Comments by Sarah J. Meyland, MS, JD
Director of the Center for Water Resources Management at
New York Institute of Technology
College of Engineering and Computing Sciences

Presented to the Nassau County Legislature's Committee on
Planning, Development and Environment
Regarding 1,4 Dioxane

Public Hearing, Monday, July 29, 2019
Legislative Chamber, Mineola, New York

Introduction

Thank you for holding today's hearing to address issues related to the presence on 1,4 Dioxane in the drinking water supplies of Nassau County, Long Island and New York State.

I have had the privilege of serving as a member of the New York State Drinking Water Quality Council (DWQC) which was established in 2017 to consider and recommend to the State whether unregulated chemicals including 1,4 Dioxane should be regulated and at what levels. Of course, the regular protocol for regulating chemicals in drinking water usually starts with the U.S. EPA which is authorized under the Federal Safe Drinking Water Act to oversee drinking water quality and the public water suppliers who provide this water.

However, the US EPA has specifically declined to set drinking water standards (known as MCLs – maximum contaminant levels) for 1,4 Dioxane and PFOS/PFOA in response to a request by New York State Governor, Andrew Cuomo. Therefore, New York State proceeded to begin the process of standard setting under the guidance of the NYS Department of Health. The role of the DWQC was to receive information about unregulated chemicals, especially PFOS/PFOA and 1,4 Dioxane, and provide informed guidance and recommendations to the State Health Department.

The DWQC recommended to the DOH an MCL of 1.0 parts per billion for 1,4 Dioxane on December 18, 2018. Although this was not the strictest MCL that was considered by the DWQC, it was considered to be protective of public health and achievable by public water suppliers.

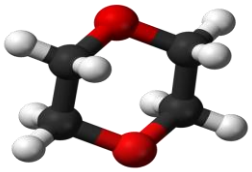
On July 24, 2019 the Department of Health published in the New York State Register the proposed regulations for 1,4 Dioxane along with PFOA/PFOS. The State is officially proposing an MCL of 1.0 ppb for 1,4 Dioxane. A 60-day hearing clock for comments is now running that will end on September 22, 2019.

Upon adoption of the MCL, public water suppliers will have between 60-days (those serving 10,000 people or more), 90-days (those serving 3,300 to 9,999 people) and 6 months (those serving < 3,300 people) to test their water to determine if it meets the new MCLs and act accordingly.

The MCLs and the timeline proposed by the DOH are the strongest response they could take to bring these unregulated chemicals under the regulatory umbrella of the State.

WHAT IS THE RISK THAT 1,4 DIOXANE POSES TO THE PUBLIC?

The chemical composition of 1,4 Dioxane is: $C_4H_8O_2$.



1,4 Dioxane is found in a wide assortment of chemicals and products. It is highly soluble in water. It does not easily evaporate and is very stable in the environment. It moves rapidly through groundwater, sometimes ahead of the main body of a plume. These characteristics allow 1,4 Dioxane to find its way into the environment and into the drinking water supply of Long Island and other areas around the nation.

1,4 Dioxane is used as a **solvent stabilizer** in the production of many chlorinated volatile organic compounds (VOCs). VOCs are the number one pollutant of groundwater on Long Island. In groundwater plumes containing common VOCs, there is a strong association between a specific VOC and the presence of 1,4 Dioxane. For example in plumes with the following VOCs:

- 1,1,1-TCA (1,1,1-trichloroethane) (70% also find 1,4 Dioxane)
- 1,1-DCE (1,1 dichlorethene) (69% also find 1,4 Dioxane)
- TCE (trichloroethylene) (52% also find 1,4 Dioxane)

Products such as paint strippers, antifreeze, aircraft deicing fluids, and industrial solvents may contain 1,4 Dioxane. It is also used in personal care products such as shampoos, body washes, soaps, laundry detergents, baby products, cosmetics and products that generate suds for washing. Canada has banned 1,4 Dioxane in cosmetics.[1]

1,4 Dioxane is considered a *likely human carcinogen*. It is a *confirmed animal carcinogen*. It can have acute impacts on the nervous system. It can also affect organs such as the kidney, liver, bladder, the lungs, colon and the muscular system. Unlike PFOA/PFOS, it does not build-up in the body, although it will be present after a significant exposure.

