Annual 1,4 Dioxane Progress Report
1,4 Dioxane NPDES Permitting Strategy
Environmental Management Commission (EMC)
Water Quality Committee (WQC)
January 2023

Purpose: As part of the Special Order by Consent (SOC) settlement agreement between the Haw River Assembly and Fayetteville Public Works Commission and the City of Greensboro, the EMC directed Department of Environmental Quality (DEQ) to supplement its 2016 and 2017 1,4-dioxane point source studies in the Cape Fear River Basin for three years. This includes oral reports every six months and an annual written report to the EMC Water Quality Committee on the following: surface water and discharge sampling efforts, identification of point sources, actions DEQ is taking to reduce 1,4 dioxane in NPDES permits and DEQ's rationale. The first oral progress report was conducted on July 13, 2022 and is attached for your reference.

Background: The EPA's Third Unregulated Contaminant Monitoring Rule (UCMR 3) required public water supply systems throughout the United States to monitor for the presence of contaminants, including 1,4-dioxane, during the years 2013-2015. Results of UCMR 3 monitoring indicated the presence of 1,4-dioxane in North Carolina was most prevalent within the Cape Fear River Basin. The North Carolina Department of Environmental Quality conducted follow up stream sampling studies to better determine the concentrations of 1,4-dioxane, and their potential sources within the basin.

Elevated concentrations of 1,4-dioxane were reported in the Cape Fear River Basin based on the sampling effort conducted as part of the EPA's Third Unregulated Contaminant Monitoring Rule (UCMR3). As a result, in 2014, DWR initiated ambient sampling for 1,4-dioxane in the Cape Fear River Basin and NPDES staff worked with Upper Piedmont Permittees on assessing and reducing 1,4-dioxane in their wastewaters. Ambient sampling has continued in the Cape Fear to the present, and sampling results can be found on the DWR website .

In its November 2017 Technical Fact Sheet on 1,4-dioxane, the United States Environmental Protection Agency (EPA) describes this compound as "a synthetic industrial chemical that is completely miscible in water." Its primary historical use was as a stabilizer of chlorinated solvents. The EPA fact sheet states 1,4-dioxane is a by-product present in many goods, including paint strippers, dyes, greases, antifreeze, and aircraft deicing fluids, and in some consumer and personal care products (deodorants, shampoos, and cosmetics). EPA has classified 1,4-dioxane as a likely human carcinogen; however, to date no federal maximum contaminant level (MCL) has been established for 1,4-dioxane in drinking water.

The EPA Fact Sheet states "the physical and chemical properties and behavior of 1,4-dioxane create challenges for its characterization and treatment. It is highly mobile and does not readily biodegrade in the environment." These properties, plus its widespread presence in industrial and consumer products have resulted in identifiable sources being found in industrial groundwater remediation sites and within surface water downstream of industrialized and urbanized areas.

EPA has issued a health advisory for 1,4-dioxane recommending concentrations not exceed 35 µg/L in drinking water as protection of a 1 in 10,000 excess estimated lifetime cancer risk. EPA risk assessments indicate the drinking water concentration representing a 1 in 1,000,000 cancer risk level for 1,4-dioxane is 0.35 µg/L.

Surface Water Sampling: DWR initiated a monitoring study to examine 1,4-dioxane concentrations in major surface waters of the Cape Fear River basin, identify potential sources, and document water quality improvements due to abatement efforts. Study phases:

- **October 2014-September 2015**: Screening throughout Cape Fear basin to identify areas with elevated 1,4-dioxane concentrations. Four areas were identified in the upper portion of the basin. Three of these were located immediately downstream of domestic wastewater treatment facilities, indicating that these facilities were likely conduits for 1,4-dioxane from industrial sources into surface water. The fourth, less elevated area, was located further downstream of a wastewater facility, as well as in proximity to potential legacy sources of contaminated waste. The elevated

areas had maximum concentrations ranging from 171 to 1030 µg/L and mean concentrations from 43 to 351 µg/L. These findings were communicated to effected municipalities, project partners, and the interested public.

- **October 2015-October 2016:** Quarterly sampling indicated a reduction of 1,4-dioxane concentrations in many areas of the basin. During this phase, the same elevated areas returned maximum values of 20 to 614 µg/L and means of 11 to 260 µg/L. However, further reductions were necessary to achieve federal and state health advisory levels for 1,4-dioxane in drinking water supplies.
- **November 2016-October 2017:** NC DWR secured funding to acquire laboratory instrumentation capable of analyzing 1,4-dioxane. An approved analytical method for surface and wastewaters became available, and NC DWR developed the method for internal use.
- **November 2017-December 2020:** NC DWR continued to monitor in the Cape Fear River basin and expanded monitoring into the Yadkin and Neuse River basins. The percentage and magnitude of 1,4-dioxane detections decreased over time in the Cape Fear basin, except for occasional spikes related to known discharges. In other river basins, 1,4-dioxane was not detected, or was detected rarely at much lower concentrations: 1 detection at 1 µg/L in the Neuse River basin, and 4 percent of Yadkin basin results at 1 – 3.3 µg/L.
- **2021-2022:** 1,4-dioxane was added to the analyte list for DWR's statewide Random Ambient Monitoring System (RAMS). 30 new RAMS stations were established in Jan 2021 and monitored every other month for two years. In 2021, DWR sampled 1,4-dioxane at an average of 59 surface water locations monthly, including higher sampling frequency during the growing season due to reservoir sampling. A publicly-accessible online dashboard was established to provide 1,4-dioxane surface water monitoring locations and results (link from https://deq.nc.gov/news/key-issues/emerging-compounds/managing-emerging-compounds-water).
- **2023 surface water monitoring plan for 1,4-dioxane:** Monthly monitoring will continue in the Cape Fear, Neuse, and Yadkin River basins. 2022 data will be added to the online dashboard for viewing and downloading. The 30 RAMS stations monitored in 2021-2022 will be deactivated and 30 new randomly selected stations will be activated statewide.

Surface water monitoring summary

Table 1. Cape Fear River Basin 1,4-Dioxane (µg/L) results, November 2017 – December 2021.

Year	# Stations	# Results	# Nondetects	% Detects	Minimum	Median	Maximum
2017	9	9	0	100	<1	5.7	1000
2018	52	251	111	56	<1	1.4	210
2019	22	183	82	55	<1	1.1	170
2020	26	188	132	30	<1	<1	900
2021	28	262	181	31	<1	<1	150

[1]DWR laboratory practical quantitation limit (PQL) for 1,4-dioxane is 1 µg/L.

Table 2. Other NC Basins 1,4-Dioxane (µg/L) results, November 2017 – December 2021. Two river basins with detected[1] 1,4-dioxane: Neuse, Yadkin.

Basin	# Stations	# Results		# Nondetects	% Detects	Minimum	Maximum
Broad	4	19	19		0	<1	<1
French Broad	4	13	13		0	<1	<1
Little Tennessee	3	9	9		0	<1	<1
Lumber	3	11	11		0	<1	<1
Neuse	31	383	382		0.3	<1	1
New	3	7	7		0	<1	<1
Roanoke	2	12	12		0	<1	<1
Tar-Pamlico	2	9	9		0	<1	<1

Watauga	1	1	1	0	<1	<1
White Oak	1	3	3	0	<1	<1
Yadkin	39	521	500	4	<1	3.3

[1]DWR laboratory practical quantitation limit (PQL) for 1,4-dioxane is 1 µg/L.

Permitting Actions: On October 31, 2017, the Division of Water Resources (DWR), via administrative letters, required specific POTWs to begin monthly monitoring of the effluent for 1,4-dioxane and to report the results of their analyses on monthly monitoring reports, beginning with the report for December 2017.

Follow-up screenings were conducted by DWR to better characterize the presence of 1,4- dioxane in various types of wastewaters. As part of the screening, DWR sent letters to 28 Publicly Owned Treatment Works (POTWs) that have pretreatment programs and that discharge into the Cape Fear River Basin. The POTWs were asked to sample for 1,4-dioxane for three consecutive months starting in July 2019. DWR also requested sampling of 18 selected industrial facilities in the Cape Fear River Basin. The industrial facilities were asked to sample their effluent for 1,4-dioxane for three consecutive months starting in October 2019. Based on the data received, DWR has asked several of those POTWs and industries to continue monitoring for 1,4-dioxane in their effluent. The sampling results from the screening are presented in this map located on our website.

1,4-dioxane can enter a publicly owned treatment works as a constituent of industrial and domestic wastewater. Most wastewater treatment plants are not currently designed for the removal of compounds such as 1,4-dioxane; therefore, it can pass through the treatment system and enter surface waters within the effluent discharge.

In accordance with 15A NCAC .02B Surface Water Quality Standards, the NPDES strategy is to identify, investigate, reduce, or eliminate the discharge of 1,4-dioxane from NPDES dischargers with the goal of bringing permittees into compliance with in-stream target values of 0.35 µg/L in surface waters classified as water supplies, or at the boundary of a water supply water for sources above a drinking water classification, and 80 µg/L in all other surface waters.

The permits that have been reissued to include 1,4 dioxane monitoring or effluent limits are shown below along with a projected schedule for completion of these actions.

NPDES Permits issued with 1,4-Dioxane requirements/conditions

- Nokia of America Corp. (NC0080853), issued 1/2/2018, effective 2/1/2018
  1,4-Dioxane – quarterly monitoring
  Permit expires 6/30/2023, renewal application not yet received

- Stepan Company (Invista S-A-R-L LLC) (NC0001112), issued 2/23/2018, effective 4/1/2018
  1,4-Dioxane – quarterly monitoring
  Permit expires 3/31/2023, renewal application received 9/27/2022

- Radiator Specialty Co. (NC0088838), issued 5/23/2018, effective 7/1/2018
  1,4-Dioxane – 80 µg/L limit with monthly monitoring
  Facility reported no flow since August 2020
  Permit expires 3/31/2023, renewal application received 10/4/2022

- DAK Americas LLC – Cedar Creek Site (NC0003719), issued 6/18/2018, effective 8/1/2018
  1,4-Dioxane – monthly monitoring
  Permit expired 10/31/2022, renewal application received 5/5/2022

- Tar River Regional WWTP (NC0030317), issued 2/21/2022, effective 4/1/2022
  1,4-Dioxane – monthly monitoring

- Graham WWTP (NC0021211), issued 3/1/2022, effective 4/1/2022
  1,4-Dioxane – monthly monitoring

- Moncure Holdings West LLC WWTP (NC001899), issued 3/18/2022, effective 5/1/2022
  1,4-Dioxane – included in Closure Requirements parameter list

- Ramseur WWTP (NC0026565), issued 4/6/2022, effective 5/1/2022
  1,4-Dioxane – quarterly monitoring

- Triangle WWTP (NC0026051), issued 8/1/2022, effective 9/1/2022
  1,4-Dioxane – monthly monitoring

- Siler City WWTP (NC002664), issued 9/28/2022, effective 11/1/2022
  1,4-Dioxane – monthly monitoring

- Fayetteville – Rockfish Cr WRF (NC0050105), issued 9/29/2022, effective 11/1/2022
  1,4-Dioxane – monthly monitoring

- South Durham WRF (NC0047597), issued 12/12/2022, effective 1/1/2023
  1,4-Dioxane – monthly monitoring

Permits public noticed with 1,4-Dioxane requirements or conditions

- Brenntag Mid-South, Inc – Greensboro GW Remediation Site (NC0078000), PN 7/27/2021
  1,4-Dioxane – monthly monitoring

- Daikin Applied Americas Inc. – HeatCraft Site (NC0083658), PN 5/3/2022
  1,4-Dioxane – quarterly monitoring

- Sanford – Big Buffalo WWTP (NC0024147), PN 9/22/2022
  1,4-Dioxane – monthly monitoring
  Public Hearing requested & being scheduled for early 2023

- Dutchman WWTP (NC0024191, PN 10/18/2022
  1,4-Dioxane – quarterly monitoring

- Asheboro WWTP (NC0026123) – Public noticed on 12/6/2022, comments requested by 1/13/2023
  1,4-Dioxane – Phased limits with weekly monitoring
  Phase I interim = 55.7 µg/L monthly avg, 127.6 µg/L daily max
  Phase II interim = 35.0 µg/L monthly avg, 80.2 µg/L daily max
  Final = 21.6 µg/L monthly avg, 49.4 µg/L daily max
  Instream monitoring 2/month

Permits in various draft stages with proposed 1,4-Dioxane requirements or monitoring conditions

- Reidsville WWTP (NC0024881)
  1,4-Dioxane – proposed final limits with a phased schedule

- High Point – Eastside WWTP (NC0024210)
  1,4-Dioxane – proposed final limits with a phased schedule
  Outfall 001 – Richland Creek (emergency use)
  Outfall 002 – Deep River (Randleman Lake)

- Greensboro – TZ Osborne WWTP (NC0047384)
  1,4-Dioxane – proposed final limits with a phased schedule (post SOC)
  Final = 0.54 µg/L monthly avg, 1.53 µg/L daily max

- East Burlington WWTP (NC0023868)
  1,4-Dioxane – proposed final limits with a phased schedule

- Albemarle – Long Cr WWTP (NC0024244)
  1,4-Dioxane – monthly monitoring

- Mebane WWTP (NC0024174)
  1,4-Dioxane – quarterly monitoring

DWR is working with municipalities (POTW's) and their pretreatment program coordinators to determine potential sources and treatment or product substitutions their industrial dischargers (or other significant industrial users, SIUs) can make to reduce or eliminate 1,4-dioxane in their effluent. This step is currently underway and involves reviewing individual significant dischargers to ensure that they have an active program for monitoring 1,4-dioxane. Dischargers should also employ best management practices to reduce 1,4-dioxane discharges entering their facilities.

Reductions of 1,4-dioxane will primarily be achieved by POTWs requiring SIU dischargers to install best available treatment to remove 1,4-dioxane or to substitute products used in their industrial processes. DWR will work closely with these POTWs and their implementation of approved Pretreatment Programs to ensure compliance is achieved as soon as possible.

While we are implementing a proactive approach through the pretreatment program and its SIU regulations to achieve 1,4-dioxane reductions, we will also use administrative compliance actions, as necessary. A complete evaluation of the POTWs capability of improving treatment or meeting final effluent limitations will be assessed with each permit renewal every five years.

