makes a lot of sense that — maybe it is the environment," he said. "That's what science is saying now, maybe the environment is responsible for a lot of this stuff."

More than 1,000 current and former Bethpage-area residents have joined class action or personal injury suits about health effects from the pollution that stemmed from Grumman's historic operations, lawyers said.

The Melville personal injury law firm Napoli Shkolnik represents most of those people, including Carlucci and Levtchenko, in the ongoing suits against Northrop Grumman, as well as the Town of Oyster Bay, which owns the Community Park property.

"My experience in environmental cases is that, fundamentally, not only the polluters — but the community politics — want to downplay the risks associated with any sort of contamination," said Paul J. Napoli, a partner in the firm. "The polluters, because of liability, and the local politics because they don't want to create hysteria."

'We're tired'

At the former Grumman site on Grumman Road, about two dozen people came to a town community center last November to hear Navy representatives give an update on the cleanup, as required by federal law.

Northrop Grumman sent representatives to the meeting, according to the Navy, but they didn't speak or publicly identify themselves. Northrop Grumman is mandated by the state to conduct its own public meetings about its cleanup.

The meeting, with bottled water provided upfront, quickly became a forum for residents to vent their frustration.

A dozen state and Navy officials and consultants sat off to one side, with the Navy's highlighting ongoing cleanup initiatives and others they plan to start soon.

But the Navy's project manager also affirmed that it would oppose the state's more ambitious plan to fully stop the plume's spread.

Instead, the manager, Brian Murray, said while some of the plume would continue to spread, under the Navy's current plan it would concentrate on removing the highest toxic concentrations in the expectation the rest would naturally dilute, dissipate and break down.

Water district officials who have watched the plume spread for decades said the hope was illusory.

"Your solution to pollution is dilution," said Teri Black, a real estate agent and Bethpage Water District commissioner. "I was glad I was sitting. It is unacceptable."

Richard Catalano, 61, of Seaford, a human resources manager whose home sits above the plume, criticized the pace of action.

"It's a disgrace what the Navy's done!" he shouted.

Gina McGovern, a teacher and Bethpage resident, at one point interrupted: "I realize I'm talking out of turn and I apologize to all of you. But I've been sitting in these chairs for 20 years. I had to get babysitters when I first started. My youngest is out of college now. You know how much time in my life I spent sitting on these chairs, listening to the Navy discuss how they're drilling holes?" she said.

David Sobolow, a volunteer co-chair of the Navy advisory board, noted Grumman's absence among the presenters. "With all due respect, the Navy is the one that's here trying to solve the problem."

After the meeting, McGovern explained her anger. "The whole town is just — you can see the frustration level. We're tired. We're tired of trying to be nice. We're tired of trying to be polite."

READ MORE Cancer study questions NEXT PAGE

LONE BETHPAGE CANCER STUDY LEAVES UNANSWERED QUESTIONS

BY DAVID M. SCHWARTZ
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DANIEL GOODRICH

Demonstrators greet people arriving for a June 2012 meeting with the state to discuss the community park.

It was toxic soil vapor seeping into a handful of homes, not the massive groundwater plume emanating from the old Grumman property, that triggered Bethpage's lone community cancer study.

After a three-year investigation, state health officials in 2013 found no higher overall cancer rates in a 20-block area closest to the former Grumman and Navy property, although they also noted the scientific limitations that make linking residential cancer clusters and pollution nearly impossible.

The cancer study did find that within a one-block area, all those diagnosed with cancer were younger than expected. But it concluded that even so, it was too small an area to provide a clear indication of an unusual pattern.

The debate over the strengths and weaknesses of the study — what to make of it and whether a more thorough investigation could have determined more — lingers in a community that for decades has believed it experiences a disproportionate share of cancer.

At its heart, the community is asking a seemingly simple question: Has the pollution in the water, soil and air caused illness there?

Answering that question through science is maddeningly elusive.

Calls for a study

The state has repeatedly counseled residents not to worry because all Bethpage drinking water is treated to government standards and is therefore safe to drink. Similarly, living over the underground water pollution "plume" hundreds of feet below poses no risk to the public, officials said.