According to the NYS-DOH, 89 water supply facilities in NYS may exceed the 1 ppb MCL.[2] Of these, **82 are expected to be on Long Island**, involving 20 different water suppliers. Water suppliers have estimated that as many as 185 wells may ultimately be affected because some wells below the 1 ppb level may be removed from service because they are very close to the 1 ppb MCL.

[1] Legislation banning the sale and distribution of household cleaning products and personal cosmetic products containing 1,4 Dioxane has passed both houses of the legislature (7-27-2019) in New York State. Concentrations of 1,4 Dioxane exceeding 2 parts per million are banned by 2022 and 1 ppm by 2023. The bills were A-6295-A (Engelbright et al.) and S-4389-B (Kaminsky et al.)

[2] NYS Register, July 24, 2019, pg. 22.

One aspect of the 1,4 Dioxane problem is that we do not know how long the residents of Long Island have been exposed to this chemical. Since Long Island and especially Nassau County has been dealing with VOC contamination for many decades, dating back to the late 1970s, it is possible that some people have had this chemical in their water for decades.

WHERE CAN 1,4 DIOXANE BE FOUND AND IN WHAT CONCENTRATIONS?

1,4 Dioxane is used in the manufacture of many VOCs (volatile organic compounds) that are typically found as groundwater pollutants on Long Island.

Because of the connection with VOCs, many of the 258+ superfund sites on Long Island (approx. 150 in Nassau County) are expected to also contain 1,4 Dioxane. As an extreme example, the Navy-Grumman groundwater plume in Bethpage, NY has been investigated for the presence of 1,4 Dioxane. As of the latest reporting, out of 634 groundwater testes for 1,4 Dioxane at the Grumman plume, **306 were positive**.[3] **The levels identified ranged from 0.46 to 190 ppb**. The Bethpage Water District is one of two water utilities that have already installed an AOP treatment system at one of their wells. The other is the Suffolk County Water Authority. The SCWA system has already been approved by NYS DOH.

The NY State DEC has directed all superfund sites in the state to conduct tests to determine if 1,4 Dioxane is present. The detection level is set at 350 parts per trillion. While there does not appear to be a definitive list of affected water suppliers, some of the Long Island water utilities dealing with 1,4 Dioxane include:

- Franklin Square Water District (W.D.)
- Greenlawn W.D.
- Town of Hempstead – East Meadow W.D.
- Port Washington W.D.
- Manhasset-Lakeville W.D.
- Oyster Bay W.D.
- South Farmingdale W.D.
- West Hempstead W.D.[4]
- Water Authority of Great Neck North
- Suffolk County Water Authority

WHAT ARE THE SOURCES OF 1,4 DIOXANE?

There are many sources of 1,4 Dioxane from which it can enter the environment. Some of the sources include:

A. Existing groundwater plumes associated with contaminated sites with high levels of VOCs such as TCA and TCE. This includes both active remediation sites and sites already closed and delisted (e.g. determined to be cleaned up).
B. Leaks from unlined landfills or landfills with failed liners.
C. Wastewater discharges – treated effluent from sewage treatment plants.

[3] NYS DEC, *Proposed AROD for Northrop-Grumman and Naval Weapons Industrial Reserve Plant*, May 2019, Appendix A, pg. 3
[4] D. Schwartz, State Proposes New Drinking Water Standards for 3 Chemicals, *Newsday*, July 9, 2019

D. Discharges from on-site wastewater systems, such as cesspools and septic systems.
E. Military installations and airports.
F. Industrial discharges and spills.

DRINKING WATER STANDARDS AND TIMELINES

On July 24, 2019, the NYS Department of Health started the official process to adopt legal drinking water standards for 1,4 Dioxane.[5] Depending on how long it takes the DOH to review comments on the new standard, it is possible that the 1 ppb MCL for 1,4 Dioxane could be in place by the end of 2019.

On Long Island, during the first year of the new MCL, water suppliers will test their wells every quarter. If 1,4 Dioxane is detected, this schedule of testing will continue. If it is not detected, then testing may decrease to one test (for each well) per year and eventually decrease to once every three years if non-detection continues.