All Permittees will be required to continue to improve treatment or eliminate 1,4-dioxane from their wastewaters until the in-stream target values are achieved. Additionally, we have utilized our compliance and enforcement program where necessary, by issuing Notices of Violations and working within the SOC process with facilities to meet initial reduction goals.

DWR is utilizing a tiered approach by first addressing facilities with high concentrations of 1,4-dioxane in their discharge. DWR will work with Permittees to establish permit compliance schedules to achieve in-stream target values or levels equivalent to Best Available Technology as soon as practicable. This stepwise approach may utilize NPDES permit, special orders by consent, or both. Finally, permittees must comply with antidegradation rule under 15A NCAC 02B .0201.

NPDES Permitting Action Level Tiers- 1,4 Dioxane
Discharges have been categorized based on data collected, the stream classification of the discharge, the calculated allowable discharge limit for 1,4-dioxane, and the potential impact to water supplies. In addition, continued monitoring will be requested of POTWs and industries with 1,4-dioxane levels above their calculated allowable discharge limit using reasonable potential protocols or when insufficient effluent data is available to make this determination.

Applicability -These tiers will apply to:
- Major facilities (for POTW's- 1 MGD or more)
- Minor facilities with Pretreatment programs
- Facilities associated with industry categories known or suspected to discharge 1,4-dioxane, or for facilities which have reported 1,4 dioxane concentrations from NPDES permit application data, or other supplemental information from verified sources using certified laboratory data.

Discussion on NPDES Sampling Frequencies and Permitting Actions

Effluent data are evaluated via the Reasonable Potential Analysis (RPA) to determine if a Reasonable Potential (RP) exists to exceed the calculated ITV. If the Permittee demonstrates reasonable potential to exceed the state's in-stream target values either at the point of discharge or at the WS boundary downstream, then a limit will be added to the permit and, if needed, a requirement included to perform an analysis of the best available technology for reducing or eliminating 1,4-dioxane in its effluent.

DWR recognizes there may be technological limitations in meeting 1,4 dioxane effluent limits below 10 µg/L. If that is the case, the facility will be asked to incorporate best available technology and continue to optimize treatment and reductions until the state's in-stream target values of 0.35 µg/L for water supply waters (including protecting downstream WS classifications) and 80 µg/L for non-water supply waters are achieved.

Compliance schedules, if needed would be for the existing permitted flows only. Compliance schedules may be developed to achieve the in-stream target values, or to achieve levels equivalent to the Best Available Technology analysis, as soon as practicable. First phase interim NPDES limit target will be no more than 35 µg/l (if practicable) provided the calculated allowable effluent 1,4 dioxane limits are lower than this value. Permittees will be required to continue to improve treatment or eliminate 1,4-dioxane from their wastewater until the in-stream target values are met, or they achieve levels equivalent to the Best Available Technology analysis.

Currently, the practical quantitation limit (PQL) for 1,4-dioxane is 1 µg/L. Permittees reporting less than the PQL will be considered in compliance with limits less than 1 µg/L. There also may be situations in which DWR may ask for continued monitoring when warranted or at the Director's discretion.

The next semi-annual progress report to the Water Quality Committee will take place in July 2023.

Attachments:

1. 'Special Order by Consent (SOC) 1,4 dioxane Semi-Annual Progress Report' Presentation to WQC – July 2022
2. 'Semi-Annual Progress Report on 1,4-dioxane in the Cape Fear River Basin' Presentation to WQC – January 2023

Special Order by Consent (SOC) 1,4 dioxane Semi-Annual Progress Report

EMC Water Quality Committee Meeting, July 13, 2022

Jenny Graznak, Assistant Regional Supervisor Winston Salem Regional Office

Julie Grzyb, Deputy Director, Division of Water Resources

Michael Montebello, Chief, NPDES Program Branch, Division of Water Resources

SOC 1,4 Dioxane Progress Report

-Ongoing and planned surface water and discharge sampling efforts, including results
-Update on recent actions to reduce 1,4-dioxane concentrations in the Basin

- **Julie Grzyb**

-Update on Greensboro's Special Order by Consent – status and recent actions

- **Jenny Graznak**

-Identification of additional point sources in the Basin upstream of drinking water intakes
-Incorporation of 1,4-dioxane limits into NPDES permits with reasonable potential
-DEQ's reasoning regarding the expected time for completion
-Additional steps needed for compliance with 1,4 Dioxane water quality standard

- **Michael Montebello**

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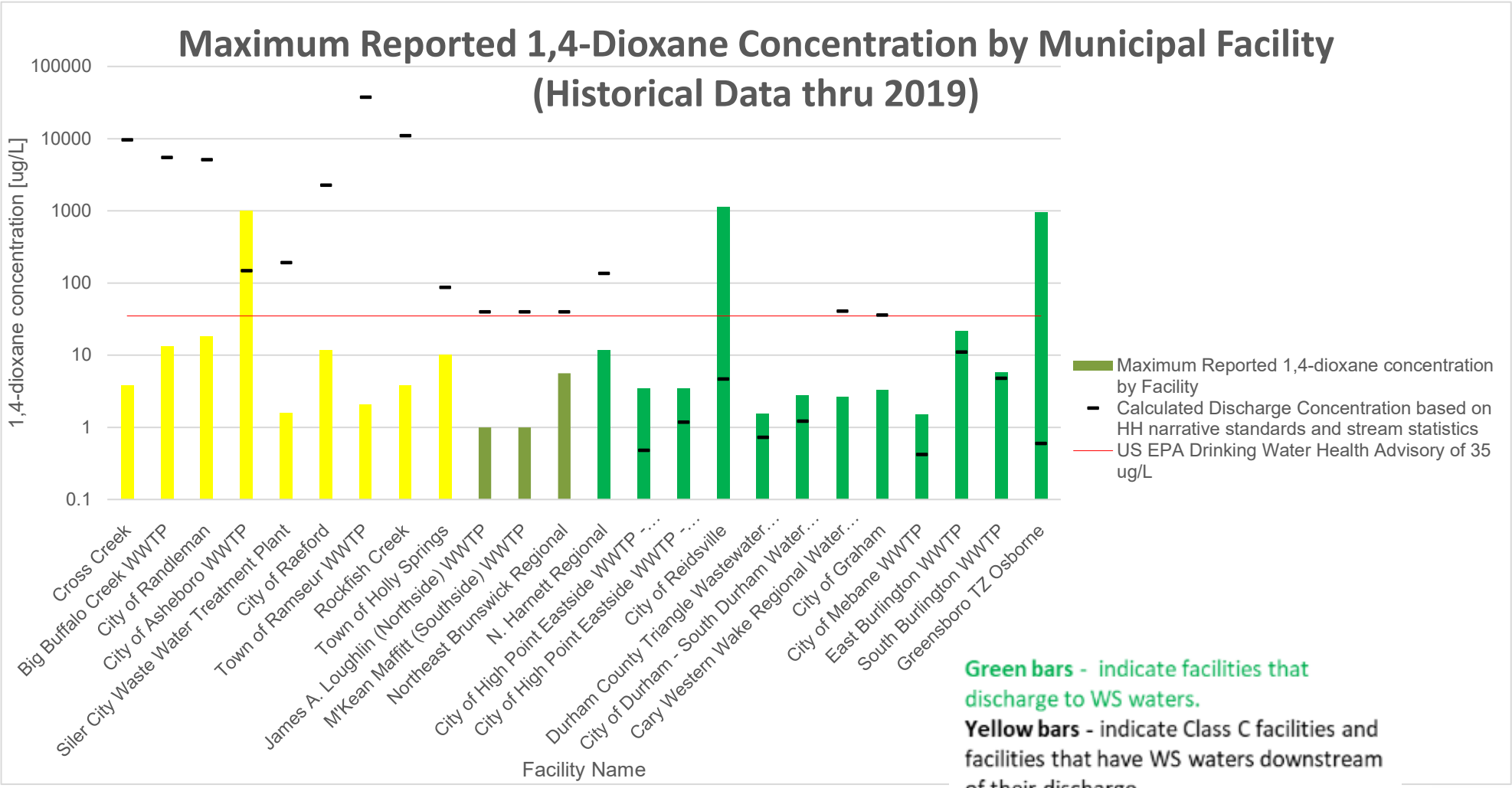
Ongoing and planned surface water and discharge sampling efforts, including results

Maximum Reported 1,4-Dioxane Concentration by Municipal Facility (Historical Data thru 2019)



28 requests, all submitted data

23 POTWs showing data on chart

(High Point Eastside has two outfalls)

1- no discharge (Columbus)

4- POTWs ND (<400-1000)

Green bars - indicate facilities that discharge to WS waters.

Yellow bars - indicate Class C facilities and facilities that have WS waters downstream of their discharge

Blue bars – are dischargers in Class SW waters with no downstream WS intakes

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1,4-Dioxane Sampling Data

Permit No.	Owner	Facility Name	No. Samples	Dates Sampled	Notes
NC0024881	City of Reidsville	Reidsville WWTP	267	Dec 2017 - Apr 2022	All effluent
NC0047384	City of Greensboro	T.Z. Osborne WWTP	176	Dec 2017 - Apr 2022	All effluent
NC0026123	City of Asheboro	Asheboro WWTP	117	Dec 2017 - May 2022	All effluent
NC0024210	City of High Point	Eastside WWTP	81	Nov 2018 - Apr 2022	40 influent, 41 effluent
NC0003719	DAK Americas LLC	Cedar Creek Site	46	Aug 2018 - Apr 2022	All effluent
NC0078000	Brenntag Mid-South Inc	Brenntag / Greensboro remediation	20	Mar 2020 - Apr2022	All effluent
NC0001112	Stepan Company	Wilmington Facility	19	May 2018 - Mar 2022	All effluent
NC0024147	City of Sanford	Big Buffalo WWTP	16	Jul 2019 - Jun 2020	9 influent, 7 effluent
NC0086827	Brenntag Mid-South Inc	Brenntag / Durham remediation	14	Mar 2020 - Apr 2022	All effluent
NC0080853	Nokia of America Corporation	Salem Business Park remediation site	12	May 2019 - Mar 2022	All effluent
NC0088838	Radiator Speciality Co.	Radiator Speciality Co.	9	Jul 2018 - Jul 2020	All effluent
NC0003794	Corning, Inc.	Wilmington Fiber Optic Facility	6	Oct-Dec 2019	All effluent
NC0003875	Elementis Chromium Inc	Castle Hayne Plant	6	Oct-Dec 2019	All effluent
NC0023868	City of Burlington	Eastside WWTP	5	Nov 2019 - Apr 2020	3 influent, 2 effluent
NC0000892	Arclin USA, LLC	Arclin USA, LLC	5	Dec 2020 - Apr 2021	All effluent
NC0088846	Town of Cary	W Wake Regional WRF	5	Jul-Sep 2019, Mar 2022	3 influent, 2 effluent
NC0023973	Cape Fear Public Utilities Authority	M'Kean Maffit (Southside) WWTP	4	Jul-Sep 2019, Jan 2022	3 influent, 1 effluent
NC0021211	City of Graham	Graham WWTP	4	Jul-Sep 2019, Apr 2022	3 influent, 1 effluent
NC0083658	Daikin Applied Americas	HeatCraft Groundwater Remediation Site	3	Oct-Dec 2019	All effluent
NC0003573	The Chemours Company	Fayetteville Works	3	Nov-Dec 2019	All effluent
NC0001228	Global Nuclear Fuel - Americas LLC	GNF-A Wilmington-Castle Hayne WWTP	3	Mar-May 2021	All effluent
NC0001899	Eco Tip West LLC	Moncure Holdings West WWTP	3	Nov 2019 - Feb 2020	All effluent
NC0002304	Lear Corp.	Lear Corp WWTP	3	Oct-Dec 2019	All effluent

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1,4-Dioxane Sampling Data

Permit No.	Owner	Facility Name	No. Samples	Dates Sampled	Notes
NC0026126	Harnett County	North Harnett WWTP	3	Jul-Sep 2019	All influent
NC0026565	Town of Ramseur	Ramseur WWTP	3	Jul-Sep 2019	All influent
NC0021474	City of Mebane	Mebane WWTP	3	Jul-Sep 2019	All influent
NC0023876	City of Burlington	Southside WWTP	3	Jul-Sep 2019	All influent
NC0023957	Fayetteville Public Works Comm.	Cross Creek WWTP	3	Jul-Sep 2019	All influent
NC0025445	City of Randleman	Randleman WWTP	3	Jul-Sep 2019	All influent
NC0026051	Durham County	Triangle WWTP	3	Jul-Sep 2019	All influent
NC0026441	Town of Siler City	Siler City WWTP	3	Jul-Sep 2019	All influent
NC0026514	City of Raeford	Raeford WWTP	3	Jul-Sep 2019	All influent
NC0047597	City of Durham	South Durham WRF	3	Jul-Sep 2019	All influent
NC0050105	Fayetteville Public Works Comm.	Rockfish Creek WWTP	3	Jul-Sep 2019	All influent
NC0063056	Town of Holly Springs	Holly Springs WWTP	3	Jul-Sep 2019	All influent
NC0086819	Brunswick County	NE Brunswick Regional WWTP	3	Jul-Sep 2019	All influent
NC0024538	Town of Shelby	First Broad River WWTP	2	Mar, Apr 2022	All effluent
NC0021903	Town of Warsaw	Warsaw WWTP	2	Jun, Jul 2021	All effluent
NC0025763	Town of Kure Beach	Kure Beach WWTP	2	Apr 5, 26 2021	All effluent
NC0055913	Thomas L. Monroe	Monroe's Mobile Home Park WWTP	2	May, Jun 2021	Collected by DWR
NC0007820	Town of Franklinville	Franklinville WWTP	2	Apr, Jun 2021	Collected by DWR
NC0059242	Town of Broadway	Broadway WWTP	2	Jan-Feb 2020	All effluent
NC0065102	Town of Cary	South Cary WRF	2	Mar-22	All effluent
NC0026433	Town of Hillsborough	Hillsborough WWTP	1	Mar-22	All effluent
NC0048879	Town of Cary	North Cary WRF	1	Mar-22	All effluent
NC0023931	Greenville Utilities Commission	GUC WWTP	1	Mar-22	All effluent
NC0002879	Cape Fear Public Utilities Authority	Sweeney WTP	1	Apr-22	All effluent

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Update on Greensboro Special Order by Consent: Current status and recent actions