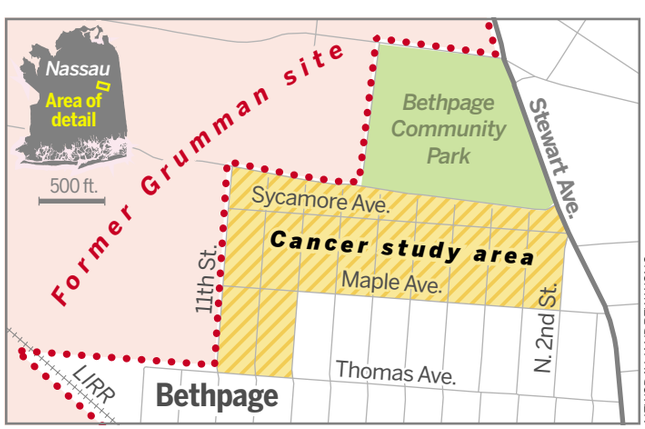
Any study, however, that could support or debunk findings like the state's confronts the scientific difficulty of tying an individual case of cancer to a specific source, an extreme rarity in almost any situation, experts said. Finding clusters of cancers is hard enough; linking those to a pollution source is rarer still.

The Bethpage study took form after the Navy in 2008 found vapors of the solvent trichloroethylene, or TCE, and two other chemical solvents in soil around its property, which Grumman operated. Further testing found contamination had reached a nearby neighborhood.

The Navy installed air purification units at 14 homes, as well as a system to extract and contain soil vapors on its property.

Inside a handful of homes, the levels of the solvents were above state limits meant to protect human health.

By 2009, the clamor for a state cancer study had become intense. One resident provided a list of nearly 80 people diagnosed with cancer or lupus since the early 1960s. Community members made a map stuck with color-coded pins matched to different diagnoses and compiled a list of Bethpage High School graduates and parents stricken with cancer.



NEWSDAY / ANDREW WONG

Edward Mangano, then a county legislator from Bethpage, and then-state Sen. Carl Marcellino asked the state to conduct a survey.

In April 2009, the state Department of Health's Cancer Surveillance Program began evaluating cancer cases and possible environmental exposures. It relied on the state's Cancer Registry — a database of all cases of cancer diagnosed or treated in New York State, tied to patients' addresses.

No 'unusual patterns'

The state released its finding of no higher overall rates in January 2013.

Using photographs of the community map and lists of cancer cases gathered by neighbors, the study found the citizens' evidence inadequate.

Of the nearly 80 cases of cancer reported by residents, researchers could only confirm eight with the state's database. Working off two photographs of the map, the study authors said that only "some of the names were visible." A list attached with the map — provided by unnamed residents to the Navy, which passed it to the state — included streets and blocks where people had been diagnosed with cancer and were grouped by cancer type, but it did not include names.

"Much of the information that would have been useful for a more complete cancer evaluation was not available," the state report said. "The information that was available did not indicate any unusual patterns of cancer."

The state concluded other evidence was unpersuasive.

Five cases of breast cancer among 1979 and 1980 graduates of Bethpage High School were higher than the two cases that would be expected, for example. But the increase wasn't statistically significant and could have been by chance, the study determined.

But the state also decided to look at possible exposure to pollution in the area. Toxic vapor in homes justified taking an additional look at cancer rates, using the state's database to drill down on specific areas, it determined.

In particular, researchers focused on blocks within the neighborhood known as the "Number Streets" that includes homes on 11th Street, where TCE and other chemical vapors had been found.

In the 19-block L-shaped area, south of Bethpage Community

YEONG-UNG YANG

A Bethpage Water District treatment plant on Sophia Street in Bethpage. The district certifies its water as safe to drink.

Park and east of the Navy-owned land, the study found 88 cases of invasive malignant cancers from 1976 to 2009.

But based on the average cancer rates in the state, outside of New York City, 107 cancer cases would have been predicted.

The report said, "uncertainties with population estimation may have led to an overestimate of the number of cases expected. Still, the calculations provide no evidence that the total number of cancers or the number of cases of any individual cancer was greater than expected in the study areas."

The other area examined was a single block directly east of the former Navy site — between 11th and 10th streets, and Sycamore and Maple avenues — where chemical vapors had been found in or under six homes at levels above state standards.