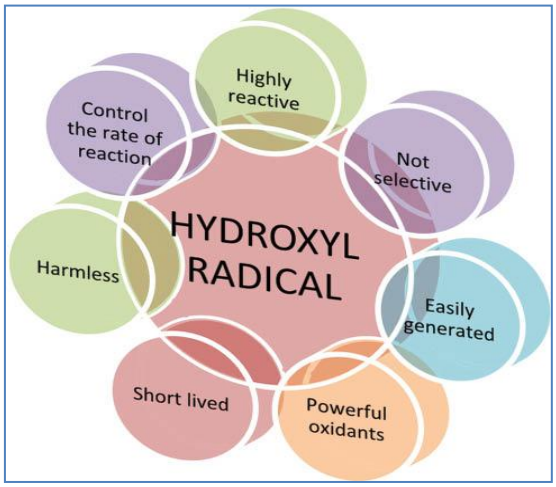
If a test detects 1,4 Dioxane that exceeds the MCL, then retesting occurs and if the result again exceeds the MCL, the well must come out of service. The water supplier will then begin the process of installing a 1,4 Dioxane removal system. This process can take up to 2 – 3 years, assuming there are no unexpected delays in the process.

The main legal deadline water utilities must meet is the water testing and reporting requirements. The water supplier can take as long as they wish to install treatment for 1,4 Dioxane, however, many suppliers want the wells back in service as soon as possible because most wells are essential to meet summer water demand.

WHAT IS THE TREATMENT TECHNOLOGY FOR 1,4 DIOXANE?

AOP

For 1,4 Dioxane, the preferred treatment technology is **AOP** (advanced oxidation process). This is a new technology that has not been utilized for drinking water processes on Long Island. The procedure adds hydrogen peroxide (H_2O_2) to the contaminated water and then the mixture is exposed to U.V. (ultraviolet) light. The UV radiation causes the hydrogen peroxide molecule to split into two hydroxyl radicals (OH^-) which are highly aggressive oxidizing agents. They attack the 1,4 Dioxane molecule and break it apart. Rather than removing the chemical, the molecule is broken down.



Some additional considerations for this technology are that the water being treated should not have many other pollutants in it. This may require pre-treatment of the water to remove VOCs and other pollutants that will

[5] Note: The 60-day comment period will end on Sept. 22, 2019.

diminish the oxidizing capacity of the hydrogen peroxide. Also, after the AOP treatment, the remaining hydrogen peroxide must be removed and any remaining by-products also removed.

It is the hydroxyl radical (OH^-), along with the help of the U.V. radiation that breaks down the 1,4 Dioxane molecule along with other pollutants in the water. The OH^- is not selective as to what it breaks down. In order to get the most destruction of 1,4 Dioxane, it should be the primary pollutant in the water.

The picture above shows the outside of an AOP unit. This version, by Trojan UVPhox, is the system that seems to be popular so far on Long Island.

There are a variety of oxidizing agents possible for AOP systems. For the 1,4 Dioxane application, hydrogen peroxide with U.V. produces the hydroxyl radical delivering the greatest oxidizing power.

Oxidizing Power of Various Agents

Oxidizing Species	Relative Oxidation Power
Hydroxyl radical	2.05
Atomic oxygen	1.78
Ozone	1.52
Hydrogen peroxide	1.31
Permanganate	1.24
Hypochlorous acid	1.10
Chlorine	1.00

COST OF TREATMENT

A typical drinking water treatment system for a Long Island water supplier might include the following treatment steps:

- Removal of various chemicals (VOCs and others) by air stripping, granular activated carbon, or reverse osmosis systems. None of these will remove 1,4 Dioxane.
- Next, an AOP system to treat and remove 1,4 Dioxane.
- Removal of remaining chemicals after AOP using granular activated carbon.
- Disinfection.

Each water supplier will have to custom-design a treatment system to match the pollutants in a given well and install the treatment technology that will remove or eliminate the blend of pollutants present. The same is true for the remediation of contaminated sites. They too will have to meet the new MCLs as they clean-up contaminated groundwater. Various superfund sites are already using versions of AOP to address 1,4 Dioxane and other pollutants.

The estimated cost of treating 1,4 Dioxane, as reported by the NYS DOH, is **$3,570,000 per system**. In addition, the annual cost of operation and maintenance is estimated to be **$150,000 per system**.[6] This could be higher for Long Island because more pollutants that require treatment may be in the water.

WHAT ARE THE ROLES OF DOH AND DEC?

The NYS Department of Health (DOH) along with the Nassau County DOH have the role of ensuring that the drinking water is safe and that it meets established MCLs and other guidelines. The State Health Department administers the state version of the Safe Drinking Water Act, the law that governs drinking water issues. County Departments of Health work with the State DOH to ensure local compliance and oversight of public water supply systems.[7] The DOH sets the rules that govern public water supply systems.