Greensboro SOC for 1,4-dioxane

- Original SOC approved by EMC in March 2021, with effective date of May 1, 2021
  - Two Year SOC with Compliance Values: Year One: 45 ug/l, Year Two: 33 ug/l
- Fayetteville Public Works Commission and Haw River Assembly filed legal petition against SOC in April 2021
- Due to settlement negotiations, an amended SOC approved by EMC in November 2021, with effective date of December 1, 2021
  - Three Year SOC with lower Compliance Values:
    - Year One: 35 ug/l, Year Two: 31.5 ug/l, Year Three: 23 ug/l
- Part of that settlement included a requirement for semi annual progress reports to the WQC on SOC and DWR 1,4-dioxane actions

Greensboro's Ongoing Monitoring for 1,4-dioxane

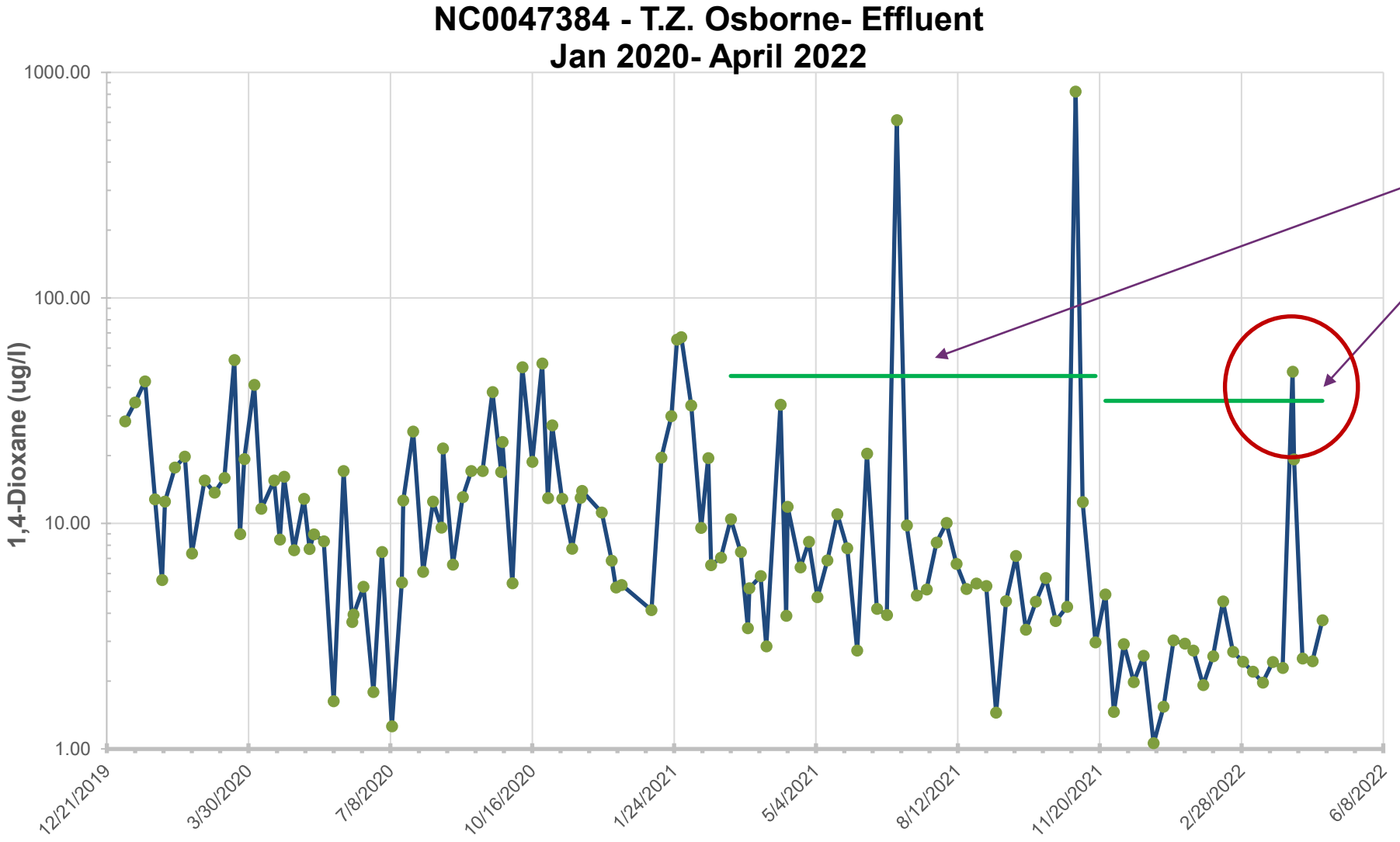
- Amended SOC monitoring plan has 58 sampling sites (includes addition of all Significant Industrial User (SIU) discharges as well as Pittsboro raw water intake)
- "Rush" laboratory analysis on weekly effluent 1,4-dioxane samples to allow notification to downstream users
- Since the November 2021 exceedance, composite samplers remain 24/7 at 4 trunklines within City's collection system
  - Patton trunkline weekly samples are sent for "rush" analysis since it had the highest results ever recorded at that site during November 2021 event
    - There was no sampler at Patton trunkline during June 2021 event
  - Samples collected/samplers maintained twice per week
  - Part of ongoing investigation into recent exceedances

Additional Monitoring: Direct Sampling of SIUs

- In August 2021, as part of SOC Settlement Agreement negotiations, City agreed to conduct 1,4-dioxane composite sampling and analyses for each of 32 SIU discharges once in two consecutive quarters in all 3 years of SOC
- In Year One, any SIU with 1,4-dioxane discharge concentration of >100 ug/l was required to investigate and report back to City
- City Identified 9 SIUs with discharge >100 ug/l
  - All 9 SIUs inspected 3 times by Greensboro Pretreatment staff during SOC Year One
- After November 2021 exceedance, all Patton trunkline SIUs with concentrations >15 ug/l are required to collect and retain daily and weekly composite samples
  - Daily composites analyzed in first week
  - Weekly composites analyzed thereafter (daily composites retained)
  - All sample results sent to City

Latest April 2022 Exceedance

Effluent 1,4-Dioxane concentrations with SOC compliance value (Jan 2020 – April 2022)



Original SOC (45 ug/l)

Amended SOC 35 ug/l

Year 2 SOC Compliance Value 31.5 ug/l Begins May 1, 2022

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April 5, 2022 Event

- 4/5/2022 TZO Effluent Split samples: 55.7/38.5 = 47.1 ug/l (average)
  - 1st Rush sample split (55.7ug/l) received 4/6/2022
  - DWR WSRO notified by phone 4/6/2022
  - 12 downstream utilities notified by phone 4/6/2022
- Patton Trunkline sample: 4/4/22 = 95.1 ug/l
- 7 Patton SIUs notified of TZO Exceedance
  - Instructed to send corresponding retained weekly composites for "Rush" analysis
  - Daily retained samples to be sent for analysis if weekly sample is elevated
  - Report results to City

April 5, 2022 Event

- Lanxess (SIU) contacted City after receiving elevated results for the weekly composite
  - Weekly Sample: 15,200 ug/l (Composite 3/30/22 - 04/04/22)
  - Corresponding daily composites sent for analysis
  - Daily Range: 1080 - 36,200 ug/l (3/30, 3/31, 4/1, 4/4)
  - Discharge Flow Range: 20,650 – 78,546 gpd
- They had been sampling every week since Nov 2021 (6 months)
  - Had no previous elevated results during prior 6-month period
- Results from other 6 SIUs were typical

Lanxess: Organic Chemical Manufacturer

- Reviewed production for corresponding week
- Narrowed to one potential product
  - Made ~once/year: 1 sister product also reviewed
  - Reactor rinse out had very high concentration
  - Raw materials analyzed were below detection, 1,4-dioxane was likely created during manufacturing process
  - Corporate R&D lab small batch for process testing to confirm generation of 1,4-dioxane during reactions
- Products production schedule review (previous events)
- Corporate Global Production Manager is reviewing products

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Lanxess: Organic Chemical Manufacturer

- Results from Lanxess indicate they were definitively the source of the April 2022 exceedance:
  - Lanxess identified a product that generated 1,4-dioxane as an unintended reaction by-product during the production process
  - SDS review of raw materials in this product did not indicate 1,4-dioxane presence
  - Raw materials used in the product have been sent to laboratory for analysis
  - They typically only produce this product once per year
  - They also identified a sister product is manufactured only 1-2 times per year that may also generate 1,4-dioxane as an unintended byproduct
    - Lab scale small batch testing being conducted on this product as well

- **Manufacture of the suspected products at the Greensboro facility has been halted until further notice**

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Next steps for Greensboro

- Copy of SOC and associated reports, effluent/trunkline data, monitoring plan, and reports from the 3 exceedance events are posted on City website
- Year One SOC Report received by DWR on 6-13-2022 (also on website)
- Year Two started May 1, 2022 – SOC compliance value is 31.5 ug/l
  - Year Three starts May 1, 2023 – SOC compliance value is 23 ug/l
- Year Two of SOC requires calculation of an effluent 1,4-dioxane mass balance using all data (including industrial, domestic, commercial, drinking water, and collection system data)

Recent actions to reduce 1,4-dioxane concentrations in the Basin

Update on recent actions

- 1,4-dioxane permitting strategy
- Emerging compounds website and related information

NPDES Permitting-
1,4 Dioxane Permitting Update June 2022

- Radiator Specialty Co. (NC0088838), effective 7/1/2018
  - 1,4-Dioxane – 80 µg/L Daily Max. limit

- April 2019- DWR sends letters to 25 POTWs with Pretreatment Programs requesting influent sampling once per month (July, Aug, Sept). Results due Oct. 31, 2019.
- August 2019- DWR sends letters to 20 NPDES Permitted Facilities (Industry and Groundwater Remediation sites) requesting effluent monitoring of PFAS and/or 1,4-dioxane. Samples to be collected, once a month, Oct. through Dec. 2019.

- Municipal Systems- 1,4-Dioxane – monthly monitoring
  - Graham WWTP (NC0021211), effective 4/1/2022
  - Tar River Regional WWTP (NC0030317), effective 4/1/2022
  - Ramseur WWTP (NC0026565), effective 5/1/2022
  - Salisbury WWTP (NC0023884), effective 7/1/2022

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NPDES Permitting-
1,4 Dioxane Permitting Update June 2022

Permits public noticed

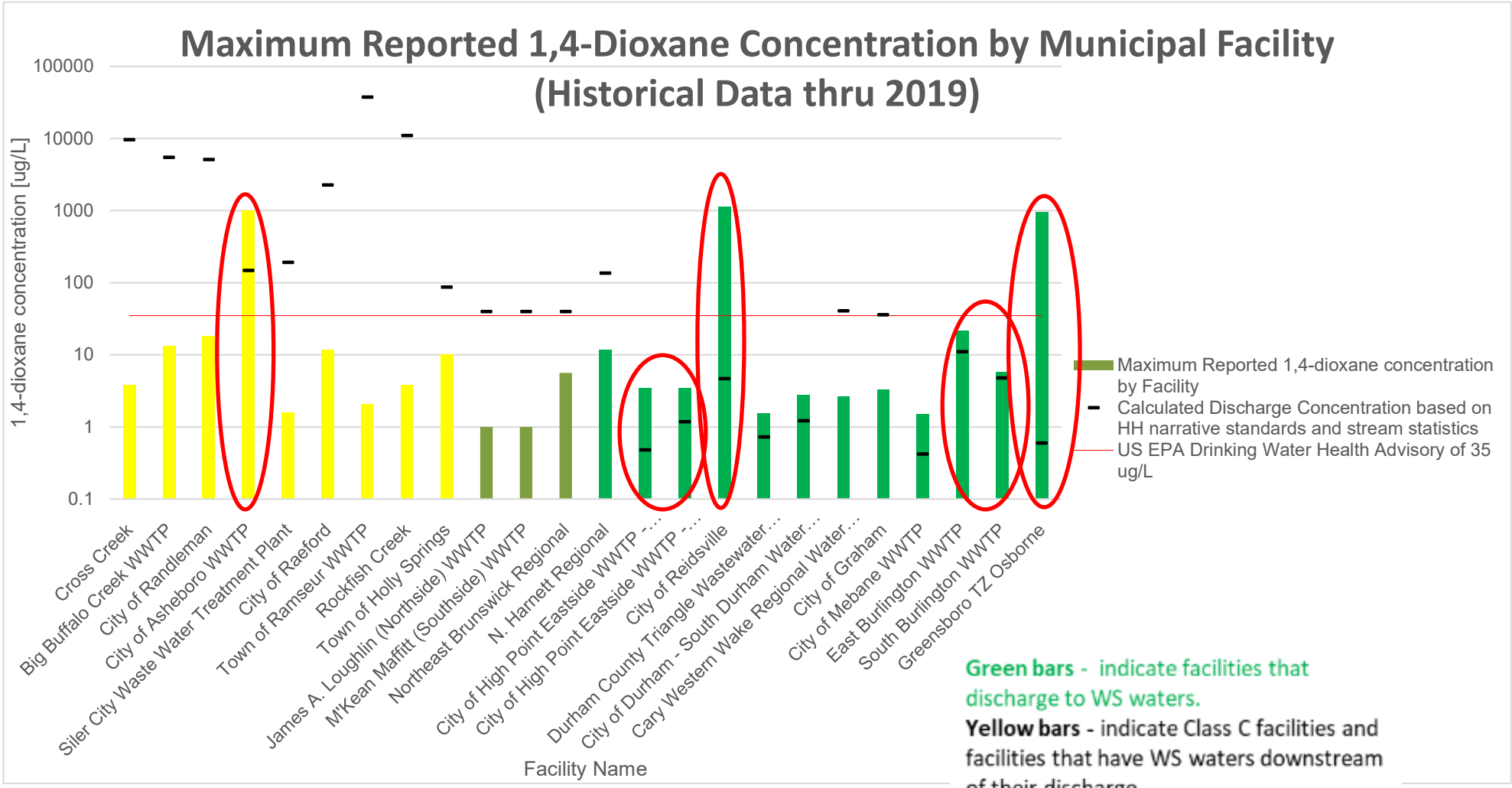
- Siler City WWTP (NC0026441), PN 3/31/2022, comment ended 5/2/2022
  - Proposed 1,4-Dioxane – monthly monitoring
- Triangle WWTP (NC0026051), PN 5/20/20022, comment period ends 6/20/2022
  - Proposed 1,4-Dioxane – monthly monitoring

- Daikin – HeatCraft Ground Water Remediation (NC0083658), PN 5/6/2022, comment period end 6/6/2022
  - Proposed 1,4-Dioxane – quarterly monitoring

Identification of additional point sources in the Basin upstream of drinking water intakes

Additional NPDES point sources

- Addressing the next group of NPDES permits that would be expected to include effluent limitations for 1,4-Dioxane
- Taking NPDES permits in a step-wise approach
- Prioritizing permits based on both sampling results and discharge location
- Reviewing Chemical Addendum information being provided with NPDES permit applications



28 requests, all submitted data

23 POTWs showing data on chart

(High Point Eastside has two outfalls)

1- no discharge (Columbus)

4- POTWs ND (<400-1000)

Green bars - indicate facilities that discharge to WS waters.