In that block, six people were diagnosed with "invasive malignant" cancer between 1976 and 2009, including the types of cancers linked to chemicals found there . Still, the number was only slightly higher than the five that would have been predicted based on state averages, and not statistically significant, the report said.

The analysis found one concerning feature below the topline number: All those diagnosed with cancer were in their mid-20s to early 50s, younger than average for the different cancers.

"The number of cancers diagnosed in people under age 55 was greater than the number expected," according to the report, which didn't specify the statistically predictive number. "This difference was statistically significant, meaning that it was not likely to occur by chance."

The report concluded that "due to the limited size of this one-block area, however, these results do not provide a clear indication of an unusual pattern of cancers."

In a question-and-answer website released with the study, the state Department of Health said no follow-up was warranted.

'Didn't speak to anybody'

The results left many residents disappointed and frustrated that the state didn't go beyond its database and knock on doors.

"They didn't speak to anybody," said Jeanne O'Connor, who co-founded a group that has collected 2,000 cancer cases in the hope of prompting another state study. She said the effort has become overwhelming, and the group has shifted its efforts to expanding awareness.

"They needed a bigger sampling area," said Mangano, who later served as Nassau County executive from 2010 to 2017 and is appealing his 2019 conviction on federal corruption charges.

He said exposure went beyond the 20-block area studied and included people who were exposed for decades at Bethpage Community Park. Mangano had requested that the state examine a larger area.

The state, however, said larger areas, outside the blocks with the highest exposure levels, can often dilute results, making a cancer connection less likely. It also said its Cancer Registry is highly accurate, as certified by a national association of registries. And door-to-door surveys can be unreliable, with some residents unwilling to share information or unaware of previous residents' diagnoses, according to the state.

The state Department of Health, like most federal and state agencies around the country that have attempted studies, has never tied a residential cancer cluster to chemical exposure in the environment.

Just three community cancer clusters nationally have been linked with environmental exposures such as water or air pollution, according to a 2012 paper that reviewed 567 cancer cluster investigations over the previous 20 years. They included cases of childhood leukemia in Woburn, Massachusetts, from TCE and childhood cancers in Toms River, New Jersey, from industrial pollution. Just one cancer cluster in a coastal South Carolina community with lung cancer and a history of work at a nearby shipyard with asbestos had been tied to a more definitive "established cause."

Tough to draw a link

Part of the reason for the paucity is the difficulty of the science. Most cancers can't be traced to a single specific cause. Additionally, cancer can take five to 40 years after exposure to develop, in which time people move and can be difficult to track. Influences such as age, race and lifestyle can affect cancer rates.

"Very often what we find is that while cancer levels are elevated, they're not definitively linked," said Brad Hutton, deputy commissioner for the state Department of Health, in an interview last year.

Critics say part of the problem is that state regulators tend to downplay risks and dangers in an effort not to alarm the public, but even they say studies can raise false expectations.

Dr. Howard Freed, who from 2008 to 2012 was director of the department's Center for Environmental Health, said when there's doubt the state minimizes risks in an effort not to cause a panic.

Freed headed the division responsible for the evaluation of the health effects of man-made chemicals.

In an email to Newsday, he wrote: "New York DOH has always emphasized scientific uncertainty over what many others see are clear warnings of real risk to the public," adding, "Routine reassurance cannot be justified in the face of our profound scientific ignorance about the health effects of long-term exposure to toxins in drinking water."

After reviewing the state's Bethpage cancer study, Freed said the state appeared too quick to dismiss the community's list of cancer cases and maps because of incomplete information, rather than trying to go back and get more data.

"It strikes me as not aggressive or a good-faith effort to try to substantiate people's concerns," he said in an interview. "If there's information out there and they don't seek it — to me it's not effective."

Yet Freed said another health study would be a "terrible idea."

The state should "do what it can now to protect the public, and not wait for conclusive proof of harm, especially when such proof is unlikely to become available in the foreseeable future," he said.

The state's report itself laid out its limitations.

"This type of study is not capable of demonstrating any cause-and-effect relationships," it stated. "At the current level of understanding, it is not possible to separate out all possible causes to determine the role of environmental factors in causing cancers in a small geographic area."

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COMING TOMORROW

THE MAKING OF AN ENVIRONMENTAL CRISIS:
Warnings came early, but they often were met with denials from a company with great political influence.