The NYS Department of Environmental Conservation (DEC) is responsible for keeping the environment, including groundwater, clean and sustainable. All groundwater in New York State is given the water quality classification "GA" meaning the highest quality ranking and fit for drinking water. Therefore, it is the obligation of the DEC to try to keep all groundwater at its highest quality, especially for regions such as Long Island where the groundwater is stored in a federally designated Sole Source Aquifer.[8] DEC has many programs that impact the quality and quantity of the groundwater and thus, drinking water, on Long Island. Among these programs are:

- Water Withdrawal Permit program (includes the L.I. Well Permit program)
- SPDES Discharge Permit program
- Inactive Hazardous Waste Remediation program
- Oil Spill Cleanup program
- Bulk Chemical Storage Permit program
- Solid Waste Permit program
- Land Mining Permit program

Chief among the duties of the DEC is to regulate the withdrawal of groundwater, the discharge of pollutants into the ground and groundwater, the remediation of contaminated sites such as Superfund sites, and the disposal of various types of wastes onto the land. Thus, the long term quality and availability of the drinking water supply for Long Island is largely in the hands of the DEC. Nassau County DOH often monitors the clean-up of contaminated sites and the issuance of water withdrawal permits. It approves various treatment systems installed by water suppliers.

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[6] New York State Register, July 24, 2019, pg. 24.

[7] In the state and federal law, public water supply systems are referred to as community water supply systems. These are defined as any water supplier that has 15 service connections throughout the year, or that serves at least 25 people for 60 days per year. The details of the rules for drinking water are contained in Part 5 of the NYS Sanitary Code.

[8] Long Island (Nassau and Suffolk Counties) was designated as a Sole Source Aquifer in 1978, and was one of the first four aquifer systems in the nation to be so designated. This program is within the purview of the Safe Drinking Water Act.

HOW IS THE PUBLIC NOTIFIED WHEN MCLs ARE EXCEEDED?

Within the NYS Sanitary Code, Part 5, the procedures are outlined for notifying the Health Departments and the public when an MCL or other operating requirement is not complied with. For the violation of an MCL, the water supplier must quickly take steps to limit public exposure to water not in compliance with an MCL. The water supplier does not know an exceedance has happened until testing results are reported by the water testing lab. The water supplier then notifies the DOH and usually is directed to conduct a second test to confirm the results. The well may not be used during the retesting period. If the second test confirms the first exceedance, the well is removed from service. As this is happening, the water supplier must also provide public notification to its customers. The notification typically will use standardized wording that has already been provided by the DOH. The cause of the exceedance is usually explained and guidance for public action is issued, such as do not use for drinking, or boil water before use, or similar messages depending on the problem being encountered.

All these actions are the obligation of the water supplier, as spelled out the Part 5 of the Sanitary Code. The Health Department will be working with the water supplier during this period, conducting its own water testing to confirm water quality, and providing guidance to the water supplier.

WHAT TYPE OF FINANCIAL ASSISTANCE IS AVAILABLE FOR WATER SUPPLIERS?

It is assumed that each water supplier will take steps to increase water rates as they make plans to treat 1,4 Dioxane. However, the costs will vary from system to system. Water suppliers with multiple wells affected by 1,4 Dioxane may bear a higher cost of compliance. For example, the Town of Hempstead operates six different water districts, consisting of 32 wells at 17 well sites. So far, 8 well field sites are affected by 1,4 Dioxane. The Town projects that their total cost will be approximately $40 million. That estimate includes a cost of $4 to $5 million for treatment system and operating costs of $300,000 to $400,000 per site. As a municipality, they have procurement procedures that will extend the time needed to secure a vendor and complete construction. The Town estimates a 4-year implementation schedule.[9]

At the State level, there are several sources of funding that water utilities can access. State programs for drinking water infrastructure and water quality protection include the following:

- Drinking Water State Revolving Fund: provides low-interest loans for water projects;
- NYS Clean Water Infrastructure Act of 2017: provided $2.5 billion overall for water-related projects, statewide.
    - NYS Water Infrastructure Improvement Act (2017): provides grants to municipalities for water quality projects.
    - $200 million: A separate drinking water grant program specifically for 1,4 Dioxane and PFOS/PFOA projects.[10]