Yellow bars - indicate Class C facilities and facilities that have WS waters downstream of their discharge

Blue bars – are dischargers in Class SW waters with no downstream WS intakes

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POTW	NPDES Permit #	Permitted Flow [MGD]	Stream Classification	Permit expires	Drafting Status
Greensboro TZ Osborne	NC0047384	56	WS-V,NSW	6/30/2019	In Process
City of High Point Eastside WWTP - Richland Creek/Deep River (2 outfalls)	NC0024210	26	WS-IV (Lake Randleman)	12/31/2018	Staff drafting
City of High Point Eastside WWTP	NC0024211	32 (proposed expansion)	WS-IV (Lake Randleman)	same	Reviewing modeling
City of Reidsville	NC0024881	7.5 (with proposed reduced flow 5.5 MGD)	WS-IV,NSW	4/30/2016	Staff drafting
City of Asheboro WWTP	NC0026123	9	C with downstream WS-waters	9/30/2016	Staff drafting
Burlington- East Burlington WWTP	NC0023868	12	WS-V,NSW	6/30/2019	Reviewing application
Burlington- South Burlington WWTP	NC0023876	12	WS-V,NSW	6/30/2019	Reviewing application

Additional NPDES point sources

- Draft permits for City of High Point, City of Reidsville, and City of Asheboro will be discussed with each permittee
- Summary of discussion will be included with next semi-annual WQC report
- Process will be similar to Greensboro NPDES permitting

Additional steps needed for compliance with 1,4 Dioxane water quality standard

Additional steps needed & future challenges

- Assessment of treatment technologies for permittees with NPDES permit limits that may require something equivalent to BAT
- Working with SIUs to assess alternatives like product substitution or relocation of specific manufacturing products
- Future challenges in permitting:
  - Potential requests for 1,4-Dioxane variances of permit limitations in specific circumstances

January 2023 – 2nd semi- annual progress report and written progress report to WQC

Questions?

Extra Slides with Greensboro Sampling Data

SOC Sampling Plan Data: WWTP Sampling Sites

Site and Sample Type		Results in ug/l: 5/1/2021 to 4/30/2022			Sampling Plan #
		# Samples	Range	Average	
TZO POTW Influent	C	52	1.6 – 580^	24.0	1
NB Influent	C	23	<1 - <2	All BDL	2
TZO POTW Effluent (eDMR samples)	G	106	1.54 – 823^	32.7	3G
TZO POTW Effluent	C	10	5.1 – 547*	87.6	3C
TZO Aeration Tank (ug/kg)	G	4	3.6 – 5.5	3.81	4
TZO Dewatered Sludge Cake (ug/kg)	C	4	<8.3 - <38.2	All BDL	5
Incinerator Scubber/ Centrate (ug/kg)	G	4	<2.0 - 5.7	3.6	6

NORTH CAROLINA Department of Environmental Quality

**June 30, 2021 event ^November 3, 2021 event + April 5, 2022 event*

SOC Sampling Plan Data: 7 Industrial Trunklines

Site	Number of SIUs	Results in ug/l: 5/1/2021 to 4/30/2022			Sampling Plan #
		# Samples	Range	Average	
Patton Trunk	6	4	2.3 - 8.9	5.07	7
Arlington Trunk	6	4	2.46-6.81	4.69	8
Reedy Fork	4	4	66-125	101	9
Airport Trunk	6	4	1.3 – 2.6	1.9	10
Whitsett Trunk	4	4	1.2 – 2.5	1.9	11
North Buffalo	4	4	<1 – 1.69	1.5	12
Radar Road	2	2	<2 - <50	All BDL	12A

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SOC Sampling Plan Data: 5 Drinking Water Sites

Site	Results in ug/l: 5/1/2021 to 4/30/2022			Sampling Plan #
	# Samples	Range	Average	
GSO Townsend Plant	4	<1 - <2	All BDL	18
GSO Mitchell Plant	4	<1 - <2	All BDL	19
PTRWA Interconnect (Randleman Lake)	12	1.1 – 2.77	1.81	20
Burlington Interconnect	4	<1 - <2	All BDL	21
Reidsville Interconnect	4	<1 - <2	All BDL	22

SOC Sampling Plan: Other Sites

Site	Results in ug/l: 5/1/2021 to 4/30/2022			Sampling Plan #
	# Samples	Range	Average	
City Landfill	7	32 - 71	55.9	23
Domestic Septage (ug/kg)	7	All <2	All BDL	24
Haw River Arm of Jordan Lake	25	<1.0 – 8.76*	1.98	25
Pittsboro Haw River Intake (Composite Sample)	36	<1 – 43.9^	3.8	26
Pittsboro Haw River Intake (Grab Sample)	48	<1 - 93.6*	11.9	

SOC Sampling Plan Data: Year One SIU Sampling

SIU	# Samples - Results in ug/l 5/1/2021 to 4/30/2022		Trunkline	Sampling Plan #
Aramark	3	All <5	Arlington	27
Chemol	4	<50, <100, <100, <100	Arlington	28
Ecolab	7	<50, 93/48, 82.5, 67, <100, 73	Airport	29
Elastic Fabrics	2	19, <20	Patton	30
Evonik 01	2	<2, <2	Arlington	31
Evonik 02	2	126, 27.3	Arlington	32
Express Container	2	5.2, <20	Airport	33
GILBARCO	2	<2, <2	Radar Road	34

SOC Sampling Plan Data: Year One SIU Sampling

SIU	# Samples - Results in ug/l 5/1/2021 to 4/30/2022		Trunkline	Sampling Plan #
GSO Platers 01	2	1.74, <2	North Buffalo	35
GSO Platers 02	2	1.26, <2	Patton	36
HAECO	2	<1, <2	Radar Road	37
IQE	2	<1, <2	Airport	38
ITG (Lorillard)	2	1.42, <2	North Buffalo	39
Lanxess	2	15.4, <2	Patton	40
Machine Specialties	2	<1, <2	Whitsett	41
P&G BS 01	7	(5 <1), <10, <2	Reedy Fork	42

SOC Sampling Plan Data: Year One SIU Sampling

SIU	# Samples - Results in ug/l 5/1/2021 to 4/30/2022		Trunkline	Sampling Plan #
P&G BS 02	7	(5 <1), (1 < 10), 14.4	Reedy Fork	43
P&G Swing	3	5.8, 2.1, <2	Airport	44
Parker Metal	2	<1, <2	Arlington	45
Piedmont Plating	2	<1, <100	Direct to TZO	46
Precision Fabrics	3	52, 37, <50	Patton	47
PRECOR	2	<2, <2	Whitsett	48
QORVO	2	<1, <2	Airport	49
Qualicaps	2	<10, <2	Whitsett	50

SOC Sampling Plan Data: Year One SIU Sampling

SIU	# Samples - Results in ug/l 5/1/2021 to 4/30/2022		Trunkline	Sampling Plan #
Shamrock BS 01	3	956, 286, 5.3 (PT system)	Reedy Fork	51
Shamrock BS 02	4	159, 322, 1040, 92	Reedy Fork	52
Shamrock Patton	2	32, 7	Patton	53
Solenis	2	6.9, <100	Arlington	54
Triad Anodizing 02	2	<2, <2	North Buffalo	55
United Metal	2	3.24, <100	Arlington	56
Vertellus	3	220, 819, 38.5	Patton	57
ZINK	2	<10, <2	Whitsett	58

6 SIUs Source Investigation, Evaluation, and Survey

SIU	# SIU Self-Monitoring Samples Results in ug/l: 5/1/2021 to 4/30/2022		Response Submitted
Chemol	11	789, 30, <100, <10, 154, 1230, 282, 178, 873, 575, 292 (Also Internal process sampling)	Yes**
Evonik 02	Internal raw materials sampling		Yes**
Ecolab (foam issue)	39	108, 77, 64, 748, 161, 102 (17 <100, 2 <200, 12 <1000, 2 <2000)	Yes**
Vertellus	20	29, 582, 1240, 309, 310, 436, 143, 868 (12 <100)	Yes**
Shamrock BS 01	64	Daily Composite Samples Retained Weekly Composite Analyzed - Avg. 377	Yes**
Shamrock BS 02	19	Daily Composite Samples Retained Weekly Composite Analyzed - Avg. 228	Yes**

Pittsboro Drinking Water Plant Sites

Site	Results in ug/l: 5/1/2021 to 4/30/2022			
	# Samples	Range	Average	
Pittsboro Finished Water	60	<1 – 49.8^	5.6	Grab Samples
Pittsboro Horton Tank	33	1.2 – 19.3^	7.2	Grab Samples
Pittsboro Standpipe	33	< 1 – 43.3^	7.7	Grab Samples
Pittsboro Million Gallon Tank	33	1.1 - 33.1^	8.3	Grab Samples

**June 30, 2021 event* ^*November 3, 2021 event* + *April 5, 2022 event*

Trunkline Surveillance Sampling:

Site	# SIUs	Results in ug/l: 5/1/2021 to 4/30/2022			Comment
		# Samples Analyzed	Range	Average	
Summit Ave MH	1	5	All < 1.0	All BDL	P&G BS 01/02
Patton	6	31	<2 – 369^	25.8	
Arlington	6	24	< 2 - 32	8.0	
Airport	4	7	<2 – 4.48	2.95	
Bryan Park MH	1	17	8.74 - 610	337.5	Shamrock BS 01/02

**June 30, 2021 event* *^November 3, 2021 event* *+ April 5, 2022 event*

Composite samplers have remained at Patton, Arlington, Airport and Bryan Park every day since November 3 event.

208 TL surveillance samples collected since November event

5 Patton Trunkline SIUs Self-Monitoring since Nov 3 Event

SIU	Results in ug/l: 5/1/2021 to 4/30/2021		Source Investigation, Evaluation & Survey Required?
	# Samples	Range of Results	
Vertellus (both groups)	20	29, 582, 1240, 309, 310, 436, 143, 868 (12 <100)	Yes - Submitted
Elastic Fabrics	13	135, 10, 18, 26, 16, 31, 23, 73, 19 (4 <10)	Yes – Submitted
Lanxess	32	21 Detections: 6.9 – 36,200+ (11 < 10)	Yes – Submitted
Precision Fabrics	25	128, 55, 56, 53, 97, 94, 127, 54, 94 (15 <100, 1 <200)	Yes - Submitted
Shamrock Patton	23	14 Detections 2.7 – 48.1 All others BDL	No – All results < 100 ug/l

**June 30, 2021 event* *^November 3, 2021 event* *+ April 5, 2022 event*

NORTH CAROLINA Department of Environmental Quality

Semi-Annual Progress Report on 1,4 dioxane in the Cape Fear River Basin

EMC Water Quality Committee Meeting, January 11, 2023

Jenny Graznak, Assistant Regional Supervisor, Winston Salem Regional Office

Michael Montebello, Chief, NPDES Program Branch, Division of Water Resources

Semi-Annual 1,4 Dioxane Progress Report

- Ongoing and planned surface water and discharge sampling efforts, including results (Jenny Graznak)

- Identification of point sources dischargers of 1,4-dioxane in the Cape Fear River Basin upstream of any drinking water intake (Michael Montebello)

- Update on the actions DEQ is taking to reduce 1,4-dioxane concentrations in the Basin, including incorporation of limits into NPDES permits, an explanation of DEQ's reasoning, and an expected time for completion (Michael Montebello)

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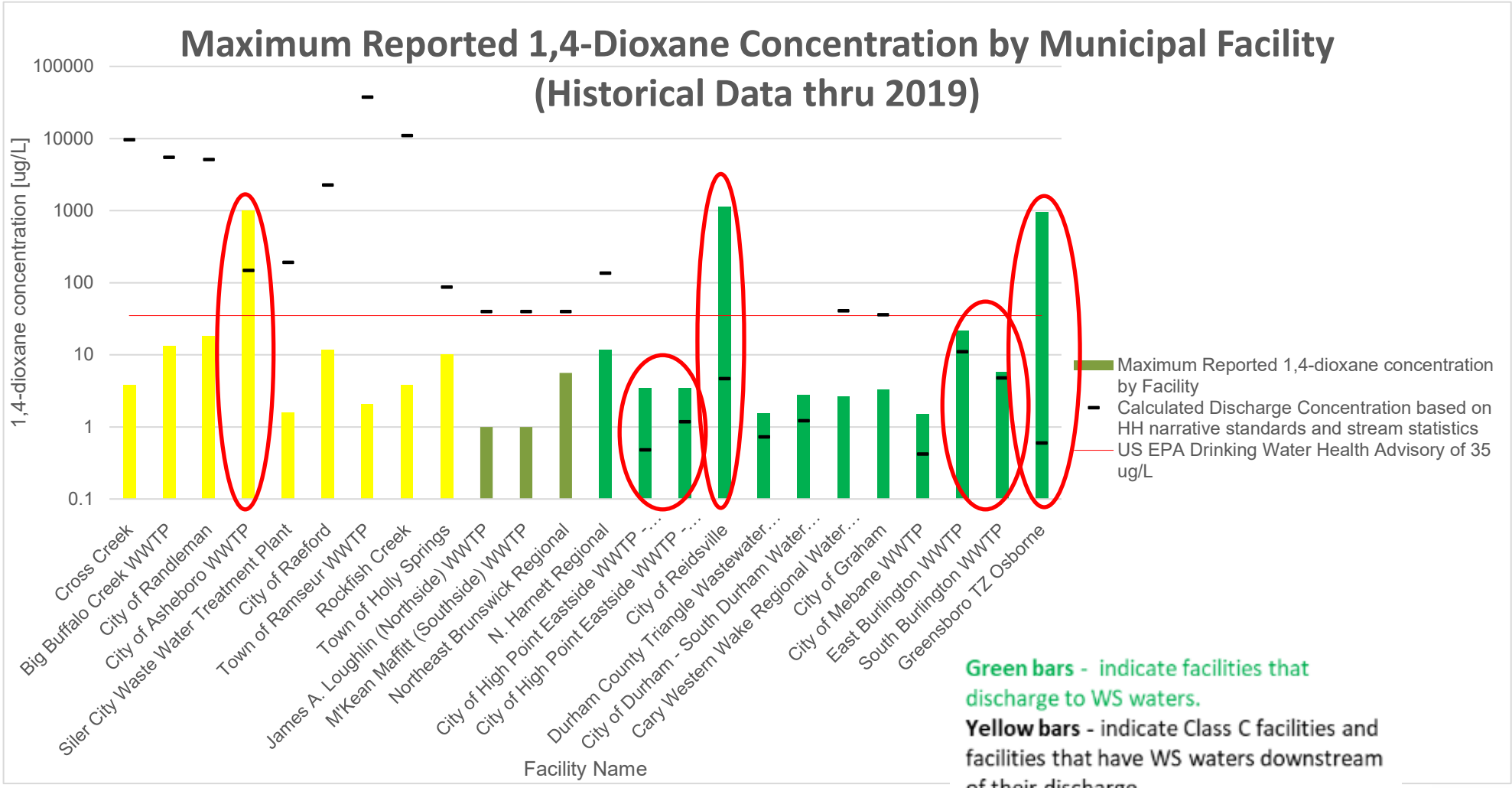
DWR 1,4-dioxane DWR Sampling
and
POTW Discharge Sampling Efforts

Maximum Reported 1,4-Dioxane Concentration by Municipal Facility (Historical Data thru 2019)



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(High Point Eastside has two outfalls)

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DWR 1,4-dioxane Surface Water Sampling

- **2023 surface water monitoring plan for 1,4-dioxane:** Monthly monitoring will continue in the Cape Fear, Neuse, and Yadkin River basins. 2022 data will be added to the online dashboard for viewing and downloading. The 30 RAMS stations monitored in 2021-2022 will be deactivated and 30 new randomly-selected stations will be activated statewide.

Cape Fear River Basin 1,4-Dioxane (µg/L) results, November 2017 – December 2021.

Year	# Stations	# Results	# Nondetects	% Detects	Minimum	Median	Maximum
2017	9	9	0	100	<1	5.7	1000
2018	52	251	111	56	<1	1.4	210
2019	22	183	82	55	<1	1.1	170
2020	26	188	132	30	<1	<1	900
2021	28	262	181	31	<1	<1	150

[1]DWR laboratory practical quantitation limit (PQL) for 1,4-dioxane is 1 µg/L.

DWR 1,4-dioxane Discharge Sampling

- WSRO collects/collected weekly grab & composite samples at:
  - Greensboro TZ Osborne WWTP
    - October 2019 through April 2021 (when original SOC became effective)
  - Reidsville WWTP
    - October 2019 through Present
  - Burlington East WWTP
    - November 2019 through April 2020 (when City entered agreement with Haw River Assembly that included routine sampling)
  - Asheboro WWTP
    - July 2021 through Present
  - High Point Eastside WWTP
    - June 2022 through Present

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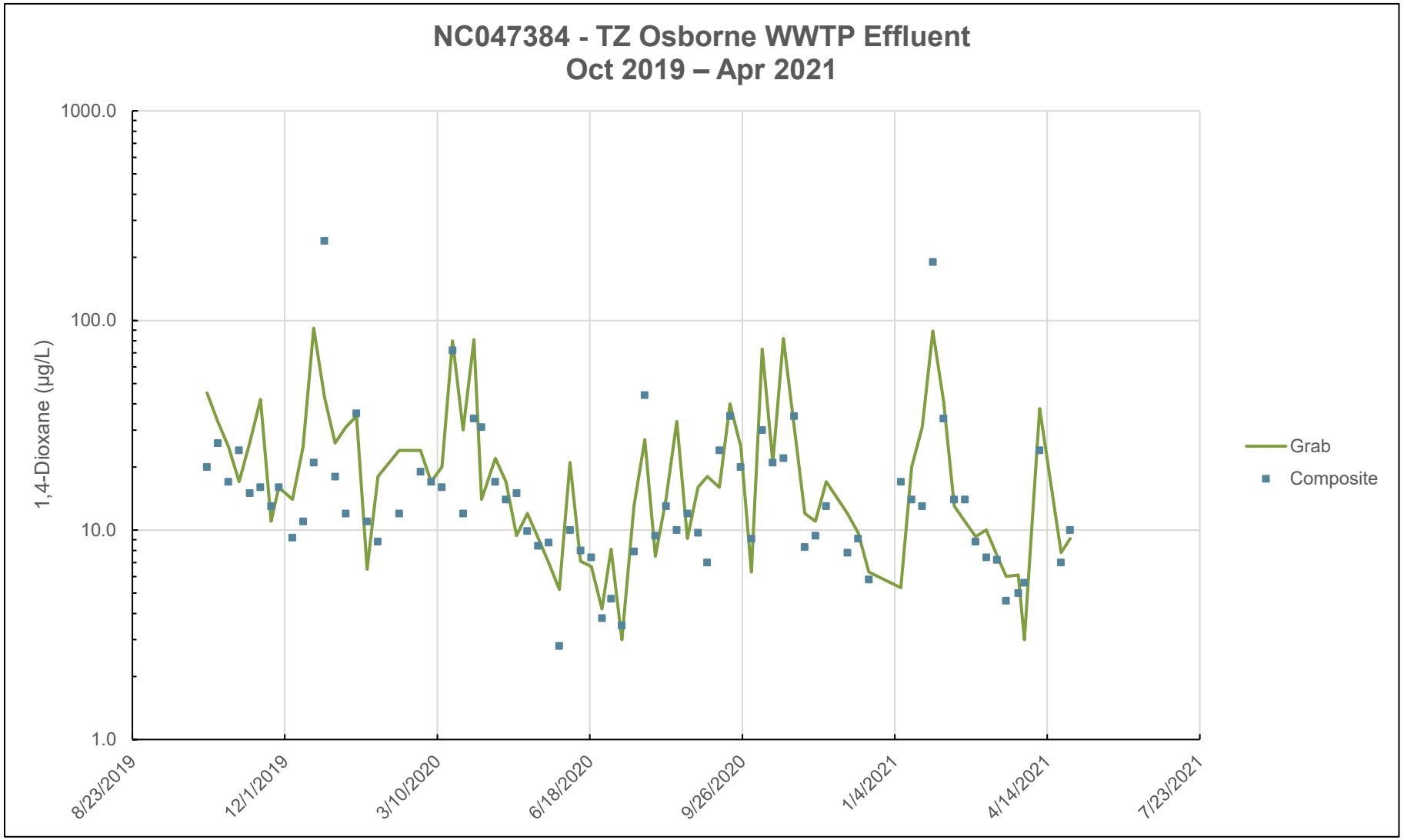
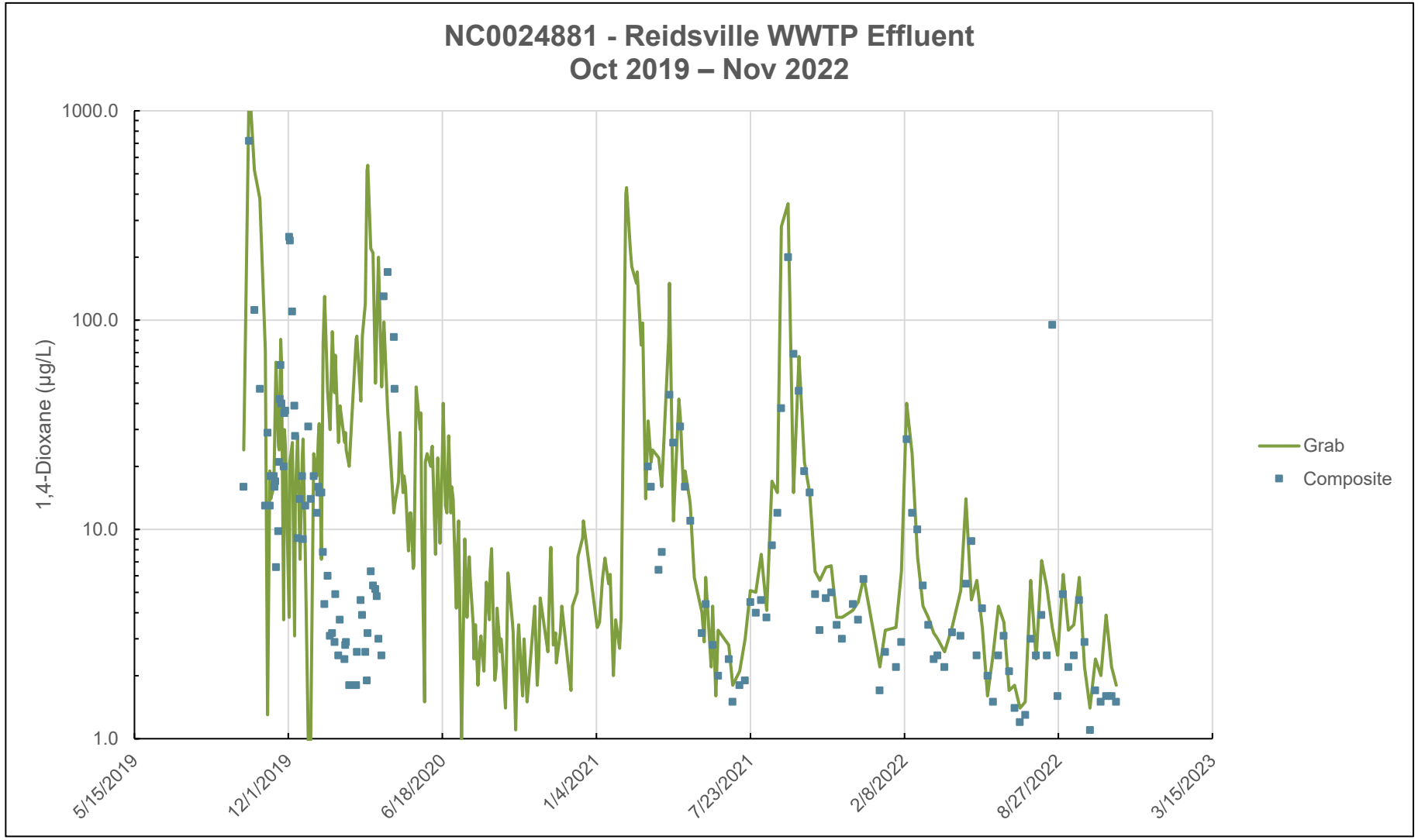
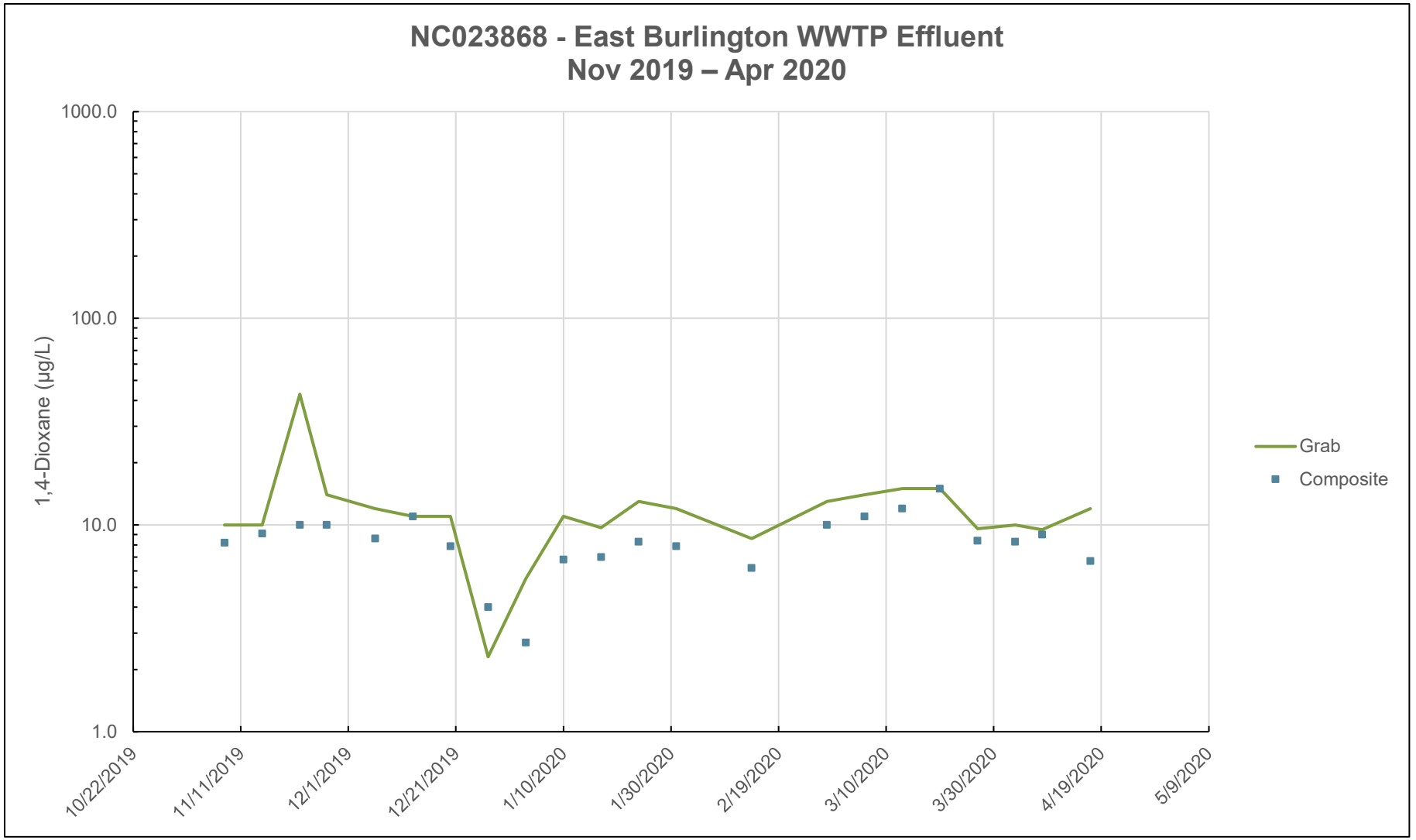
DWR 1,4-dioxane Sampling Data – Greensboro