Newsday reported that in total, $350 million in grants would be available for the costs of implementing treatment for 1,4 Dioxane and PFOS/PFOA.[11]

[9] L. Gillen, *Drinking Water Emerging Contaminants: Local Government Responding to an Emerging Crisis*, Presentation to Nassau County Bar Association, June 19, 2019.
[10] New York State Register, July 24, 2019, pg. 23.
[11] D. Schwartz, State Proposes New Drinking Water Standards for 3 Chemicals, *Newsday*, July 9, 2019

WHAT CAN NASSAU COUNTY DO TO SUPPORT AND IMPROVE THIS PROCESS?

There are in fact several important actions that can be taken by the County.

Action Number One :
1. The one stakeholder in this discussion that has not been addressed is **the customers** – the ones for which all this effort and expense is for. While the regulatory agencies and the water utilities are busy following protocols and responding to the need to protect public health, the public has largely remained in the dark as to what is happening.

Each water provider has taken the steps necessary to address their individual situation. Some systems are more affected than others. The public is hearing and reading about the discovery of unregulated chemicals in the drinking water but the way that it is affecting them personally is not being properly addressed.

Some water suppliers are transparent about how they have responded but others are not.

I am asking Nassau County to please address the need for more and better information directed at the customers, the public, in each and every water supply district in the county. Specifically, the County Health Department should request every public water supply operator to prepare and send to their customers, a special report on what they are doing to meet this new set of regulations. The report should include the following information:

- Specific information about what chemicals have been found (1,4 Dioxane, PFOS and PFOA);
- Report the levels detected for all testing of the chemicals of concern as well as:
    - Chemical names, dates of testing, the well's general location/neighborhood, and actions taken such as taking the well out of service, continuing to use the well, blending of the water, etc.;
- What plans the water supplier has to address the problem (e.g., shut the well permanently, treat the well, open a new well, etc.); and
- What timeline and cost do they anticipate for finishing their planned response?

All water supplier reports should also be sent to the County Health Department which will compile the reports into a single document so that the full picture of what is happening in the county is possible. This report can be posted on the County DOH website. The report can be updated periodically. The report should be sent to all customers by the end of September or as an insert in the next regular billing cycle.

Please Note: Do not be dissuaded when water suppliers say that this information is contained in their *Annual Water Quality Report*. The level of detail being requested here is not in the Annual Reports. Also, most customers are not able to easily pull this detail out of the Annual Reports. If the information is already there, then pulling it together in a separate report is should be an easy task.

Action Number Two:
2. On many occasions since 1999, I and others have repeatedly asked that the Health Department Report, known as the *Groundwater and Public Water Supply Facts for Nassau County, N.Y.*, be reinstated. It was an annual compilation of the conditions of groundwater in general and what is occurring in each water supply district in the county. It provided details such as: what contaminants

were being detected and at what levels, how much water each system pumped, what types of treatment were being used, the number of wells and their depth and the aquifer they tapped. Most of this information was already being submitted to the Health Department. It just needed to be consolidated into a single document.

2019 marks the 20th year that we have missed the important information of this report. This hearing is a testament to the fact that we have lost touch with the details of what is happening to our drinking water. Isn't it time that we changed that.

If Nassau County cannot find the $50,000 or so to produce this annual report, then surely our State legislative delegation can get state backing to do a job such as this.

ADDITIONAL ACTIONS NEED BY NASSAU COUNTY

3. Nassau County should urge the NYS DEC to report on 1,4 Dioxane testing results connected with groundwater testing of all contaminated sites in the county (both current Superfund and RCRA sites) and those delisted or deemed remediated.

4. Nassau County should work with the water supply community to assess whether the 2% cap on budget expansions should be waived for water systems that must install new treatment systems and borrowing is necessary.

5. Nassau County should work with State legislators to introduce legislation calling for the preparation of a series of county-wide maps depicting groundwater quality by aquifer, depth and specific contaminants. Maps should be prepared for pollutants including:

- VOCs
- 1,4 Dioxane
- PFOA/PFOS and PFAS
- Perchlorate
- Nitrates
- Gasoline spills and by-products (MTBE and BTEX) and
- Other serious pollutants such as: PCBs, pesticides, and radiological contaminants.

Thank you for this opportunity to provide information regarding 1,4 Dioxane in the drinking water of Nassau County.