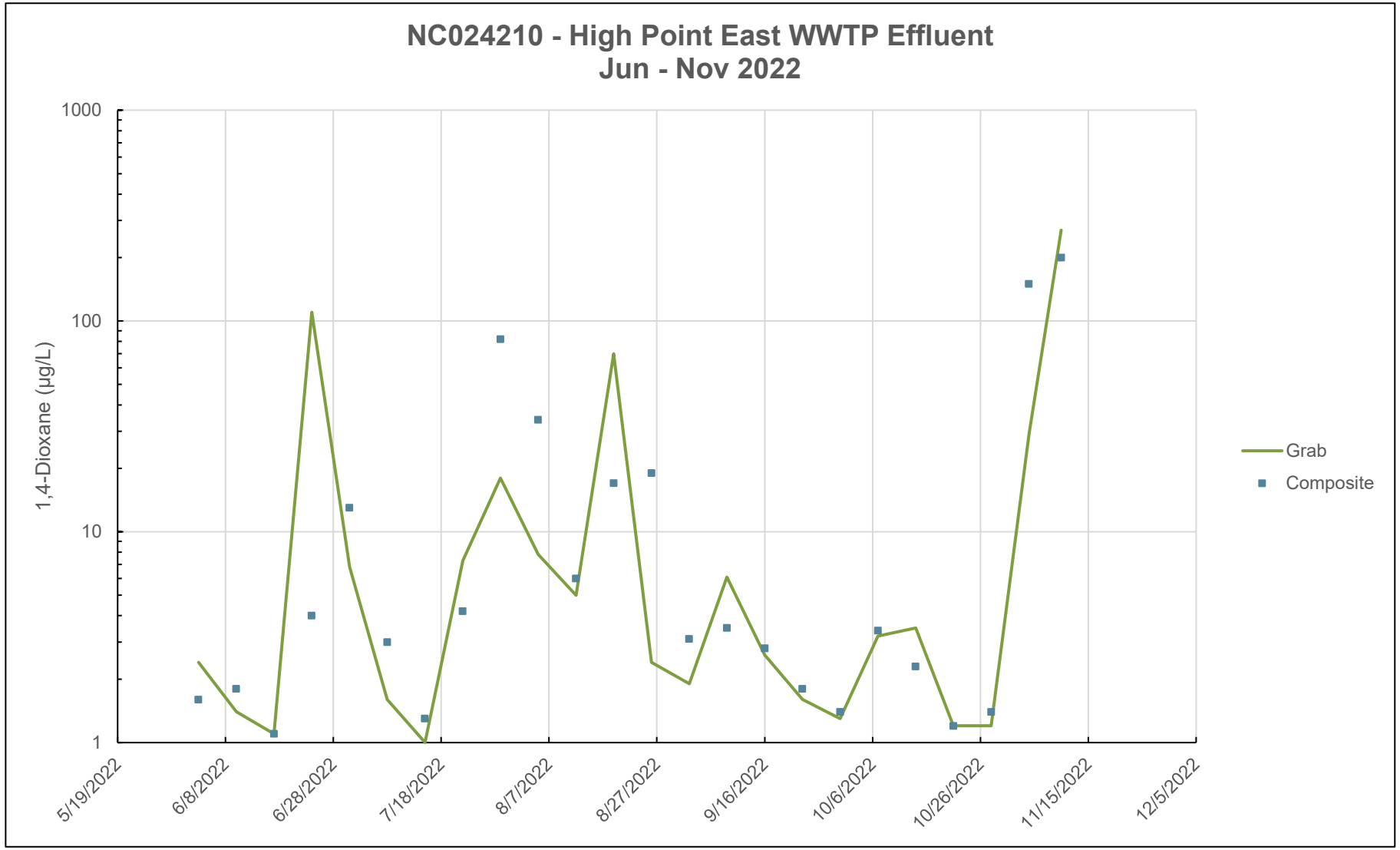
DWR 1,4-dioxane Sampling Data – Reidsville



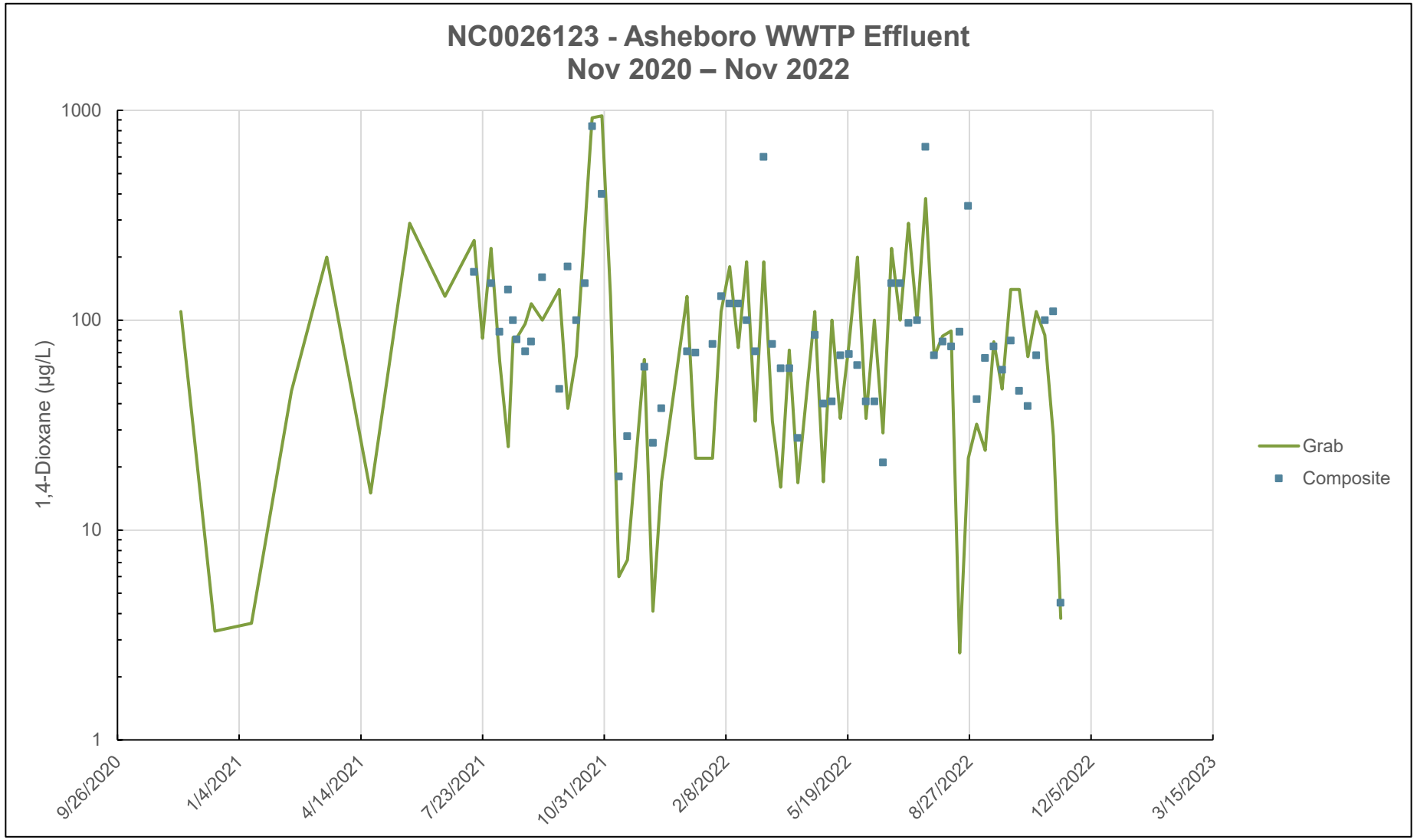
DWR 1,4-dioxane Sampling Data – Burlington



DWR 1,4-dioxane Sampling Data – High Point



DWR 1,4-dioxane Sampling Data – Asheboro



Brief Update on Greensboro Special Order by Consent:

Current status and recent actions

Greensboro SOC for 1,4-dioxane

- Original SOC approved by EMC in March 2021, with an effective date of May 1, 2021
  - Two Year SOC with Compliance Values: Year One: 45 ug/l, Year Two: 33 ug/l
- Fayetteville Public Works Commission and Haw River Assembly filed legal petition against SOC in April 2021
- Due to settlement negotiations, an amended SOC was approved by EMC in November 2021, with an effective date of December 1, 2021
  - Three Year SOC with lower Compliance Values:
    - Year One: 35 ug/l, Year Two: 31.5 ug/l, Year Three: 23 ug/l
- Part of that settlement included the requirement for these semi-annual progress reports to the WQC on DEQ 1,4-dioxane actions

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Greensboro's Ongoing Monitoring for 1,4-dioxane

- City's amended SOC monitoring plan has 58 sampling sites (includes addition of all Significant Industrial User (SIU) discharges as well as Pittsboro raw water intake)
- "Rush" laboratory analysis on weekly effluent 1,4-dioxane samples to allow notification to downstream users if necessary
- Composite samplers remain 24/7 at 4 trunklines within City's collection system
  - Samples collected/samplers maintained twice per week

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Additional Monitoring: Direct Sampling of SIUs

- As part of SOC Settlement Agreement, City conducts 1,4-dioxane composite sampling and analyses for each of 32 SIU discharges once in two consecutive quarters in all 3 years of SOC
  - All SIUs on Patton trunkline with concentrations >15 ug/l are required to collect and retain daily and weekly composite samples
- In Year One, any SIU with 1,4-dioxane discharge concentration of >100 ug/l was required to investigate and report back to City
  - City Identified 9 SIUs with discharge >100 ug/l
  - SIUs >31.5 ug/l in Year Two
  - SIUs >23 ug/l in Year Three

NORTH CAROLINA
Department of Environmental Quality

Hallstar (formerly Lanxess): Organic Chemical Manufacturer

- Results from this SIU indicate they were definitively the source of the 1,4 dioxane April 2022 exceedance:
  - They identified a product that generated 1,4-dioxane as an unintended reaction by-product during the production process
  - SDS review of raw materials in this product did not indicate 1,4-dioxane presence
  - They typically only produced this product once per year
  - They also identified a sister product is manufactured only 1-2 times per year that may also generate 1,4-dioxane as an unintended byproduct

- **Manufacture of the suspected products at the Greensboro facility was halted until further notice, however...**

NORTH CAROLINA
Department of Environmental Quality

City investigation of slightly elevated effluent 1,4 dioxane grab result – October 2022

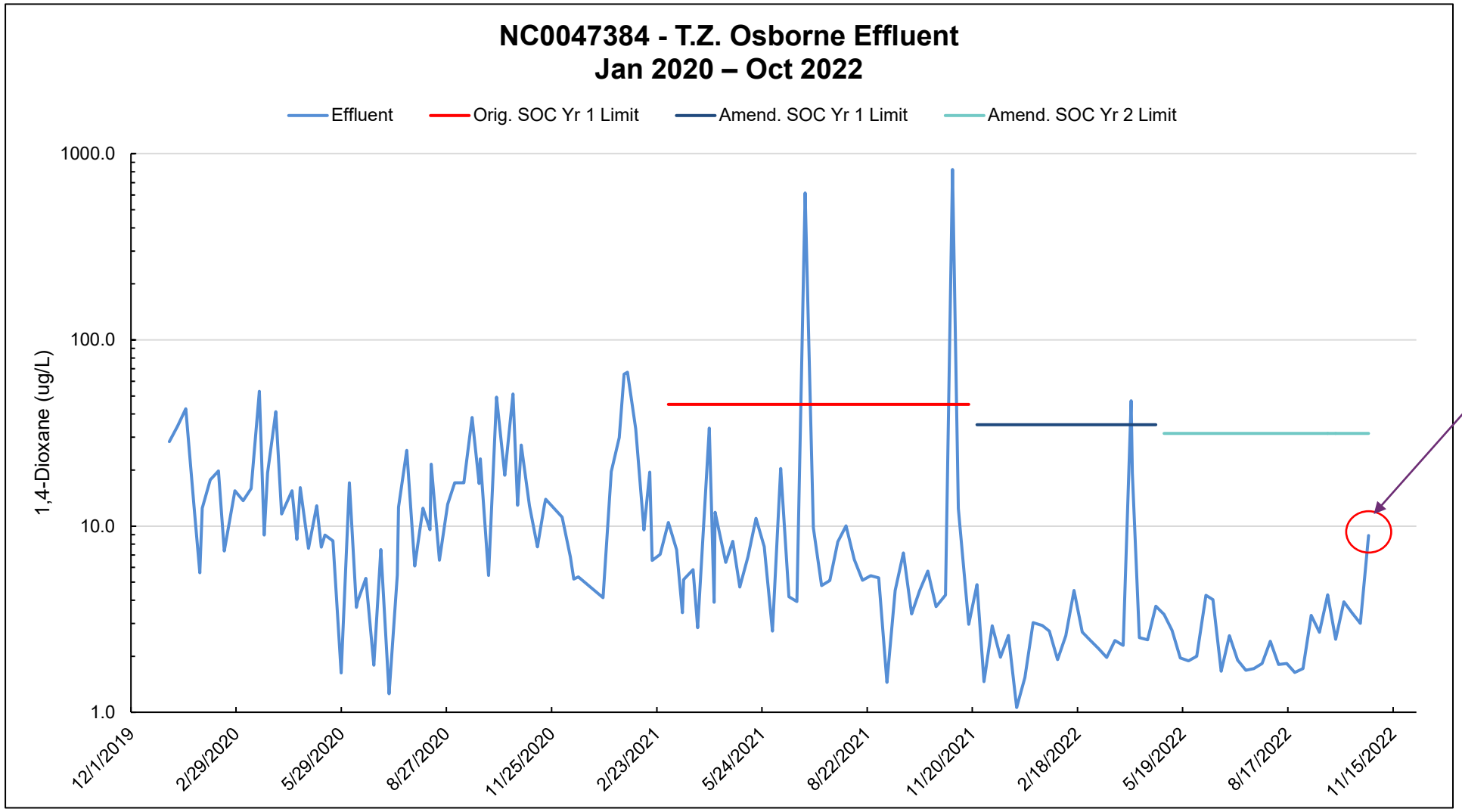
- City received 1,4-dioxane result of **8.4 ug/L** for effluent grab sample collected on 10/25/22
  - Not an exceedance of Year Two SOC compliance value of 31.5 ug/L, but slightly higher than normal
- Patton Surveillance sample result from 10/21-24 was 27.3 ug/L
  - That is more elevated concentration than usually seen there
- City required the previously identified Patton trunkline SIUs to submit weekly composite samples for the week of 10/16-22 for analysis
  - Hallstar (new owner of former Lanxess) reported significantly higher than normal daily & weekly composite results during same time period
- Lanxess was sold to new company Hallstar in October 2022
- Hallstar attempted to manufacture one of the halted products and capture all resulting wastewater, but some was ultimately released to collection system

NORTH CAROLINA
Department of Environmental Quality

City's Investigation of slightly elevated effluent 1,4 dioxane grab result – October 2022

- City has a Local Pollutant Allocation for Hallstar
  - According to daily composite sample, they exceeded that on 10/20/22
  - City is currently pursuing enforcement action based on this exceedance
  - DWR will provide an update to WQC on these actions in next report
- City's voluntary investigation of the slightly elevated effluent sample resulted in discovery
  - Combined effluent data, collection system surveillance sampling, and SIU sampling to determine from where the elevated concentration originated
- Based on this information, the SOC process and other voluntary efforts by the City are working

eDMR Effluent 1,4-Dioxane concentrations with SOC compliance value (Jan 2020 – October 2022)



Year 2 SOC 31.5 ug/l
Began May 1, 2022

October 25, 2022
Elevated Value

Identification of Point Source Dischargers of 1,4-dioxane in the Cape Fear River Basin

NPDES Permitting-
1,4 Dioxane Permitting Update January 2023

NPDES Permits issued with 1,4-Dioxane requirements/conditions

- Nokia of America Corp. (NC0080853), issued 1/2/2018, effective 2/1/2018
  - 1,4-Dioxane – quarterly monitoring
  - Permit expires 6/30/2023, renewal application not yet received

- Stepan Company (Invista S-A-R-L LLC) (NC0001112), issued 2/23/2018, effective 4/1/2018
  - 1,4-Dioxane – quarterly monitoring
  - Permit expires 3/31/2023, renewal application received 9/27/2022

- Radiator Specialty Co. (NC0088838), issued 5/23/2018, effective 7/1/2018
  - 1,4-Dioxane – 80 ug/L limit with monthly monitoring
  - Facility reported no flow since August 2020
  - Permit expires 3/31/2023, renewal application received 10/4/2022

- DAK Americas LLC – Cedar Creek Site (NC0003719), issued 6/18/2018, effective 8/1/2018
  - 1,4-Dioxane – monthly monitoring
  - Permit expired 10/31/2022, renewal application received 5/5/2022

- Tar River Regional WWTP (NC0030317), issued 2/21/2022, effective 4/1/2022
  - 1,4-Dioxane – monthly monitoring

- Graham WWTP (NC0021211), issued 3/1/2022, effective 4/1/2022
  - 1,4-Dioxane – monthly monitoring

NPDES Permitting-
1,4 Dioxane Permitting Update January 2023

NPDES Permits issued with 1,4-Dioxane requirements/conditions

- Moncure Holdings West LLC WWTP (NC001899), issued 3/18/2022, effective 5/1/2022
  - 1,4-Dioxane – included in Closure Requirements parameter list
- Ramseur WWTP (NC0026565), issued 4/6/2022, effective 5/1/2022
  - 1,4-Dioxane – quarterly monitoring
- Triangle WWTP (NC0026051), issued 8/1/2022, effective 9/1/2022
  - 1,4-Dioxane – monthly monitoring
- Siler City WWTP (NC002664), issued 9/28/2022, effective 11/1/2022
  - 1,4-Dioxane – monthly monitoring
- Fayetteville – Rockfish Cr WRF (NC0050105), issued 9/29/2022, effective 11/1/2022
  - 1,4-Dioxane – monthly monitoring
- South Durham WRF (NC0047597), issued 12/12/2022, effective 1/1/2023
  - 1,4-Dioxane – monthly monitoring

NORTH CAROLINA
Department of Environmental Quality

NPDES Permitting-
1,4 Dioxane Permitting Update January 2023

Permits public noticed with 1,4-Dioxane requirements or conditions

- Brenntag Mid-South, Inc – Greensboro GW Remediation Site (NC0078000), PN 7/27/2021
  - 1,4-Dioxane – monthly monitoring
- Daikin Applied Americas Inc. – *HeatCraft* Site (NC0083658), PN 5/3/2022
  - 1,4-Dioxane – quarterly monitoring
- Sanford – Big Buffalo WWTP (NC0024147), PN 9/22/2022
  - 1,4-Dioxane – monthly monitoring
  - Public Hearing requested & being scheduled for early 2023
- Dutchman WWTP (NC0024191, PN 10/18/2022
  - 1,4-Dioxane – quarterly monitoring
- Asheboro WWTP (NC0026123) – Public noticed on 12/6/2022, comments requested by 1/13/2023
  - 1,4-Dioxane – Phased limits with weekly monitoring
    - Phase I interim = 55.7 µg/L monthly avg, 127.6 µg/L daily max
    - Phase II interim = 35.0 µg/L monthly avg, 80.2 µg/L daily max
    - Final = 21.6 µg/L monthly avg, 49.4 µg/L daily max
    - Instream monitoring 2/month

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NPDES Permitting-
1,4 Dioxane Permitting Update January 2023

Permits being prepared by staff with proposed 1,4-Dioxane requirements or monitoring conditions

- Reidsville WWTP (NC0024881)
  - 1,4-Dioxane – proposed final limits with a phased schedule
- High Point – Eastside WWTP (NC0024210)
  - 1,4-Dioxane – proposed final limits with a phased schedule
    - Outfall 001 – Richland Creek (emergency use)
    - Outfall 002 – Deep River (Randleman Lake)
- Greensboro – TZ Osborne WWTP (NC0047384)
  - 1,4-Dioxane – proposed final limits with a phased schedule (post SOC)
    - Final = 0.54 µg/L monthly avg, 1.53 µg/L daily max
- East Burlington WWTP (NC0023868)
  - 1,4-Dioxane – proposed final limits with a phased schedule
- Albemarle – Long Creek WWTP (NC0024244)
  - 1,4-Dioxane – monthly monitoring
- Mebane WWTP (NC0024174)
  - 1,4-Dioxane – quarterly monitoring

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Update on DEQ actions to reduce 1,4-dioxane concentrations in the Cape Fear River Basin

NPDES Permitting-
1,4 Dioxane Permitting Update January 2023

Permits public noticed with final limits

- City of Asheboro, comment period ends 1/13/2023
  - Proposed 1,4-Dioxane effluent limit – weekly monitoring
    - Phased compliance schedule for 5 years
    - Phase I interim = 55.7 µg/L monthly avg, 127.6 µg/L daily max
    - Phase II interim = 35.0 µg/L monthly avg, 80.2 µg/L daily max
    - Final = 21.6 µg/L monthly avg, 49.4 µg/L daily max
    - Instream monitoring 2/month

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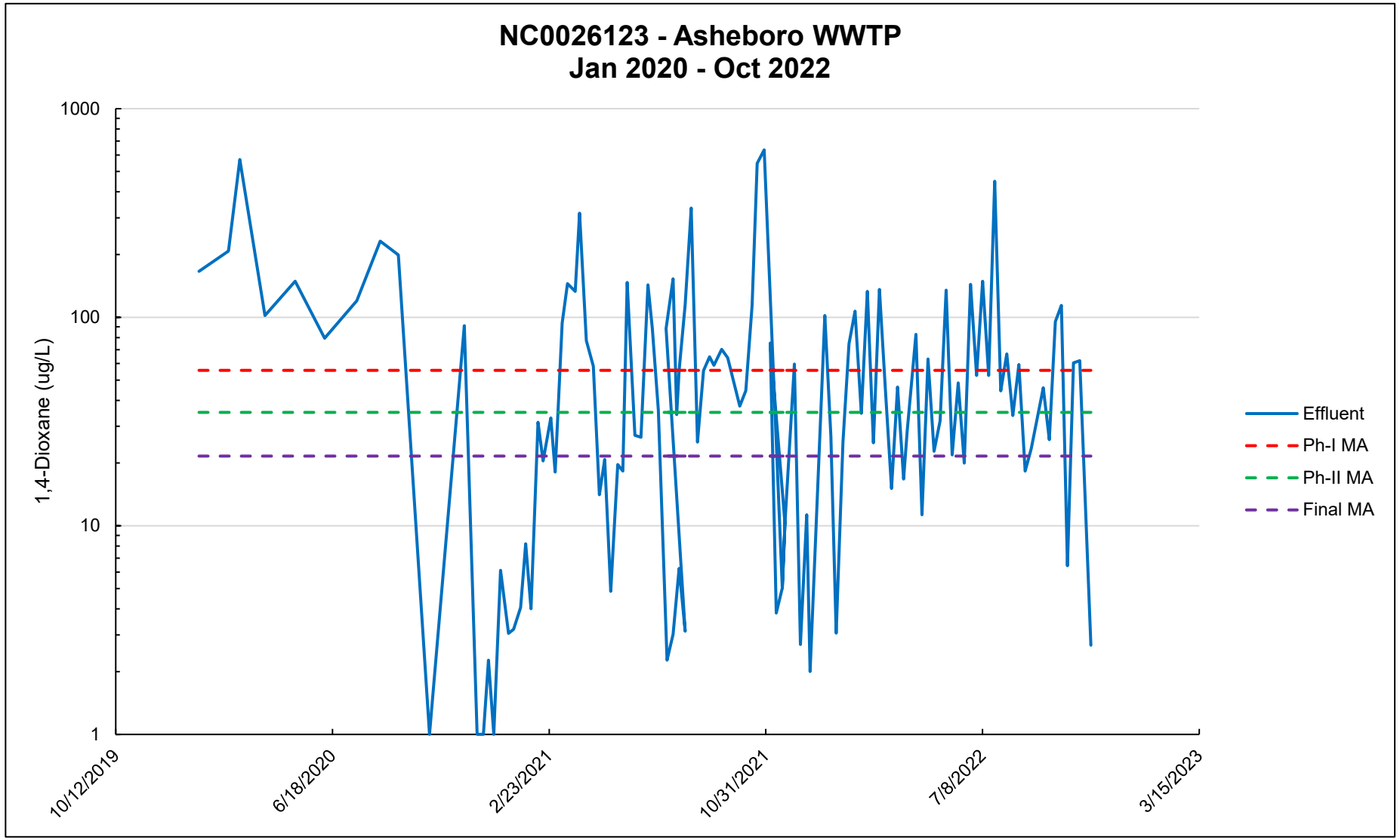
Asheboro WWTP 1,4-dioxane eDMR Effluent Sampling Data



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Update on recent actions – January 2023

- 1,4-dioxane permitting strategy-updated
- Emerging compounds website and related information

Additional NPDES point sources

- Addressing the next group of NPDES permits that would be expected to include effluent limitations for 1,4-Dioxane
- Taking NPDES permits in a step-wise approach
- Prioritizing permits based on both sampling results and discharge location
- Reviewing Chemical Addendum information being provided with NPDES permit applications

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A Brief Explanation of DEQ's Actions, Reasoning, and the Expected Time for Completion

POTW	NPDES Permit #	Permitted Flow [MGD]	Stream Classification	Permit expires	Drafting Status
Greensboro TZ Osborne	NC0047384	56	WS-V,NSW	6/30/2019	Draft shared with permittee
City of High Point Eastside WWTP - Richland Creek/Deep River (2 outfalls)	NC0024210	26	WS-IV (Lake Randleman)	12/31/2018	Staff drafting
City of High Point Eastside WWTP	NC0024211	32 (proposed expansion)	WS-IV (Lake Randleman)	same	Reviewing modeling
City of Reidsville	NC0024881	7.5 (with proposed reduced flow 5.5 MGD)	WS-IV,NSW	4/30/2016	Staff drafting
Burlington-South Burlington WWTP	NC0023878	12	WS-V, NSW	6/30/2019	Staff drafting
Burlington- East Burlington WWTP	NC0023868	12	WS-V,NSW	6/30/2019	Staff drafting

Estimated Time for Actions in 2023

- Draft permits for Cities of Burlington, High Point (including their proposed expansion) and Reidsville will be discussed with each permittee
- Summary of discussion will be included with next semi-annual WQC report in 2023
- Process will be similar to Greensboro and Asheboro NPDES permitting

Additional steps needed & future challenges

- Assessment of treatment technologies for permittees with NPDES permit limits that may require something equivalent to BAT
- Working with SIUs to assess alternatives like product substitution or relocation of specific manufacturing products
- Future challenges in permitting:
  - Emerging compounds that must be addressed: PFAS, new EPA guidance December 5, 2022

July 2023 – 3rd semi-annual progress report to WQC

Questions?

Extra Slides with POTW eDMR Effluent Sampling Data

POTW 1,4-dioxane eDMR Effluent Discharge Sampling

- Reidsville WWTP (proposed 5.5 & existing 7.5 MGD)
- Asheboro WWTP (9 MGD- on public notice thru 1/13/2023)
- High Point Eastside WWTP (existing 26 MGD and proposed expansion to 32 MGD)
- Greensboro TZ Osborne WWTF (56 MGD with existing SOC)

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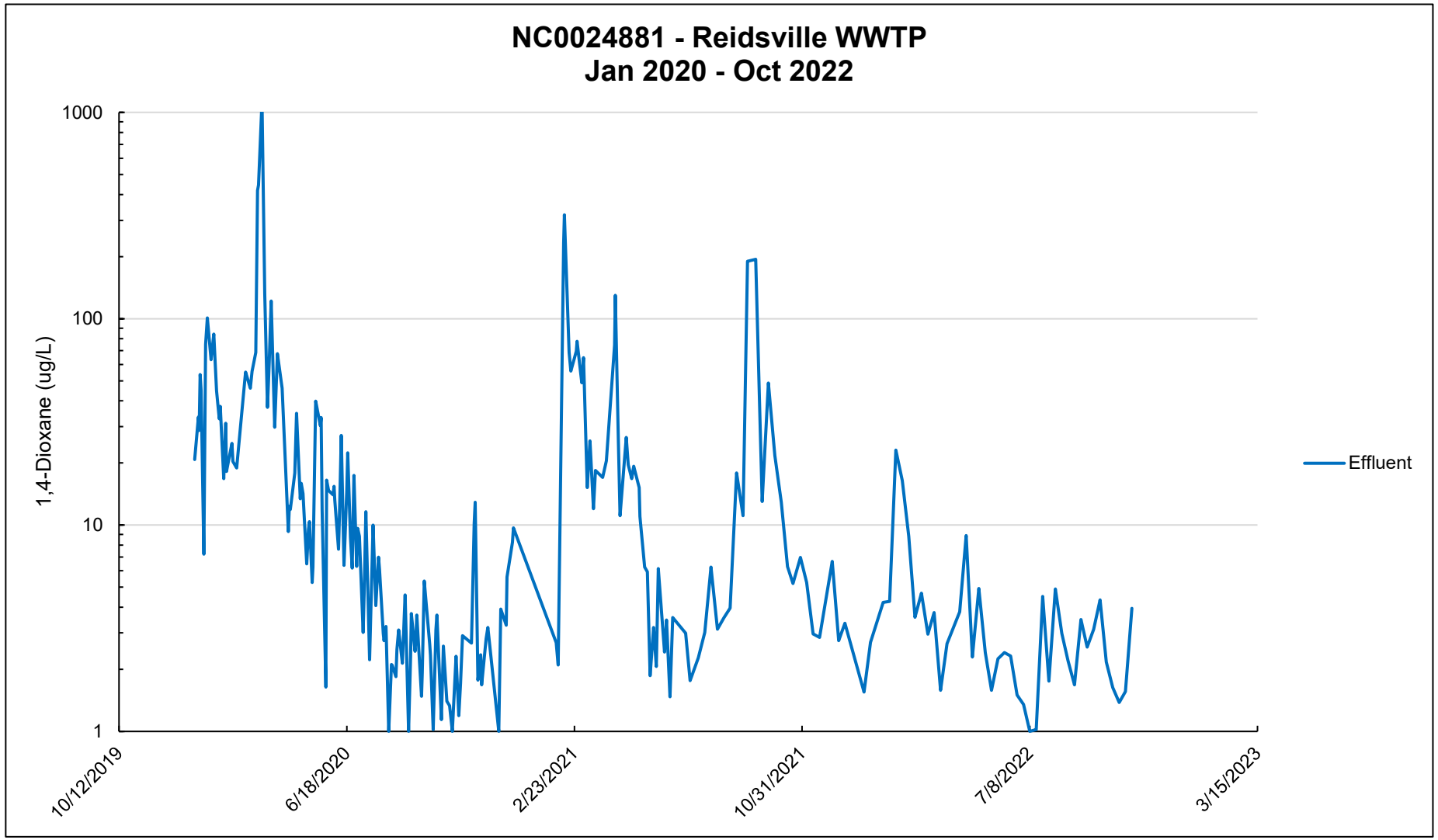
Reidsville 1,4-dioxane eDMR Effluent Sampling Data



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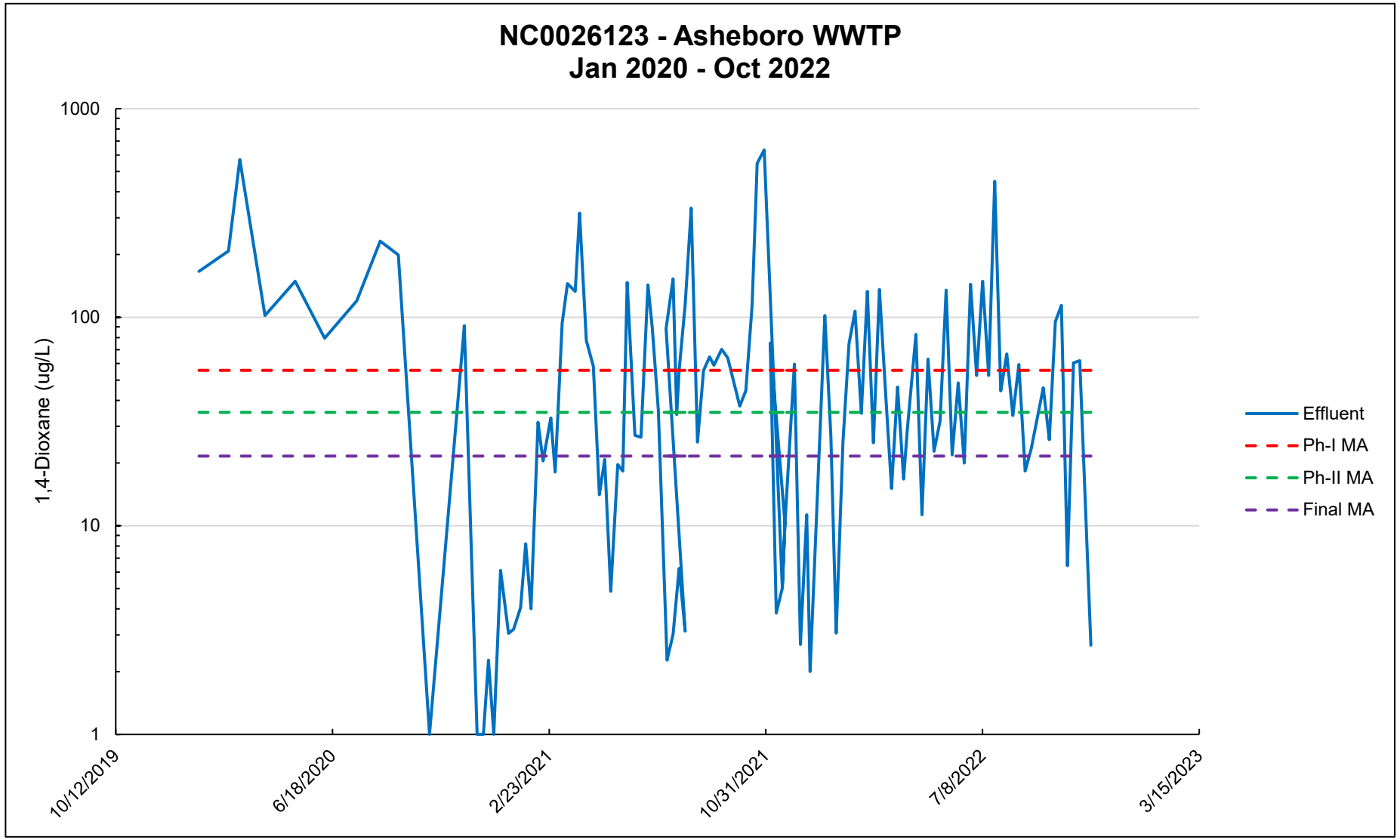
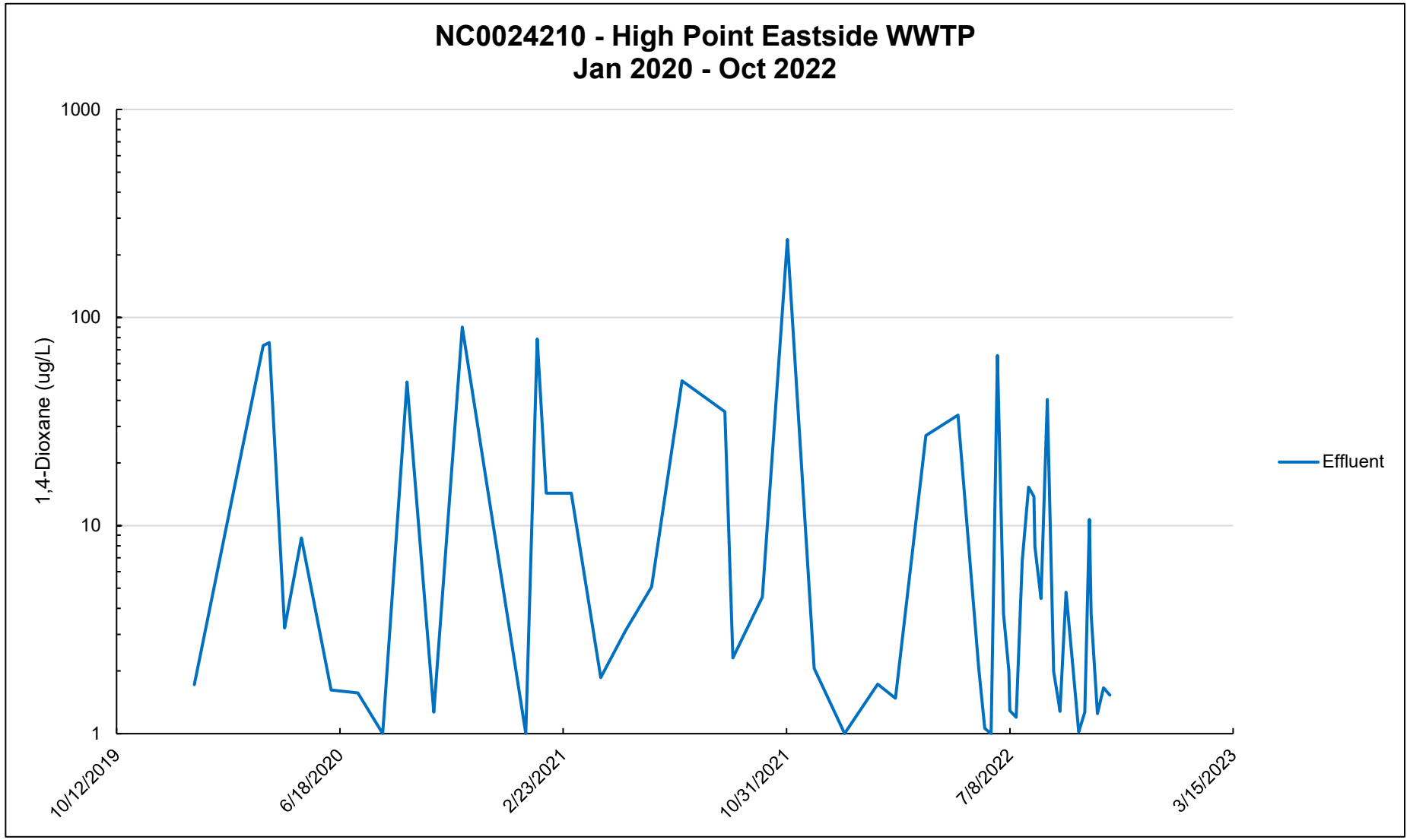
Asheboro 1,4-dioxane eDMR Effluent Sampling Data



High Point 1,4-dioxane eDMR Effluent Sampling Data



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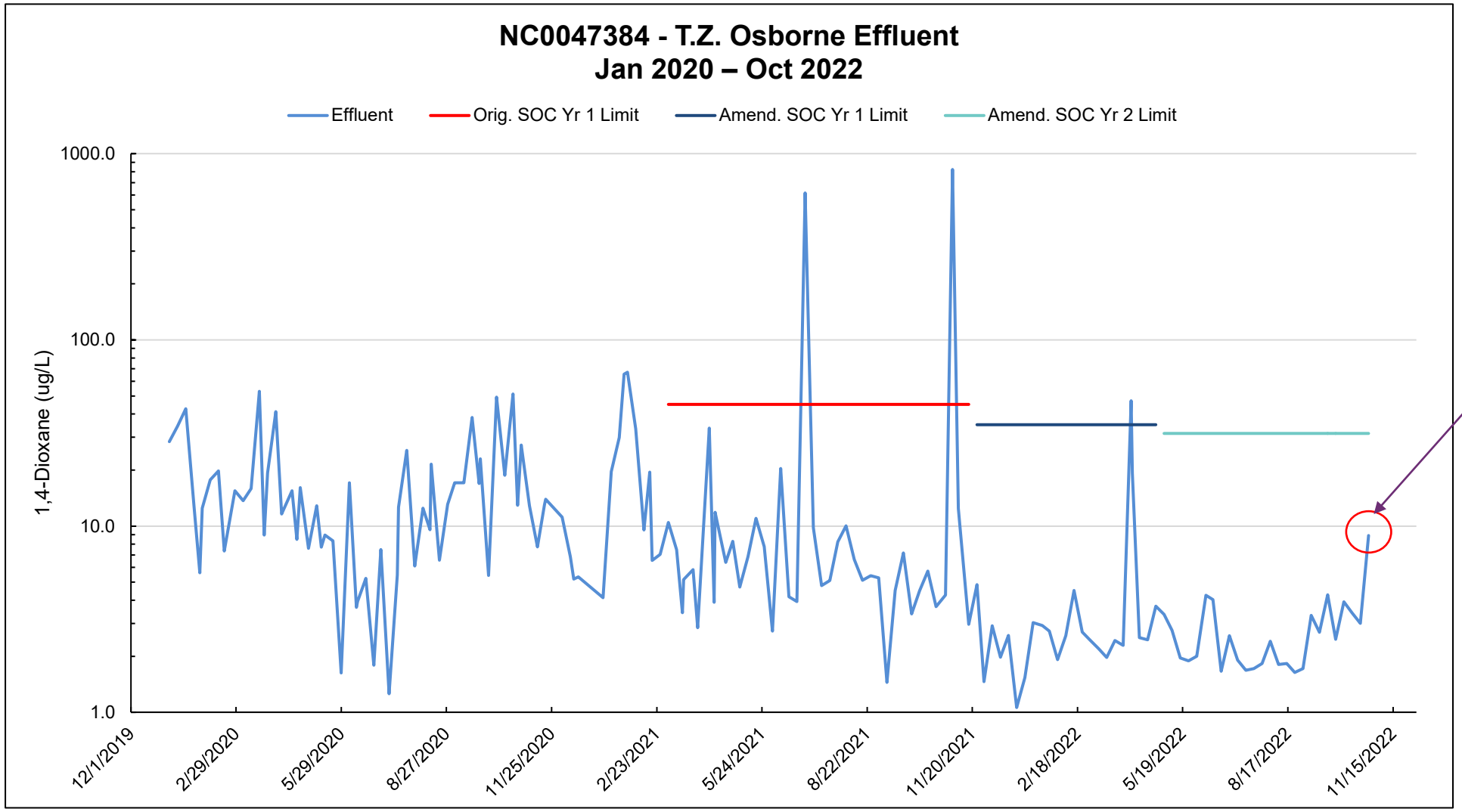
Greensboro 1,4-Dioxane eDMR Effluent concentrations with SOC compliance value (Jan 2020 – October 2022)



Year 2 SOC 31.5 ug/l
Began May 1, 2022

October 25, 2022
Elevated Value